



MINERALS EXPLORATION | INDUSTRIAL MINERALS | ENERGY RESOURCES | TENEMENTS MANAGEMENT

## Exploration Licence 7407

# REVIEW OF ENVIRONMENTAL FACTORS

## VICKERY SOUTH COAL PROJECT EXPLORATION DRILLING PROPOSAL STAGE 2

Project commissioned by  
Coalworks (Vickery South) Pty Ltd

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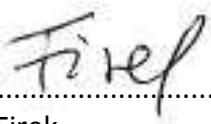
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Coalworks (Vickery South) Pty Ltd warrants that the information contained in this document is a true and accurate statement.

Signed:  .....Date: 9 February 2010  
Andrew Firek,  
Managing Director, Coalworks Limited

## 1. INTRODUCTION

Coalworks (Vickery South) Pty Ltd holds Exploration Licence (EL) 7407 for coal in the Gunnedah area, northern New South Wales. Coalworks (Vickery South) Pty Ltd (“Coalworks”) is a wholly owned subsidiary of Coalworks Limited. This Review of Environmental Factors (REF) has been prepared as a supporting document for the drilling of up to 55 cored and non-cored drill holes within EL7407.

The proposed programme represents Stage 2 of a progressive drilling campaign which aims to upgrade the initially defined Stage 1 Inferred Resource to a Measured Resource status in compliance with JORC guidelines.

### 1.1 Locality

EL 7407 is located between Gunnedah and Boggabri (Figure 1) in northern New South Wales and is centred approximately 25km north northwest of Gunnedah and 15km south east of Boggabri. EL 7407 is situated within the Manilla 1:250,000 sheet SH56-09 and Boggabri 8936 1:10,000 topographic map sheets. The licence covers an area of about 720 hectares.

