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Review of Environmental Factors  
Volume 1



Proposed Removal of Bulk Sample  
BICKHAM COAL COMPANY Pty Ltd  
"Bickham", Murrurundi

Prepared By:

FINAL DRAFT



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# REVIEW OF ENVIRONMENTAL FACTORS

PROPOSED REMOVAL OF

BULK SAMPLE

FOR

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**PREPARED BY**

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# SECTION 1

## INTRODUCTION

### 1.1 Background

Coal mining commenced on this site in the early 1900's and was relatively short lived. Later, the site was used by Commercial Minerals for the mining of naturally occurring chamotte, which ceased in the early 1990's. There remains a Private Mining Agreement with responsibilities to rehabilitate disturbed areas associated with Commercial Minerals' previous operation.

Bickham Coal Company Pty Ltd purchased the "South Bickham" and "Glencoe" properties in early 2002. Bickham Coal holds adjoining Exploration Licences 5306 and 5888 and has carried out exploration drilling on this site since 1999. As a result of this drilling, a resource of some 25 million tonnes of coal has been identified for recovery by open cut mining methods.

The quality of the coal is variable throughout the seven seams of the sequence, with some seams having a very high iron value found in the ash, which may present problems with boiler fouling for customers. Bickham Coal needs to establish whether the iron can be removed by processing and to achieve this, a bulk sample of some 25,000 tonnes needs to be obtained for trial processing.

The bulk sample will be shipped to Bickham's potential customers in Japan for trial combustion burning through their boilers. The findings of the bulk sample will determine whether the mine proceeds and at what quantity, together with whether or not the coal will require beneficiation by washing.

### 1.2 The Proponent

The applicant and owner of this site is Bickham Coal Company Pty Ltd.

**A.B.N. 94 087 270 899**

The registered office of Bickham Coal is:

Four Mile Creek Road

**EAST MAITLAND** NSW 2323

The company was previously called Four Mile Developments Pty Ltd and is jointly owned by the Cant and Foster families.

The shareholders are local Hunter Valley people who have a long association with the coal industry.

### **1.3 The Location**

The proposed bulk sample extraction area lies on the eastern side of the New England Highway between Blandford and Wingen, approximately 50km north of Muswellbrook and 13km south of the township of Murrurundi. **Refer Figure 1 – Location Map**

The bulk sample area sits within the overall defined potential open cut reserve on its northern end. The extent of the lease, together with the property boundary, open cut area and bulk sample area is shown in **Figure 2 – Site Layout**.

### **1.4 Site Development History**

This site has a long association with mining. In the late 1800's coal was discovered when wells were being dug on the site.

Coal mining commenced by underground methods in the early 1900's and closed in the 1930's. The shaft was located in the northern section of the site, as shown in **Figure 3 – Site History**. This shaft was at a relatively low level and subject to flooding from the adjoining Pages River. It is understood that this shaft mined the lower seam. The steep slope of the seams, flooding and the onset of the Great Depression contributed to its relatively short life.

“Bickham” was part of a large grazing property (20,000 acres) owned by the Wright family since the 1850's. It was sold to E R Bromley Pty Ltd, by the Executrix of the “Bickham” estate, in 1982. The Bromley family operated the holding as a cattle raising stud until the late 1980's when it was scaled down to a cattle grazing and agistment operation and then subsequently sold in 2002 to Bickham Coal Company Pty Ltd.

Unimin Australia Limited operating as Commercial Minerals, mined naturally occurring flint clay (chamotte) between 1970 and 1994.

Mining was carried out in a series of quarries on the site with varying standards of success. Mining operations were carried out under a private mining agreement. The location of six quarries plus a plant site associated with this activity, is shown in **Figure 3 – Site History**.

The previous owner, E R Bromley was dissatisfied with the level of rehabilitation of these quarries and recent works to stabilise the quarries was undertaken by the Department of Land & Water Conservation. Unfortunately this rehabilitation work has been less than successful and the quarries remain in need of further rehabilitation.

## **1.5 Development Objectives**

The objective of this activity is to recover a 25,000 tonne sample of coal from the E, F and G seams (See Geological Section) for testing purposes.

## **1.6 The Proposal**

Bickham Coal Company Pty Ltd propose to extract approximately 25,000 R.O.M. tonnes of coal at a rate no greater than 500 tonnes per day from a bulk sample site as shown in **Figure 4 – Proposed Bulk Sample**. The bulk sample will be obtained from the E, F and G seams and will entail the removal of some 330,000m<sup>3</sup> of overburden.

The overburden material will be transported to an existing void associated with the previous flint clay operation and used to rehabilitate the area.

The surface area of disturbance for the bulk sample pit, including ramps, will be less than 2 hectares. Excavation will be carried out using an excavator and trucks and utilizing existing internal road systems associated with the previous flint clay operation. The flint clay void, which has a total capacity of 500,000m<sup>3</sup> of fill will be rehabilitated using the overburden from the bulk sample site.

The coal recovered from the bulk sample will be transported to the Dartbrook Coal Processing Plant at a rate no greater than 500 tonnes per day. The development is further described in detail in Section 4.0.

## **1.7 Structure of Review of Environmental Factors**

This Review of Environmental Factors (REF) has been prepared in accordance with the direction from the Department of Mineral Resources and addresses issues raised in the consultation phase and by various Government Departments in accordance with the provisions of the Environmental Planning and Assessment Act 1979 and Regulations.

The REF addresses the following:

### **Section 1 – Introduction**

Provides a background to the proposal.

### **Section 2 – Planning Considerations**

Examines the statutory process and the compliance of the development within the existing planning legislation.

### **Section 3 – Existing Environment**

Describes the existing environment.

### **Section 4 – Proposed Activity**

Details in depth, all facets of the proposed activity.

### **Section 5 – Environmental Management and Monitoring Programs**

Provides detail on the ongoing monitoring programs for the site in general.

### **Section 6 – Social Economics**

Provides details on existing Social Economic Structures

### **Section 7 – Likely Impacts and Proposed Mitigation Measure**

Examines any areas of potential impact and details mitigation measures.

### **Section 8 – Project Justification**

Examines alternatives for the proposal and the consequence of not proceeding.

Details the justification for the project in environmental, economic and social terms.

## 1.8 Study Team

The Review of Environmental Factors has been prepared by, Hunter Development Brokerage Pty Ltd in conjunction with Mining Operation Services Pty Ltd and Bickham Coal Company Pty Ltd. Input has been received from various specialist sub-consultants as follows.

### **Bickham Coal Company Pty Ltd**

Mr David Foster	Managing Director
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### **Mining Operation Services Pty Ltd**

Mr Ian Pankhurst	Mining Engineer
Geological and Mine Planning	

### **Hunter Development Brokerage Pty Ltd**

Mr Kerry Nichols	Planning Director
Mr Bryan Garland	Engineering Design and Planning
Mrs Jennifer Nichols	Socio-Economic, Planning Issues
Mrs Yvonne Bain	Word Processing

### **Specialist Sub-Consultants**

<b>Umwelt Australia Pty Ltd</b>	Flora and Fauna
<b>Umwelt Australia Pty Ltd</b>	Aboriginal Archaeology
<b>Perrins Consulting</b>	Flooding and Water Management
<b>Peter Dundon &amp; Associates Pty Ltd</b>	Hydrological Studies
<b>Robert Carr &amp; Associates Pty Ltd</b>	Water Chemistry Analysis
<b>Holmes Air Services</b>	Meteorological and Air Quality
<b>Global Acoustics</b>	Noise and Vibration
<b>Mining &amp; Exploration Geology Service</b>	Geology and Coal Quality
<b>Sparke Helmore Solicitors</b>	Legal Advice



## SECTION 2

### PLANNING CONSIDERATIONS

#### 2.1 Purpose Of Submission

The purpose of this REF is to examine the impacts of the proposed activity and provide findings to the determining authorities to aid in their consideration of the proposal. The Exploration Licence Holder seeks approval for a bulk sample under the Mining Act 1992.

#### 2.2 Legislative Context

Section 29(1) of the Mining Act 1992 provides that;

***“The holder of an exploration license may in accordance with the conditions of the license prospect on the land specified and license for the group or groups of minerals so specified.”***

The effect of the Environmental Planning & Assessment Act is that if an Environmental Planning Instrument applies to the land requiring approval to development, then development may not occur other than pursuant to and in accordance with consent under that Act. The term development includes anything done on, over or in the land.

The project is considered to be development that may be conducted with the consent of the consent authority.

Prospecting is development under the Environmental Planning and Assessment Act for which unless there is further provisions in the law, development consent would be required under the Environmental Planning and Assessment Act.

The legislation has recognised the special nature of mining and has provided in the Mining Act, exceptions to the requirements of the Environmental Planning and Assessment Act for mining development.



Section 381 of the Mining Act provides that;

*“if a person is authorized under this Act to prospect on any land nothing in or done under the Environmental Planning and Assessment Act 1979 or and Environmental Planning Instrument operates so as to prevent the person from carrying on prospecting operations on that land; and*

*to the extent to which anything in or done under that Act or such Instrument would so operate, it is of no effect in relation to the person.”*

The term prospect is defined in the dictionary to the Mining Act to mean

***“To carry out works on or to remove samples from land for the purpose of testing the mineral bearing quality of the land .....*”**

The term prospecting operation is also defined and means

***“operations carried out in the course of prospecting”***

It is concluded that the removal of the bulk sample under the current exploration license (EL5306) is **prospecting** and therefore does not require development consent, under the Environmental Planning and Assessment Act, due to the provisions of Section 381 of the Mining Act.

The approval of the Department of Mineral Resources will be required for the recovery of the bulk sample under Part 5 of the Environmental Planning and Assessment Act. This also requires the preparation of a Review of Environmental Factors (REF) to be provided to the Department of Mineral Resources before the approval to recover the bulk sample can be considered.

Works associated with the prospecting operation including transport of coal, buildings, etc, would also fall under the definition of prospecting requiring approval by the Minister for the Department of Mineral Resources under Part 5 of the Environmental Planning and Assessment Act.

Under Section 112 of the Environmental Planning and Assessment Act, it is considered after review of the development, that the activity (prospecting) is not a prescribed activity or of a prescribed kind or an activity that is likely to significantly affect the environment or threatened

species populations or ecological communities or their habitat and therefore it is not required to be supported with an Environmental Impact Statement.

The removal of the bulk sample will not produce, process or transport off site more than 500 tonnes of coal or carbonous material per day. It will further be confined to less than 4 hectares of land and will be greater than 40m from any natural water body, wetland or environmentally sensitive area. While blasting is proposed, the site is greater than 1,000m from a residential zone and greater than 500m from a dwelling not associated with the mine.

Of particular importance is the fact that this activity will be undertaken for a relatively short time. Transport of coal off site will take some 12 weeks, while the extraction of the bulk sample will run for some 24 weeks in total.

The application has not been called up by the Minister under Section 88(a) of the Environmental Planning and Assessment Act. Further, in respect to State Environmental Planning Policy 34 – Major Employment Generating Industrial Development, the activity does not constitute a capital investment of more than \$20million and will not employ more than 100 people on a full time basis. It is therefore considered that the development is not a State Significant Development as defined in Section 76(a)(7) of the Environmental Planning and Assessment Act 1979.

In terms of Integrated Development, the requirement to obtain Integrated Development sits under Section 91, Part 4 of the Act. The assessment in this case is being carried out under Part 5 of the Act and therefore Section 91 does not apply.

#### **Protection of the Environment Operations Act 1997**

For the purposes of Schedule 1 of the POEO Legislation, the extraction of the bulk sample can be defined as a coal mine. Due to the small scale of the bulk sample and its limited impact due to:

- The activity does not produce greater than 500 tonnes per day of coal
- The activity does not disturb more than 4 hectares of land

It does not require licensing. The rehabilitation of the former flint clay void however, may be defined as extractive industry under Schedule 1 and as it will use more than 30,000m<sup>3</sup> of material, it is an activity requiring licensing under the Protection of the Environment Operations Act.

## **2.3 State Environmental Planning Policies**

### **State Environmental Planning Policy 11 – Traffic Generating Developments**

This SEPP does not apply in respect to this application, as it is triggered by the lodgment of a development application under Part 4 and as the approval is issued under Part 5, a development application is not required.

It should however, be noted that the RTA have been contacted and they have submitted their requirements as examined in Section 7.

### **State Environmental Planning Policy 34 – Major Employment Generating Industrial Developments**

This SEPP does not apply to this application, as the capital expenditure is less than \$20 million and the activity will not employ more than 100 persons.

### **State Environmental Planning Policy 44 – Koala Habitat Protection**

This SEPP promotes the protection of core Koala habitat as identified under SEPP 44. It requires that prior to Council granting consent to certain activities, it must assess whether the land is potential Koala habitat. This again relates to consent being granted under Section 4 and as the approval is issued under Section 5, the requirements do not apply. It has however been considered in determining the potential impact of the activity.

Potential Koala habitat has however been evaluated within the flora and fauna assessment, which is attached **Appendix A**. It was found that the area is not core Koala habitat and no historical or current Koala use of the area was identified. SEPP 44 therefore does not apply to the bulk sample site.

## 2.4 Regional Environmental Plan

### 2.4.1 Hunter Regional Environmental Plan

The Hunter Regional Environmental Plan 1989 is the Principle Regional Plan covering this site. Part 6 – Natural Resources, deals with mineral resources and extractive materials.

#### **Clause 41**

This clause deals with the control of development and is to be considered by consent authorities when determining mining or extraction operations.

These are examined as follows:

- a) “Should consider the conservation value of land concerned and apply conditions which are relevant to the appropriate post mining or extraction land use”.

#### **Comment**

The development being for the removal of a bulk sample, will disturb only a small area of land. The bulk sample site will become part of the overall open cut if the mine proceeds and if the mine does not proceed, the bulk sample site will provide a valuable water reservoir for agricultural activities on site. It will therefore support future land uses and is not inconsistent with this clause.

- b) .....
- c) “Should consult with officers of the Department of Mineral Resources and the Department of Agriculture to determine appropriate post-mining or extraction land uses”

**Comment**

All relevant Government Authorities have been contacted and their comments are included as **Appendix C**.

- d) “Should ensure the progressive rehabilitation of mined or extractive areas”.

**Comment**

The excavation of the bulk sample will provide for the rehabilitation of the previously mined area (flint clay voids).

- e) “Should minimise the likelihood and extent of the final void and the impact of any final void or facilitate other appropriate options for the use of the final void”.

**Comment**

As previously stated, the final void, if not forming part of the future mining of the site, will occupy less than 2 hectares in area and provide a valuable water storage reservoir.

- f) “Should minimise any adverse affects of the proposed development on ground water and surface water quality and flow characteristics.”

**Comment**

The impact of the development in terms of water supply, ground water and surface water is examined under Sections 4 and 7.5. It was found that the development will have a negligible impact.

- g) “Should consider any likely impacts on air quality and the acoustical environment.”

**Comment**

This has been examined in Sections 4 and 7 with the conclusion that it would have a negligible impact.

- h) “Should be satisfied that an environmentally acceptable mode of transport is available.”

**Comment**

Due to the limited volume of coal to be transported (less than 25,000 tonnes) road transport is the only viable option. This however will only take place for a period of 12 weeks at a maximum of 500 tonnes per day.

- i) .....

It is generally concluded that the development is not inconsistent with the provision of the Hunter REP 1989.

**2.5 Murrurundi Local Environmental Plan**

By virtue of the fact that the application is lodged under Part 5 of the Environmental Planning and Assessment Act the provisions of the Murrurundi Local Environmental Plan 1993 do not apply.

It should however be noted, that the site is zoned 1(a) Rural under the provisions of this Plan and mining is not prohibited within this zone.

**2.6 Consultation**

*2.6.1 Consultation with Government Agencies*

As requested by the Department of Mineral Resources, the following Government Departments have been consulted. Their responses are detailed in **Appendix B** to this REF and a table has been prepared summarising the Government Department’s requirements and providing reference to the sections of the REF where each of these are dealt with.

In addition, a site inspection and project overview was conducted on 9<sup>TH</sup> August 2002. This was well attended by Government Agencies and allowed the project team to

describe the extent of activities associated with the removal of the bulk sample. No specific issues were raised at this inspection. A list of those attending is also included as **Appendix C**.

Consultation has taken place with the following authorities.

- Roads and Traffic Authority
- Department of Land & Water Conservation
- NSW Heritage Office
- NSW Agriculture
- Planning NSW
- National Parks & Wildlife Services
- Department of Mineral Resources
- Environmental Protection Authority
- Mine Subsidence Board
- NSW Fisheries
- Murrurundi Shire Council
- Scone Shire Council
- Muswellbrook Shire Council

## **2.7 Community Consultation**

From the inception of the project, an open form of consultation has been undertaken with all those concerned with the project including Murrurundi Council and the community. This involved meeting with Murrurundi Council on a number of occasions to discuss the project and formalise ways of disseminating information to the community.

The concerns elucidated in the community consultation process mostly relate to the potential effects that the full mining project may or may not have. Studies on the full project will fully assess these issues in any subsequent applications.

With regard to the Bulk Sample, neighbouring property owners were concerned about noise and the effect of blasting and there is considerable interest in the possibility of potential adverse effects on the Pages River.

These concerns have been comprehensively answered in this Review of Environmental Factors.

Community consultation consisted of the following:

- 19/2/02 meeting with Freight Rail, Scone and Murrurundi Shire Councils
- 22/2/02 meeting with Department of Mineral Resources
- 8/5/02 meeting with Planning NSW in Sydney
- 15/5/02 meeting with Mine Watch
- 25/5/02 meeting with Bickham Coal Mine Action Group at Murrurundi
- 6/6/02 meeting with Department of Mineral Resources at Bickham site
- 9/8/02 presentation to Government Departments at Bickham Homestead
- 29/8/02 meeting with Murrurundi Shire Council representatives
- 18/9/02 meeting with Department of Mineral Resources, Sydney

At the meeting on the 25/5/02 a presentation of the proposed bulk sample extraction operation was made by Bickham Coal representatives and a list of questions was put forward by the Bickham Coal Mine Action Group. These were responded to and are further examined in the contents of this REF.

## **2.8 List Of Approvals**

As previously examined, this application is lodged under Section 5 of the Environmental Planning and Assessment Act. As it does not include a development application under Part 4 of the Act, it does not trigger Integrated Development requirements, although there is still a need to obtain any such licenses, should they be required.





## SECTION 3

### EXISTING ENVIRONMENT

#### 3.1 Location

The bulk sample site sits in an area of approximately 2 hectares towards the north-eastern portion of the property, as shown in **Figure 2 – Site Layout**. The bulk sample sits within Exploration Licence 5306, which in turn is within the proposed future open cut resource, which occupies an area as shown in **Figure 4 – Proposed Bulk Sample**, being some 2.2km long and .7km wide. The bulk sample area and the total resource sits fully within the land holding of the Bickham Coal Company.

#### 3.2 Current Site Activities

The property is used for general grazing purposes. Since the property was purchased on the 14<sup>th</sup> February, 2002 by Bickham Coal Company Pty Ltd it has been used exclusively for cattle grazing. Due to the present drought conditions, the numbers are restricted to 100 cows with calves and 50 weaner cattle owned by Bickham Coal Company. A further 50 mixed cattle are also on the site under agistment.

Since February, extensive fencing repairs have carried out on the property, together with erosion control works, dam desilting and noxious weed control works.

Pasture and stock improvements will continue on this site as an auxiliary land use to its planned future mining activities.

At present it employs one full time and two part time people, associated with agricultural uses.

#### 3.3 Topography and Slope

The site of the proposed bulk sample slopes to the north north-west at approximately 11° or 19%. It obtains a maximum height of some 445m and falls to 395m over approximately 255m.

**Figure 4 - Bulk Sample Site.**

The bulk sample is orientated perpendicular to the slope within that land.

Drainage flows are to the north and north-west and adjoin drainage line flows from the south, discharging over a low flat flood plain into the Pages River. The extent of works proposed for the extraction of the bulk sample lies greater than 50m from any water course.

### **3.4 Ground Water**

A full ground water study has been carried out by Dundon & Associates. This study and assessment has been attached in full, as **Appendix J**.

This study identified that:

- The ground water quality, in terms of total dissolved solids (TDS) ranged from 154 - 996 mg/l with an arithmetic mean of 580 mg/l. This is a mean for the whole project area and the bulk sample excavation location is expected to have a lower TDS.
- Ph values in the excavation area ranged from 6.83 – 8.28.
- In the bulk sample area, the ground water is of a better quality than the Pages River and is at levels of slightly higher elevation than the adjacent water levels in the Pages River. This indicates that the ground water is not recharged from the river, nor is there any direct hydraulic connection

### **3.5 Flora and Fauna**

A full flora and fauna assessment has been carried out by Umwelt Australia Pty Ltd. This assessment is attached in full, marked **Appendix A**.

The investigation identified one vegetation community being thin leafed string bark/forest red gum woodland. The area was investigated by transecting the site and carrying out a quadrant investigation. The level of disturbance to the land including erosion, weed infestation and lack of community maturity was also noted in the walking transects.

The availability of potential habitat for ground dwelling mammals was relatively low, due to the lack of significant ground cover and intermediate shrub layers. There was a high amount of debris in the area in the form of leaf litter, logs, etc, which would provide habitat for reptiles. There were no tree hollows identified and arboreal habitat is also limited due to the immaturity of the trees. The canopy is non-contiguous and therefore does not provide adequate protection against predators for smaller animals.

The findings of the studied are further examined in Section 5.7.

### **3.6 Services**

The site is an operating grazing property and is fully serviced for that use. Electricity is available, as too is telecommunications facilities. Potable water is supplied from roof runoff and non-potable water from dams and bores

The property is not connected to reticulated water or sewerage. Wastewater is disposed of through transpiration systems at the existing homestead.

### **3.7 Access and Traffic**

The previous use of this property for the mining of flint clay necessitated the construction of access roads to a standard suitable to cater for heavy truck movements in all weather conditions. These roads still exist on the site and are in good repair. They are unsealed, gravel roads approximately 4m – 6m wide with table drains and drainage structures. Ref **Figure 5** for locations.

There are two accesses to the property, the southern access is that which serviced the flint clay mine and is of heavy vehicle standard. The northern access services the homestead and cattle operations. This has been in existence for some considerable time also and is a stable all-weather road.

The access points to the New England Highway are gravel with the seal ending at the edge of the shoulder. The southern access will require further upgrading to ensure that loose stone is not discharged onto the road.

Site distance is greater than 180m in both entrances.

It is proposed in this case to use the southern entrance as a main entrance to this site.

### **3.8 Soils**

A full geological assessment has been carried out for this site by Mining and Exploration Geology Service.

A full profile has also been carried out of the overburden material which is also attached **as Appendix D.**

Generally soils in the area are very thin with expansive areas of exposed sandstone rock. They are also acidic and primarily sandy in nature.

A soil sample analysis taken by Department of Land and Water Conservation adjacent to the flint clay void is attached in **Appendix I.**

### **3.9 General Geology**

The coal bearing strata occurring in the Bickham Coal Project area are Greta Coal Measure equivalents. The seams at Bickham are lower rank than the Greta coals known or mined elsewhere in the Hunter Valley. The lower rank is reflected in coal quality parameters; in particular the seams have higher air-dried moisture contents, lower specific energy values and considerably reduced coking properties.

The Greta Coal Measures in the project area are comprised of the Bickham and Koogah Formations. The economic coal seams are found in the Koogah Formation. The seams are comprised of the visually dull but vitreous coal typical of Greta-type seams. Interburden is predominantly arenaceous, with occasional conglomeratic lenses. The Koogah Formation sits on top of the Werrie Basalt. The basal Koogah Formation has distinctive (bentonitic) claystone accumulations and appears to be transitional into the Werrie Basalt.

There are 7 potentially economic coal seams, designated A to G, occurring within the Wingen area Koogah stratigraphy. **Table 1** shows typical seam thickness and indicative coal quality for

each of the seams. A feature of the project area is ancient, deep cindering (+ 70m) along seam subcrops. Deep weathering oxidation (+30m) is also common in the project area.

**Table 1**

<b>WINGEN PROJECT – BULK SAMPLE AREA</b>						
<b>INDICATIVE IN SITU COAL QUALITY AND SEAM THICKNESS</b>						
<b>Seam</b>	<b>Thickness m</b>	<b>Roof cover m</b>	<b>Ash %ad</b>	<b>RD</b>	<b>Total Sulpher %ad</b>	<b>SE GAD kcal/kg</b>
A	3	40	15.5	1.55	8.8	6340
C	2 – 2.75	50	>30	>1.75	0.43	3650
D	0.5	60	16	1.47	0.52	5735
E	6.4 – 7.6	20 – 85	7.2 – 9.6	1.39 – 1.41	0.35 – 0.48	6340 – 6550
F	1.25	45 – 110	6.1 – 9.4	1.41	0.29 – 0.44	6600 – 6320
G	6.2 – 11.5	80 – 135	4 – 5.9	1.39 – 1.40	0.31 – 0.34	6650 - 6780

**Notes:**

- Figures shown based on 2002 core drilling
- Qualities are corrected to 8.0% (approx Air Dried Value) moisture basis
- RD corrected using Preston-Saunders formula
- Values are Air Dried Raw *not* ROM
- SE is on Gross Air Dried (GAD) basis
- Not all seams exist over all of bulk sample area
- Values are for bulk sample area and are not intended to represent entire deposit

The project area is structurally complex. The dominant structural features are NW-SE trending regional folds. The folds have variable plunges and limbs dipping at high angles, dips of over 70 have been recorded during exploration. Large-scale faults are also thought to exist within the project area. In the proposed bulk sample area, the Koogah Formation seams dip to the west at 15-25°. **Figure 6**

**3.10 Bulk Sample Geology**

As previously noted, the proposed Bulk Sample area is shown in **Figure 2 – Site Layout**. The site has been chosen to allow access to the coal seams to be sampled with the minimum of surface disturbance. Choice of suitable bulk sample sites in the Wingen deposit is difficult as the steep dips, deep weathering and sub-crop cindering, severely limit access to any fresh

near-surface coal.

**Figure 6** shows the configuration of the seams in the proposed bulk sample area. Weathering has removed all economic coal to approximately 20-25m, with only the E and G seams unweathered at depth. The access to only 3 of the 7 seams will not reduce the validity of the sample, as these seams (E, F and G) comprise over 75% of the currently estimated reserve. Additionally, the G seam ash has the most significant iron in ash issues of all the seams, which makes its sample very important. **Figure 7.**

### 3.11 Coal Quality Issues

Quality analysis of coal has been undertaken on exploration slimcore (HQ3, 63mm) and chip samples. The results of this analysis (summarised in **Table 1**) have shown some variability in quality and some potentially problematic features. The principal concerns are sulphur content and iron in ash. These are outlined below:

**Sulphur** Sulphur results are generally low compared to other worked Greta deposits in the Hunter Valley and are generally comparable or less than values observed for Singleton Supergroup seams from the Hunter Valley. Sulphur content is however variable within and between seams. Only the stratigraphically uppermost A seam shows sulphur contents in excess of 1.0%; other seams generally have average sulphur contents in the range of 0.3% - 0.7%. In addition to the stratigraphic relationship of sulphur occurrence, exploration results also suggest that sulphur variations within specific seam profiles may be related to in-seam bands or non-coal inclusions. The slimcore data, while valuable in identifying the sulphur problem, provides very little information on the behaviour of the sulphur bearing coal and stone in a bulk excavation situation.

**Ash Analysis** Ash analysis has been conducted on slimcore exploration samples. This analysis has shown some unique relationships within the ash constituents, but of most concern is the iron content in the ash. Iron in ash results of +50% has been recorded in some samples. Particularly, the G seam ash has very high iron in ash ratios. The projected use for Bickham coal is fuel in steam boilers for power generation. Elevated iron content is projected to be a potential problem with the utilisation of the product coal. High iron content has been related to ash abrasion and ash erosion in boilers, and increased slagging and fouling in boilers. The high iron content of the ash may be an impediment to marketing the Bickham coal product and has the potential to cause difficulties with product acceptance. As with the sulphur issue, the

slimcore data available does not give direct indications of the likely product performance, and the reserves of sample left after analysis are too small to allow worthwhile trial firing. The use of theoretical formula and empirical relationship methods to predict the ash performance in boilers has been previously shown to be problematic and potentially unreliable, especially with lower rank coals. For example, some Indonesian coals (not that Bickham coals are that low in rank) have predicted ash performance that would cause extreme fouling and slagging. However, actual firing in boilers has shown this not to be the case.

To better understand the quality of the coal in an open cut extraction situation, bulk sampling of the coal at Bickham has been proposed. The sample will allow the performance of the coal during extraction, beneficiation and utilization to be monitored and studied, and will be pivotal in the final assessment of the deposit's economics and hence development. In particular, the bulk sample will help determine the practicalities of physical separation of 'problem' horizons during mining, the efficiencies of beneficiation in reducing sulphur and iron in ash, and the real performance of the coal in boilers.

### **3.12 Overburden / Interburden Characteristics**

Overburden material at Bickham is generally a sandstone/conglomerate with interburden being predominantly arenaceous with occasional conglomerate lenses.

Generally, there is a deep weathering profile of 20 – 30m caused in part by ancient deep cindering of the coal seams.

Material is neutral to slightly acid pH (7.5 – 4.6) with a low salinity (0.03 – 0.28 d/Sm).

A full analysis of the overburden / interburden types has been undertaken by Allied Testing. These results have been reviewed with regard to:

- Surface water effects by Perrens Consultants (**Appendix G**);
- Chemical analysis of bulk sample overburden by Robert Carr & Associates (**Appendix H**).

Neither report indicates that there is any significant impact from the overburden / interburden material.





## SECTION 4

### PROPOSED ACTIVITY

#### 4.1 Objectives

The objective of this activity is to recover a 25,000 tonne sample of coal from the E, F and G seams (**Figure 6**) for testing purposes.

#### 4.2 General Mining Method

Due to the nature of the overburden, most of the 330,000 cubic metres, which is the projected volume of overburden to come from the bulk sample pit, will be blasted material. It is anticipated that this will be hauled out using an excavator and trucks and worked as a conventional overburden removal operation.

As with normal open cut mining, the topsoil is removed and stockpiled. Topsoil is however extremely thin to non-existent in this location. The rock is then drilled and blasted before being removed by loading into rear dump trucks and being hauled some 2.1 km to the out-of-pit dump shown on **Figure 4**. This dump area is the northern most void from the previous flint clay mine. This void has a volume capacity of over 500,000m<sup>3</sup> and will provide the dump area for the bulk sample excavation. This material will be used to rehabilitate the void back to a similar landform that existed pre-mining.

#### 4.3 Detailed Mining Sequence

##### 4.3.1 Topsoil Removal

Topsoil removal pushed up with bulldozers, loaded with excavator and trucks, and stockpiled ready for use in the rehabilitation process.

#### 4.3.2 *Blasting and Drilling*

All blasting will be conducted during daylight hours.

The majority of overburden will require blasting in 20m lifts prior to being removed with the overburden fleet and trucked to the old flint clay void.

This topic is discussed in further detail in *Section 4.4.1*.

#### 4.3.3 *Overburden Removal*

Overburden removal will be by 100 – 120 tonne excavators and 85 tonne trucks. Due to the haul distance of some 2.1km it is expected that up to five rear dump trucks could be used at any one time.

Production is expected to take place on a daylight hours only basis nominally 6:00am to 5:00pm.

### **4.4 Extraction Of Coal**

Coal is planned to be fragmented by either ripping with bulldozers or being dug direct with the excavator before being loaded into the rear dump trucks.

The coal mining sequence will be directly related to the actual distribution of iron found in the seams.

#### 4.4.1 *Drilling and Blasting*

It is planned to use 162mm holes with a maximum instantaneous charge between 250 – 300kg. Based on the standard formulas for calculation of over pressure:

$$OP = 165 - 24(\log_{10}(D) - 0.3 \log_{10}(Q)), \text{ dB}$$

Where D is distance from the blast to the assessment point (m) and Q is the weight of explosive per delay (kg) and peak particle velocities:

$$PPV = 1140 \left( \frac{D}{Q^{0.5}} \right)^{-1.6} \text{ mm/s (average ground type)}$$

where D and Q are defined in the above equation.

The maximum peak particle velocity (ppv) and the over pressure (dB) at the nearest residences are shown in **Tables 2 and 3**.

**Table 2**

<b>PREDICTED IMPACTS FROM BLASTING (95<sup>th</sup> PERCENTILE)</b>				
<b>250kg</b>				
<b>Location</b>	<b>Distance,m</b>	<b>Overpressure Db</b>	<b>Average ground PPV mm/s</b>	<b>Hard rock PPV, mm/s</b>
Koogah West	2600	100.306	0.325	0.142
Bickham	2100	102.532	0.457	0.200
Nearest point to highway	2100	102.532	0.457	0.200

**Table 3**

<b>PREDICTED IMPACTS FROM BLASTING (95<sup>th</sup> PERCENTILE)</b>				
<b>300kg</b>				
<b>Location</b>	<b>Distance,m</b>	<b>Overpressure Db</b>	<b>Average ground PPV mm/s</b>	<b>Hard rock PPV, mm/s</b>
Koogah West	2600	100.876	0.376	0.165
Bickham	2100	103.102	0.529	0.232
Nearest point to highway	2100	103.102	0.529	0.232

As the nearest non-company owned residences are some 2km from the bulk sample area and there are two ridge lines in between, the potential for some effect on these residences is considered to be minimal. Predictions of ground vibration will be compared with the actual result obtained at each of the nearest residences.

It will be critical for both this bulk sample operation and also for providing real numbers for the full mine development EIS that each blast is carefully monitored, both at the nearest residences and at other locations thought to provide special information. This will require that, during the blast design process and auditing of results, particular note be kept of the following:

1. Weather conditions
  - Wind direction and strength
  - Cloud cover
  - Inversion potential
  - Time of blast initiation
2. Checking actual results to predicted results during the drill and blast of the excavation
3. Checking rock material types and the area to be blasted
4. Geological discontinuities
5. Trialing different types and loading densities of explosive variations for ground vibration and air blast
6. Ensuring that maximum instantaneous charge figures are accurately known
7. Type of initiation
8. Type of surface lines
9. Powder factor hole by hole and overall powder factor
10. Stemming column length
11. Stemming column material
12. Fragmentation achieved
13. Blast protection for highwall stability

**Bickham Coal will be working to the EPA License conditions for over pressure and ground vibration peak particle velocity.**

The guidelines, in relation to ground vibration, recommend that no more than 5% of blasts are to exceed 5mm per second as a peak particle velocity with the maximum being 10mm per second.

The predicted impacts (95%) is well within these guidelines both for overpressure and peak particle velocity even using average ground condition factors.

#### 4.4.2 Coal Processing

The coal will be brought from the excavation area by the overburden trucks, dumped onto a temporary stockpile located to the south of the excavation and a sizing process completed to ensure that the maximum size loaded onto road trucks for transport to the trial washery site (at Darbrook) is 200mm (depending on the washery process and what additional processing the coal will have, this size range will be between 50 – 200mm).

After the sizing takes place the coal will be stockpiled and loaded by a small front-end loader into the road trucks. The average number of loaded road truck movements per day is expected to be no greater than 18.

#### 4.4.3 Geotechnical Issues

A preliminary geotechnical study has been carried out and the excavation design reflects this study.

A further geotechnical assessment will be made when sufficient faces have been exposed to validate the original assumption.

Regular inspections will be made during the excavation process.

#### 4.4.4 Description of Excavation

As referred to in **Figure 4, Figure 8** shows the east/west and north/south cross-section of the bulk sample excavation. Section A-B has an entry ramp gradient of 1 in 8 and a total depth to the pit floor of some 90m. The batter angles, which are expected to be pre-split, are run at 85° (with a 7m wide bench every 20 vertical metres apart). These benches are set to a specific RL and will be used to control not only stability of the wall and act as a catch bench, but also used for water drainage to a chosen point.

The estimated tonnages planned to be recovered from each seam are as follows:

E Seam	18,000 ROM tonnes
F Seam	5,000 ROM tonnes

G Seam	2,000	ROM tonnes
<b>Total</b>	<b>25,000</b>	<b>ROM tonnes</b>

The actual tonnage recovered from individual seams may vary, however, the total tonnage mined and transported offsite will not exceed 25,000 ROM tonnes.

#### 4.4.5 Spontaneous Combustion

The likelihood of spontaneous combustion in the seams being mined in the bulk sample is regarded as very low. This is due to:

- the historical exposure of the coal seams near the old Bickham Coal entry;
- the low sulphur content in the coal; and
- ground water table effects.

The overburden / interburden to be removed from the bulk sample is predominately sandstone / conglomerate with little, if any, carbonaceous inclusion.

Rehabilitation of the overburden dumped in the old flint clay void will be carried out immediately following the completion of the bulk sample excavation.

## 4.5 Coal Transportation

After removal of the bulk sample, it will be loaded on to semi-trailers or B-Doubles and transported via the internal road network to the New England Highway, See **Figure 5**. The intersection with the New England Highway and the internal access road will be upgraded in accordance with the RTA's requirements as shown in their correspondence, refer **Figure 9**.

The sample will be transported south by road along the New England Highway to the Dartbrook coal loading facility for processing and rail loading for shipment to the port at Newcastle and then by ship to Bickham's clients in Japan.

Road transport will be at a rate no greater than 500 tonnes per day and will take approximately 12 weeks to complete. Transport of material by road will occur between the hours of 7.00am to 5.00pm (day light hours).

All loads will be tarped and secured in the appropriate manner.

## **4.6 Mining Infrastructure and Facilitation**

### *4.6.1 Project Infrastructure*

The infrastructure used for the bulk sample will be temporary and therefore portable buildings will be used. It is expected that there will be two demountable buildings located some 400m to the south of the excavation area. (Refer **Figure 10**) The services that will be provided at the site include:

- power provided by a generator set;
- portable toilet facilities;
- lunch room facility;
- additional facilities provided at the existing homestead include:
  - ablution facilities with potable water trucked in from the nearby township of Murrurundi or Scone and
  - first aid facility

## **4.7 Workforce**

The project will operate a single shift only to remove the bulk sample and employ a maximum of 10 people. The project will take approximately six months to complete. Staff will include:

- the supervisory staff
- production, and
- maintenance people

In addition, the transport of coal will employ a further 7 – 10 truck drivers.



## 4.8 Mine Operation

The bulk sample pit area is proposed to operate one shift, generally between the hours of 7.00am to 5.00pm. Maintenance may be performed outside of these hours, but no later than 8.00pm or earlier than 6.00 am.

## 4.9 Water Management

### 4.9.1 General

Water management, both clean and dirty, for the Bulk Sample operation is divided into two areas:

- the excavation area and roads, and
- the flint clay void area (including the coal stockpile area).

The Surface Water Assessment Plan (**Appendix G**) encompassing both these areas, deals with both surface and ground water issues, initial control works and, where appropriate, the transition from dirty water to clean water offtakes. This plan also includes a comprehensive water quality monitoring program.

### 4.9.2 Clean Water Management

A surface water assessment plan has been prepared by Perrens & Associates. Diversion of water around the Bulk Sample area, being only 2 hectares in area, will not isolate runoff in the local catchment.

A comprehensive design for temporary diversion of flow lines in the flint clay void is outlined to maintain a clean water regime wherever possible. These are detailed in **Appendix G**.

4.9.3 *Dirty Water Management*

The surface water assessment plan (**Appendix G**) deals with dirty water management. At the Bulk Sample pit, all rainfall in the excavation will drain to the pit sump and will be dealt with as dirty water.

For the flint clay void area, the management plan provides for sediment control works as part of the temporary water diversion system. When the void is filled and rehabilitated, the whole system will become a clean water area.

4.9.4 *Water Balance*

Due to the short duration nature of the Bulk Sample, both rainfall and evaporation have been excluded from the calculation on the basis that they effectively offset each other. The main water sources are:

<b>Area</b>	<b>Volume (MI)</b>	<b>Water Quality (mg/l)</b>
Existing flint clay void	30 – 40	318
Initial dewatering of Bulk Sample area	≈230	≈550
Potential short term maintenance of void dewatering	≈40	≈550
<b>Total</b>	≈310	≈550

4.9.5 *Water Use Areas*

<b>Use</b>	<b>Volume (MI)</b>	<b>Water Quality Requirements (mg/l)</b>
Dust suppression, roads and crushing	≈150	n/a
Filling farm dams	30 – 40	Preferably <1000
Irrigation of selected crops / pasture areas	≈200	<900

These tables show that on both a volume and water quality basis, the water balance for the Bulk Sample is such that it can be controlled with no effect on the surrounding area, ie, no discharge will be required. No water will or will need to be drawn from the Pages River.

## 4.10 Noise and Dust Suppression

### 4.10.1 Noise

A full acoustic assessment has been carried out by Global Acoustics and is attached **Appendix E**.

Noise can be generated by the extraction operation and through the rehabilitation of the previous flint clay void. Noise levels have been predicted using the model and acoustic levels known to be created by the proposed plant. The model takes into account the geometric spreading, atmospheric absorption and barriers and ground attenuation in arriving at the expected final noise levels.

As the bulk sample removal is a single shift operation with a limited life, a single worse case operating scenario was used.

This was compared with background noise readings taken at a number of locations as shown in the report.

The findings of the study, confirmed, that the development will have an insignificant impact.

### 4.10.2 Dust Suppression

The area of disturbance in regard to the removal of the bulk sample is relatively small (less than 2 hectares). It is further located within a cut or void which reduces the exposure of bare earth to prevailing winds, which is the major cause of dust generation.

It is also understood that the void and the extraction area will be associated with the ground water table, which will act as a natural dust suppressant.

The other possibility for dust generation onsite relates to the access roads, which are existing, unsealed, gravel roads and the rehabilitation area from the previous flint clay voids. It is proposed to operate water carts at regular intervals on all access roads and in the void emplacement area to suppress dust.

Once the former flint clay void has been rehabilitated and reshaped, the area will be seeded and a grass cover established immediately to reduce both erosion and dust generation. As the operation is planned to occur over five days per week, in extended dry weather, arrangements will be made for the water carts to operate outside of these times if required.

#### *4.10.3 Water Management*

As detailed in the Surface Water Assessment Plan (**Appendix G**), the water used for road dust suppression will be sourced from existing water on the property, particularly the water in the old flint clay void. Any water recovered from the excavation itself will either be used for dust suppression purposes or pumped to farm dams, which are currently empty following the prolonged dry period.

### **4.11 Rehabilitation of Previous Flint Clay Void**

An assessment of rehabilitation requirements for the series of flint clay voids was made by the Department of Land and Water Conservation. Due to financial limitations, rehabilitation work planned for voids 5 and 6 (referred to in this application as the old flint clay void) in the DLWC report, only tree planting took place. Almost all of these trees have subsequently died.

The void in question will be backfilled with overburden from the Bulk Sample area, using selected overburden as a top-dressing material. Slope angles will generally be a maximum of 10°. Revegetation strategies will be as recommended by DLWC and DMR but will draw on the limited success of the rehabilitation efforts made on site to date by the flint clay mine operators.

One of the major advantages that will accrue from rehabilitating this site is the removal of highwall safety issues referred to in the DLWC report (I). The final landform will be as shown in **Figure II**.

#### **4.12 Rehabilitation of Bulk Sample Pit**

Once the Bulk Sample has been completed, and all work has ceased, the ramp access will be secured and the highwall area fenced and signposted to prevent people or stock inadvertently entering the void area.

During the assessment of the Bulk Sample results and if the project progresses to the next phase, during the full EIS and approval stage, the void will be maintained as described.

If a full mining operation is undertaken, the Bulk Sample void rehabilitation will be included in the main mine rehabilitation strategy.

Should no further mining be planned for Bickham area over a longer time frame, the void would be maintained as a potable water source for both Bickham's grazing operations and possibly as an emergency water supply for Murrurundi. Murrurundi Shire Council have already approached Bickham Coal Company regarding access to water in the Pages River via the company's property.

#### **4.13 Waste Management**

The proposed development will occur for a relatively short period of approximately 6 months. Waste generation from the site during this time will be minor.

Putrescible waste will be collected in commercial skips and removed under contract from the site for disposal in approved waste facilities. Other waste, such as non-putrescible products will be removed in a similar fashion.

## SECTION 5

# ENVIRONMENTAL MANAGEMENT AND MONITORING PROGRAMS

### 5.1 Climate Data

A full weather station has been located as shown in **Figure 4**. The weather station will provide valuable base data to compare expected and actual impacts and allow better modelling of the full open cut, should it proceed.

The weather station is manufactured by Campbell Scientific Instruments and measures wind speed and direction, temperature at 1.2m and 10m above the ground, solar radiation and relative humidity.

This is measured on a continuous basis and logged for future use.

### 5.2 Hydrology

#### 5.2.1 Surface Water

As defined in **Appendix G**, water quality monitoring in the Pages River has commenced upstream and downstream of the proposed bulk sample site. Information obtained will be used to establish base line conditions prior to any excavation work or sampling.

In addition, during the rehabilitation of the previous flint clay voids the water quality of the discharge from the sediment basins and the drainage channels will also be monitored. Water quality 50m upstream and downstream of the confluence of this drainage with the Pages River will be monitored during any discharge event to determine whether its discharge is having any significant impact on the water quality of the Pages River.

It further states that surface water samples will be analysed for the following water quality parameters:

- Total nitrogen

- Total phosphorus
- Suspended solids
- Turbidity
- Salinity

**Appendix H** refers to additional sampling to be taken at the same sites for:

- Field pH
- Total heavy metals

“The findings of surface water analysis for Heavy Metals should be reviewed in a monthly review process and compared against baseline water quality and ANZECC guidelines. Monitoring should be continued until re-vegetation of the overburden dump is complete.”

#### 5.2.2 *Ground Water*

As outlined in Appendix J, a series of 14 piezometers have been installed to allow separate monitoring, sampling and testing of aquifers in the main coal, overburden and interburden.

The monitoring program to be followed during the extraction of the bulk sample will be:

- Accurate measurement of pumped discharges from the dewatering bores, on a weekly basis (by means of totalizing meters)
- Measurement of any pit inflows pumped from sumps in the pit, independent of the dewatering bore discharges
- Weekly measurement of Ph, conductivity and TDS of the pumped discharges from dewatering bores and pit sumps
- Water levels taken in all piezometers, on a weekly basis
- Water samples from all piezometers analysed for a broad suite of water quality parameters, three monthly

This program will be conducted and reviewed in conjunction with surface water monitoring.

After completion of the bulk sample, the monitoring of the following should continue until the pattern of recovery has been ascertained:

- Water levels taken in all piezometers, on a weekly basis for the first three months, then monthly thereafter

- Water level measured in the pit, on a weekly basis for the first three months, then monthly thereafter
- Water samples taken from all piezometers and analysed for a broad suite of water quality parameters, three monthly

Once the ground water levels have substantially recovered, the ongoing monitoring requirements will be reviewed.

### **5.3 Air Quality**

Air quality is being monitored using a PM10 high volume dust sampler located at South Bickham Homestead, as well as with six dust deposition gauges located around the property. The weather station measures wind strengths, directions, temperature, humidity and solar radiation. Due to the relative remoteness of this operation, dust generation is not considered to be a major factor.

### **5.4 Acoustics**

Background noise levels have been taken in this area as defined in **Appendix E**. These set baseline data and predict expected noise levels.

During the operation, noise levels will be taken at the nearest residence to validate the modelling carried out in Global Acoustics' report.

### **5.5 Blasting and Ground Vibration**

A base monitor will be set up at Bickham Homestead. A second monitor will be moved to different locations on the site and at the closest receptor point when blasting is being undertaken. Readings will be taken during these events and then compared with the modelling already undertaken. This will serve to validate the model and will provide valuable calibration for predicting further impacts of a larger open cut mine, should it proceed.



## **5.6 Transportation Systems**

Transportation of coal from the site will be undertaken in registered semi-trailers. Periodic inspections will be made of the semi-trailers to ensure their compliance with standard road rules, including tarping of all loads.

An existing grid on the access road approximately 400m from the intersection with the New England Highway will serve as a shaker grid to remove any loose material that may be caught in the mud flaps or tyres of the semi-trailers before they enter the highway.

## **5.7 Visual Impact**

The proposed bulk sample site is not visible from any public viewing areas. No works are proposed at night and therefore night glare will not be a problem.

It is not proposed to monitor visual impact.

## **5.8 Flora and Fauna**

During the initial clearing of the site a flora and fauna consultant will be present to supervise removal of undergrowth and trees and relocate any animals that are in the vicinity.

The extensive flora and fauna study of the site reveals that there were no threatened or endangered species within this area, however should any species be found during the clearing of the site, work will cease and appropriate arrangements will be made with National Parks & Wildlife Services.

## **5.9 Archaeological**

If any artifacts are discovered during the operation, works will cease and National Parks & Wildlife Services will be advised. It is unlikely however, that this will occur due to the findings of the detailed archaeological study of this area.

## SECTION 6

### SOCIAL AND ECONOMICS

#### 6.1 Background

Social impacts are those impacts on people that are not purely economic or environmental in character. Social impact assessment provides important contextual information that is crucial in balancing the benefits and costs of the proposal. The following outlines the social impacts of the proposed initial short-term bulk sample phase, as well as the anticipated social and economic benefits for the local and wider community with the establishment of the long-term mining proposal.

#### 6.2 Population Statistics

The population of the local government area of Murrurundi is 2017 (*ABS 2001*). This compares to a previous population of 2166 in 1996 and 2352 in 1991 and represents a decrease of some 149 (6.9%) since 1996 and 335 persons (14%) over the period 1991 – 2001. There is a 15% decrease in the number of males and 13% decrease in the number of females over the period 1991 – 2001

#### 6.3 Employment Statistics

The 2001 Coal Industry Profile reported that the number of people employed by mines in the Hunter Coalfields has dropped steadily over the years from 1997 to 2000. The numbers employed by mines in the area has dropped by 1588, from 6358 to 4770 during 1997 to 2000. This represents a loss of 25% of jobs in three years. There was however an increase of 155 jobs from 2000 to 2001 (*2001 Coal Industry Profile*).

In the Murrurundi Local Government Area, 35% of the employment for the area is attributed to agriculture, forestry and fishing industries. **Table 4** shows the breakup of employment by industry sector for Murrurundi Shire 1996.

According to ABS 1996 estimates, there were 87 persons unemployed out of a total labourforce of 960 within the Murrurundi Local Government Area, an estimated rate of 9.06%. This compares with the Hunter Region's unemployment rate of 11.3% in 1996.

The following is a breakup employment by industry sector for the Murrurundi area, 1996

**Table 4 - Employment by Industry (%) – Murrurundi Area 1996 and 2001**

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<b>Industry</b>	<b>1996</b>
Agriculture Forestry and Fishing	35%
Retail Trade	8.9%
Health and Community Services	7.9%
Construction	6.2%
Accommodation, Café, Restaurants	5.5%
Government Administration	4.7%
Transport and Storage	4.0%
Manufacturing	3.8%
Wholesale Trade	3.1%
Property and Business Services	3.0%
Education	2.8%
Mining	2.8%
Personal and other Services	1.8%
Finance and Insurance	1.7%
Communication Services	1.5%
Electricity, gas and water supply	1.5%
Cultural and Recreational Services	1.0%
Other	4.8%
<b>TOTAL</b>	<b>100%</b>

The 1996 ABS figures also show that there were some 72 persons (being 48 males and 24 females) between the ages of 15 and 64 years of age, looking for fulltime work (9.06%). This compares positively to comparative unemployment rates for the Hunter Area of 11.3%, however is higher than the NSW rate of 6.0% and Australian rate of 6.3%.

Although the extraction of the bulk sample provides employment opportunities of an additional 10 short-term positions, it is anticipated that the establishment of the full mine proposal will result in a workforce of approximately 60, contributing greatly to the employment prospects in the Murrurundi area. This would also result in favourable impacts on indirect employment in linkage industries such as transport, maintenance and services.

By recruiting locally, wages will remain within the locality and would have positive multiplier effects within the region. Such employment opportunities would occur in the mine servicing industry, retail trade and employment related to the provisions of services such as government services, health care, childcare, community and recreational services.

Various multipliers can be attributed to the construction and mining operations in terms of both employment and income. **Table 6** shows the relevant industry multipliers provided by the Australian Bureau of Statistics, 1997.

**Table 5 - Relevant Industry Multipliers**

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Industry	Activity	Multiplier Type 2B
<b>Construction</b>	Employment	2.08
	Income	1.74
<b>Mining</b>	Employment	3.09
	Income	1.79

**Source: ABS, 1997**

It is expected that with a single shift operation only, up to 10 people will be employed on site for the approximate six months duration of the bulk sample operation. There will be opportunities created for Bickham Coal to actively seek to employ local people and provide appropriate training, however, due to the specialised nature of some aspects of the work, the supervisory staff and maintenance people are likely to be from outside the shire. If adequately skilled people are unavailable, recruitment will be extended to areas outside the Shire.

It is anticipated that the establishment of the full mine proposal will result in a workforce of approximately 60, contributing greatly to the employment prospects in the Murrurundi area. This

should result in more people living in the Council area, as all employees will be encouraged to live within the Shire boundaries.

## **6.4 Economic Overview of the Hunter Region Coal Industry**

Coal mining accounted for \$5 billion in income from mining in New South Wales (NSW) during 2000 – 01. In 2000 – 01 this contributed approximately \$3.8 billion in export earnings for NSW from the export of 75.9Mt of high-grade thermal and metallurgical coals. Coal shipments to principal customers in the Asian Region increased in 2000 – 01, with 93.1% of export coal delivered to countries in Asia. Japan (58.6%), the Republic of South Korea (13.9%) and Taiwan (13.2%) continue to be the major customers (*NSW Coal Industry Profile, 2002*).

At the end of June, 2001, the coal mining industry provided direct employment for 9,849 people in the five coalfield regions of NSW. This increase of 266 positions during the year reverses the trend of workforce reduction that has been a feature of the industry for the last decade.

The NSW Government's 1999 strategic study of the Northern Coalfields predicted that up to 13 mines would close in the Hunter and Newcastle Coalfields over the next 10 years, due to depletion of reserves. To take advantage of predicted market opportunities and to compensate for the loss of production associated with mine closures, there will be an increasing future reliance on production from new projects and mine extensions. Hunter projects represent the majority of new and expansion proposals in the State.

The Hunter Region is of great significance to NSW. Not only does it contain a substantial part of the State's coal reserves it also contributes significantly to power generation, metal manufacturing and agricultural productivity. The regional population has grown steadily since the post war period and now accounts for approximately 10% of the State's population. The Hunter is second to Sydney as the State's most populated region.

Murrurundi Local Government Area is located within the Hunter Region, approximately 327km north of Sydney, 44km north of Scone and 417metres above sea-level. The main service centre is the township of Murrurundi, a small rural town of approximately 1000 people and located by the Pages River at the foot of the Liverpool Ranges. Murrurundi and its rural heritage is well preserved with Murrurundi's main street being declared an urban conservation area.

Except for shale mining in the early 20<sup>th</sup> Century there has been an absence of heavy industry in the locality and change has been gradual. Shale was mined between 1911 and 1915 with the town's population peaking in 1914. Coal was discovered in water supply bores and wells on the subject site in the late 1800's. Coal mining commenced at Bickham Colliery on this property, in the early 1900's. The operation closed in the 1930's. The current owners took over the exploration lease in 1999. The original mine was an underground mine.

Murrurundi has settled into being a service and transport centre. Today it is sustained by quality sheep, beef and horse studs and by both crop and meat production.

It is expected that in the initial phase, being the extraction of the bulk sample the proposal will generate up to an additional 10 positions. These will be predominantly short term and would most likely be filled from within the region from the pool of experienced workers available. However, the establishment of the mine proper will result in a workforce of approximately 60 and would result in favourable impacts on indirect employment in linkage industries such as transport, maintenance and services.



## SECTION 7

# LIKELY IMPACTS AND PROPOSED MITIGATION MEASURES

### 7.1 Introduction

The proposed activity relates to the removal of a bulk sample only. The project has a relatively short life (estimated 24 weeks). The test results from the Bulk Sample will provide valuable information to assist in the development of this site for an open cut coal mine, which will be addressed under a separate application. At this stage, the activity relates to prospecting including the works required to obtain the bulk sample only.

### 7.2 Flora and Fauna

Disturbance of the bulk sample site will be restricted to an area, less than 2 hectares. Existing roads will be used on the site, not requiring further major construction. In addition, the void from the previous flint clay operation will be rehabilitated using the overburden produced from the bulk sample.

The potential for impact in terms of flora and fauna therefore exist only in respect to the bulk sample area. A full flora and fauna assessment was carried out in August, 2002 by Umwelt Australia Pty Ltd, this is attached as **Appendix A**. This included both the open cut areas and the existing flint clay void. It also included examinations under State Environmental Planning Policy 44 (Koala Impact Assessment). This was required, as Forest Red Gum species were present in the bulk sample area and these are listed in Schedule 2 of SEPP 44.

It was noted that the proposed extraction of the bulk sample would not require the removal of a significant area of the vegetation typical within the extended area. There were also no threatened or regionally significant species or vegetation found within the study area and it was further noted that the site was highly modified.



In addition, it found that the removal of 2 hectares of thin leafed stringy bark with some forest red gum could not be considered as a key threatening process and would not result in loss of diversity.

### **Findings**

The studies carried out in respect to flora and fauna by Umwelt Australia Pty Ltd indicate that the proposed development would have an insignificant impact on flora and fauna in this location. It was recommended that appropriate sediment and erosion control measures be implemented to protect the riparian vegetation along the Pages River. This has been addressed and is part of the Management Plan.

### **7.3 Aboriginal Archeology**

An archaeological survey and assessment of the proposed bulk sample site has been carried out by Umwelt Australia Pty Ltd and is attached **Appendix F**. A survey of the site was conducted with representatives from the Upper Hunter Wonarua Council, the Wonarua Local Aboriginal Land Council and Umwelt Australia Pty Ltd.

In addition to actual site inspections, the general history of archaeological investigations in the area was taken into consideration, together with the history of Aboriginal occupation of the area.

The area was small enough to allow its whole area to be examined by the team. All exposures were examined, including the windrows produced by the construction of the existing access tracks, and all other exposed earth.

No sites were recorded in the survey area. This was noted by the consultant as being consistent with the low expectations for the area due to previous occupation.

### **Findings**

The Aboriginal survey recommended that no objection be raised to the proposed bulk sample extraction process.

## 7.4 Noise and Vibration

A full acoustic evaluation was carried out by Global Acoustics in September, 2002 and is attached **Appendix E**. The guidelines of the industrial noise policy were followed in the assessment. This sets the assessment method and recommended noise level targets for the proposed development.

The evaluation took into account the extraction operation and rehabilitation of the previous flint clay void. It addressed the background noise level and the noise level during the extraction process.

As the operation will not be carried out at night, sleep disturbance was not considered and due to the limited size of the development and the fact that there is no construction phase, the construction of infrastructure also was not considered. With regard to transport three extra trucks movements on the New England Highway per hour would only raise the heavy vehicle noise level by 0.6dB, which is imperceptible.

Background noise levels were taken at a number of locations and were configured to provide statistical noise data summaries every 15 minutes.

### Findings

The findings of the study were that the proposed activities would have an insignificant impact on noise levels within the area. The levels emitted from the proposed development are likely to be well below the criteria for all but the most adverse weather conditions. As the report details, even in the worse case conditions, only a marginally 1dB exceedance is predicted at the most affected residence. No exceedances are predicted for any other residence.

## 7.5 Ground Vibration and Air Blast

A range of scenarios was examined with regard to affectation at the two nearest residences.

Two Maximum Instantaneous Charge (MIC) values as well as two types of ground conditions were considered.

Using the worse case scenario, the predicted air blast value at the nearest residence was 103.1dB and the predicted ground vibration was 0.529mm/sec.

## Findings

Both these values are well within the limits provided for under EPA license conditions of 115dB and 5 mm/sec respectively. This is further reduced by the limited duration of the activity. The development is therefore expected to have a minimal impact.

## 7.6 Water Management

### 7.6.1 Surface Water

A full flooding and water assessment was carried out by Perrens Consultants Pty Ltd, refer **Appendix G**. The assessment took into consideration all surface water related issues including flooding, rehabilitation, clean and dirty water segregation, water demand, sediment and erosion control.

A second report into the water chemistry analysis of overburden for the Bulk Sample, was also undertaken by Robert Carr & Associates. This report reviewed the potential for leachate issues when water came into contact with overburden from the Bulk Sample area refer **Appendix H**.

## Findings

The findings of the Perrens report showed:

- That flooding was not an issue with the excavation being some 7m above the 1 in 100 flood level;
- Sediment, erosion control and rehabilitation requirements were detailed;
- Clean and dirty water segregation designs are included in the report;
- Water demand will be more than met from existing surface water and expected water make.

The water is of potable quality and any excess will be used for agricultural purposes by Bickham Coal Company rural operations. With regard to the effect on the Pages River,

from the Carr report, the leachate test results were well within the normal range and any impacts will be “insignificant”.

As regards acid sulphate, **Appendix H** states, “acid generation from the overburden samples is not expected”. Conductivity in the overburden samples was very low and “significantly lower than the Pages River”.

As detailed in the Carr Report, **Appendix H**, Heavy Metal concentrations were below the relevant guidelines except for copper and lead.

“The assessment of overburden leachate undertaken has identified that the concentrations of contaminants in leachate are not likely to impact on the receiving waters of the Pages River or on the aquifer at the site. The assessment is based on the concentrations of contaminants identified in the leachate being low and comparable to concentrations already existing in receiving waters and the volume of leachate being low in comparison to the volume of receiving waters.”

#### 7.6.2 *Ground Water*

A full ground water assessment of the Bickham Project area, with particular attention to the Bulk Sample area, was undertaken by Dundon & Associates. This assessment included the installation of 14 piezometers together with comprehensive pump tests, refer **Appendix J**.

This report dealt with:

- pre-excavation ground water quantity, quality and distribution;
- likely make into the mining area;
- post-excavation water level and water quality.

The effect of heavy metals in the ground water was assessed in **Appendix H**.

#### **Findings**

- Quantity of water in the bulk sample excavation area requiring removal by pumping is estimated at 230MI (1.3MI/day).

- The existing ground water quality in the bulk sample area, ranges from 270 – 622mg/l, with an average of ≈550mg/l..
- Pre-excavation water level ≈388m RL.
- Minimal change is expected in the post-excavation water quality and level.
- There is no direct hydraulic connection between the river and the ground water table.

With regard to any interaction between the Pages River and the ground water table in the vicinity of the bulk sample area, the Dundon report details that during drilling the first water intersections occurred at depths of 35m or greater, ie, well below the river bed level. This indicates that there was no direct hydraulic connection between the river bed and the ground water in proximity to these bores. No evidence of direct hydraulic connection between the ground water and the surface water is available from either the ground water levels or water quality.

In the flint clay void, the ground water is considered to be separate from the surface water. This surface water is believed to be derived by the collection of rainfall and runoff from the catchment upslope from the quarry. The water level in the quarry appears to fluctuate seasonally, under the influence of evaporation, and may even dry up altogether during extended periods without rain.

The Dundon Report concludes:

“The proposed bulk sample extraction program will have very little lasting impact on the ground water system, yet it will provide an excellent opportunity to observe the response of the ground water system to extended pumping. This will be invaluable for confirming the conceptual model of the groundwater flow system, and will allow the reliable calibration of the numerical model that will be set up for assessing the impacts of the full-scale mining operation. It will also allow the interpreted independence of the groundwater system from stream-flow in Pages River to be confirmed.”

With regard to the potential of heavy metals from overburden leachate on the groundwater table, the Carr Report stated:

“The Heavy metals analysed were also compared against the heavy metal concentrations identified in groundwater at the site. The concentrations in leachate were identified to be below the existing groundwater concentrations for those analytes

tests. On the basis it would be expected that any leachate from the overburden material would not impact on the heavy metal concentrations in the underlying aquifer.”

### 7.6.3 *Licensing and Regulations*

The scale of the development is relatively small and licences required relate primarily to the following areas:

- Dangerous Goods Licence
- Storage of fuel onsite for plant and equipment
- Storage and use of explosives onsite for blasting
- Rehabilitation of the previous flint clay void

If defined by the EPA as an extractive industry it would be classified as a scheduled activity requiring license under the Protection of the Environment Operations Act 1997, due to the fact that it will use over 30,000m<sup>3</sup> of material.

## **7.7 Air Quality**

Holmes Air Sciences were engaged to provide advice on both the likely effect from the Bulk Sample as well as establishing a meteorological and air quality monitoring network.

### **Findings**

Due to the short duration, relative remoteness and small scale of the Bulk Sample, little, if any, adverse impact is expected from the operation.

A network of gauges has been established and high volume dust sampling run concurrently with the Bulk Sample at the location nominated by Holmes Air Sciences.

A meteorological station has been established in the middle of the project area but slightly to the west of the likely final highwall.

## **7.8 Transport**

Transport of material will occur over a 12 week period at a rate no greater than 500 tonnes per day. Approximately 18 load per day will be transported south along the New England Highway to the Dartbrook Coal Processing Plant. This increase in traffic will be insignificant compared to the existing traffic on the New England Highway.

The intersection will be upgraded in response to the request from the RTA and all gravel roads will be watered to reduce dust. It is considered that transport of coal will have an insignificant impact. The RTA's approval for upgrading works on the highway will be required.

## **7.9 Economic Impact**

The mine represents an investment in both the local and national economy and the economic benefits are considerable.

The project has many social, environmental and economic positives. The social benefits, principally the provision of employment opportunities in a region with limited opportunities for alternative employment, are significant in the Upper Hunter.

The infrastructure used for the bulk sample will be temporary and therefore portable buildings will be used. It is expected that there will be two demountable buildings located some 400m to the south of the excavation area, however it is considered that there will be significant construction required with the establishment of the full mining proposal.

According to the 2001 ABS Census Basic Community Profile and Snapshot, the median weekly income for people aged 15 years and over in 2001 was \$200 - \$299. This has remained constant over the past 10 years.

Information obtained from the Coal Industry Profile publication 2002, shows the following statistics regarding the average weekly earnings for NSW Coalminers.

**Table 6 - Average Weekly Earnings, NSW Coalminers (\$)**

YEAR	UNDERGROUND				OPEN CUTS	ALL MINES
	NORTH	WEST	SOUTH	TOTAL		
1994-95	\$1,295.00	\$1,263.40	\$1,167.80	\$1,243.50	\$1,246.00	\$1,305.80
1995-96	\$1,332.90	\$1,441.70	\$1,272.90	\$1,327.30	\$1,429.50	\$1,363.40
1996-97	\$1,415.00	\$1,475.80	\$1,326.20	\$1,396.30	\$1,496.80	\$1,432.30
1997-98	\$1,519.70	\$1,580.20	\$1,507.10	\$1,526.40	\$1,559.30	\$1,554.40
1998-99	\$1,467.00	\$1,597.40	\$1,500.10	\$1,503.00	\$1,675.60	\$1,572.70
1999-2000	\$1,463.00	\$1,621.40	\$1,510.90	\$1,505.40	\$1,679.20	\$1,574.40
2000-2001	\$1,448.30	\$1,679.70	\$1,579.10	\$1,525.50	\$1,776.10	\$1,623.70

**Source: Coal Industry Profile 2002**

From these figures, it can be calculated that the average weekly wage for an open cut coal miner over the period 1994 – 2001 is \$15,83.21. There has been a 24.5% increase in wages over this period. Average wages for underground miners over the same period are \$1,432.00, with a 22.6% increase over the period.

At fully operational, it is expected that the proposed mine will employ some 60 persons. This has the potential to provide an additional \$94,980/week, or approximately \$4.9m/year, through wages. It can be reasonably expected that 80% of wages and flow-on income will remain in the locality.

## 7.10 Impact on Housing

It is expected that the short term increase in employment during the bulk sample phase (approximately 6 months) will only result in a small increase in the long- term numbers in the Murrurundi Shire. It is expected that this will not result in an increase in demand for housing in the Shire. Demand for short term accommodation may however increase during the bulk sample phase.

According to the 2001 ABS Census Basic Community Profile and Snapshot of all occupied private dwellings in 2001, there were 802 separate houses (93%), 6 semi detached, row or terrace houses (0.7%), 22 flats, units or apartments (2.6%) and 29 other dwellings (3.4%). Of all private dwellings, 571 were either fully owned or being purchased (66%) and 176 were being rented (20%). Comparative figures show that this percentage has remained relatively constant over the past 10 years.



It is characteristic of the coal mining industry in the Hunter that new employees choose not to relocate from their established place of residence, however, the management of Bickham Coal have given an undertaking that they will give preference of employment to workers and management who live in the Murrurundi Shire.

### **7.11 Impact on Community Services**

It is not anticipated that the bulk sample phase will result in the requirement for additional community services. Due to the relative isolation of the Shire, the development of the mine proper however and the associated increase in the population of the Shire, will create a need for an upgrading of a range of community services and facilities currently available within the Shire.

## SECTION 8

### PROJECT JUSTIFICATION

#### 8.1 Alternative To The Development Proposal

Due to the particular problem with coal from the Bickham area, namely the iron level in the ash, for the main project to proceed, a sufficient sample size was needed to:

- assess its effect on boiler fouling; and
- what processing methodology, if any, could be used to remove the high iron coal.

Drilling and core recovery has been extremely difficult at Bickham due to the nature of the strata, the dip of the strata and in the upper sections, the effect of prehistoric deep cinders. Small diameter core would not recover a sufficient tonnage and large diameter core recovery (ie, +500mm diameter) was believed to be impractical given the difficulties with slim core (65 mm).

The possibility of an underground sample was considered, however, safety concerns associated with the old Bickham underground precluded such an option. In addition, a sample was required from both the E and G seams and an underground sample would not have provided this.

Other sites for the Bulk Sample were considered, however, the absence of low ratio / low cover coal meant that other locations which accessed both the E and G seams generated more overburden than the 500,000m<sup>3</sup> of void space available in the old flint clay void.

A secondary, but very important, benefit to flow from the Bulk Sample is ascertaining whether or not a coal preparation plant would be needed for the coal and, if required, what type.

Should a preparation plant not be required, it has advantages for the project as a whole.

There are therefore no economical or practically viable alternatives to taking the bulk sample in the manner as proposed. The bulk sample location and method provides the least amount of impact over the shortest operational time.

All viable alternatives were examined and the bulk sample as proposed was considered the most favourable.

## **8.2 Consequence of Not Proceeding**

As previously stated, the qualities of the coal need to be assessed and the only practical way of doing this is to remove the 25,000 tonnes of coal for processing through the prospective client's boilers.

If this is not carried out then the quality of the coal cannot be assessed. This in turn places significant doubt over the financial viability of the development. Questions in regard to the quality of the coal could not be answered, therefore limiting its market potential and significantly prejudicing the project proceeding at all.

Analysis of the bulk sample will determine whether a coal preparation plant is required and if required, in what form. There are significant benefits both financially and environmentally if a coal preparation plant is not required. If the bulk sample is not removed for testing and if the development does proceed, it will be more than likely that a coal preparation plant would be factored in and provided irrespective of whether it was needed or not.

The extraction of the bulk sample also provides an opportunity to establish valuable monitoring and modelling validation on site to calibrate future expected impacts of the larger operation. If the bulk sample did not proceed, there would be no opportunity to carry out this validation work.

## **SECTION 9**

### **CONCLUSION**

The proposed extraction of a bulk sample is defined as “Bulk Sample” under the Exploration License under the Mining Act. The consent authority, being the Minister for the Department of Mineral Resources, is charged with the responsibility of considering the application, its impacts and imposing conditions as may be required should it be demonstrated that any impacts can be appropriately dealt with.

The qualities of the coal on this site need to be assessed to appropriately plan for the future development of the site. The only viable means of obtaining this sample is as outlined in this Review of Environmental Factors.

The Review is accompanied by a number of specific studies, all of which have found that the proposed activity will have an insignificant impact. All Government Agencies have been contacted and they have raised no significant objection to the development.

The studies will be expanded to cover the whole site should it be found that it is viable to continue with the larger project under a separate development application

This Review of Environmental Factors has concluded that the proposed development has an insignificant level of impact and can proceed with appropriate consideration and imposition of standard conditions.