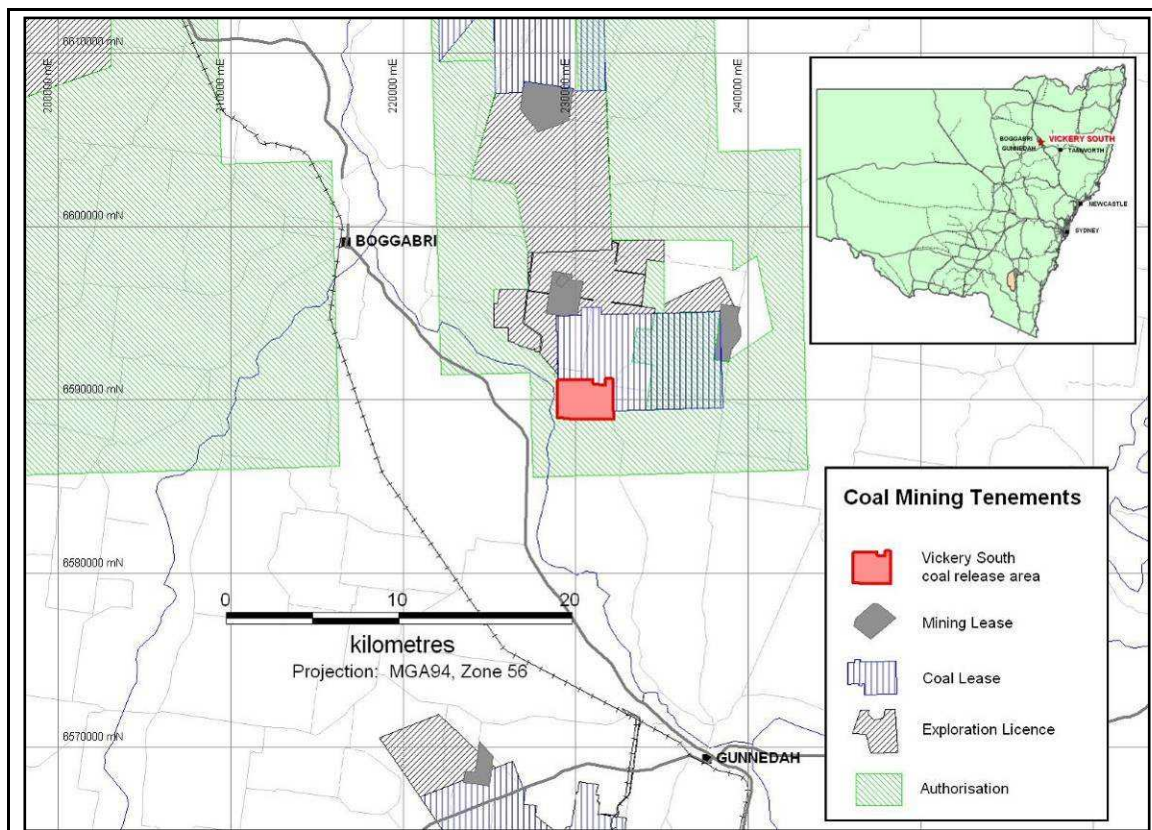
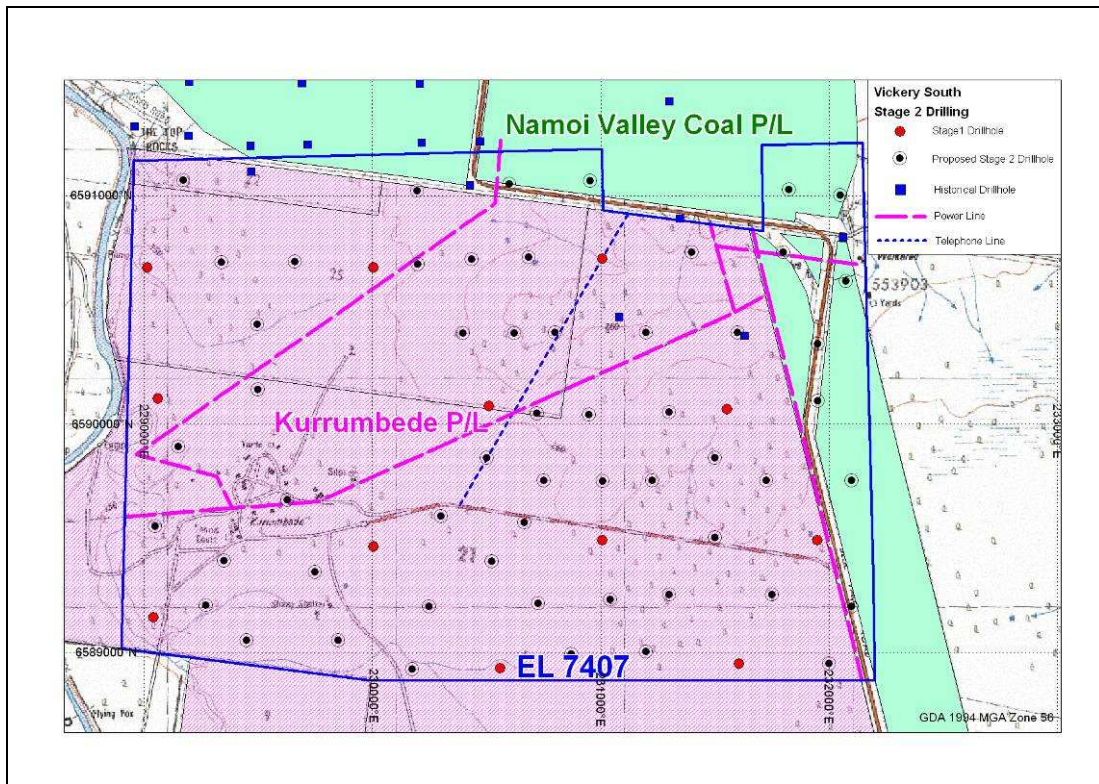


Figure 1: Location of EL 7407

There are 12 land parcels of the Gunnedah Local Government Area within EL7407 but within the area of the proposed drilling, only 7 parcels and 2 landowners are affected (Figure 2 and Table 1).



**Figure 2: Landholding within EL7407**  
 [Stage 2 drill hole collars shown in black]

**Table 1: Landowners Affected by the Proposed Programme**

Landowner	Lot/ DP	Agreement
Kurrumbede P/L	9/754929	Written agreement
	21/754929	
	22/754929	
	25/754929	
Namoi Valley Coal	3/1018347	Verbal, written agreement in progress
	2/1018347	
	7/1018347	

## **1.2 Description of the activity**

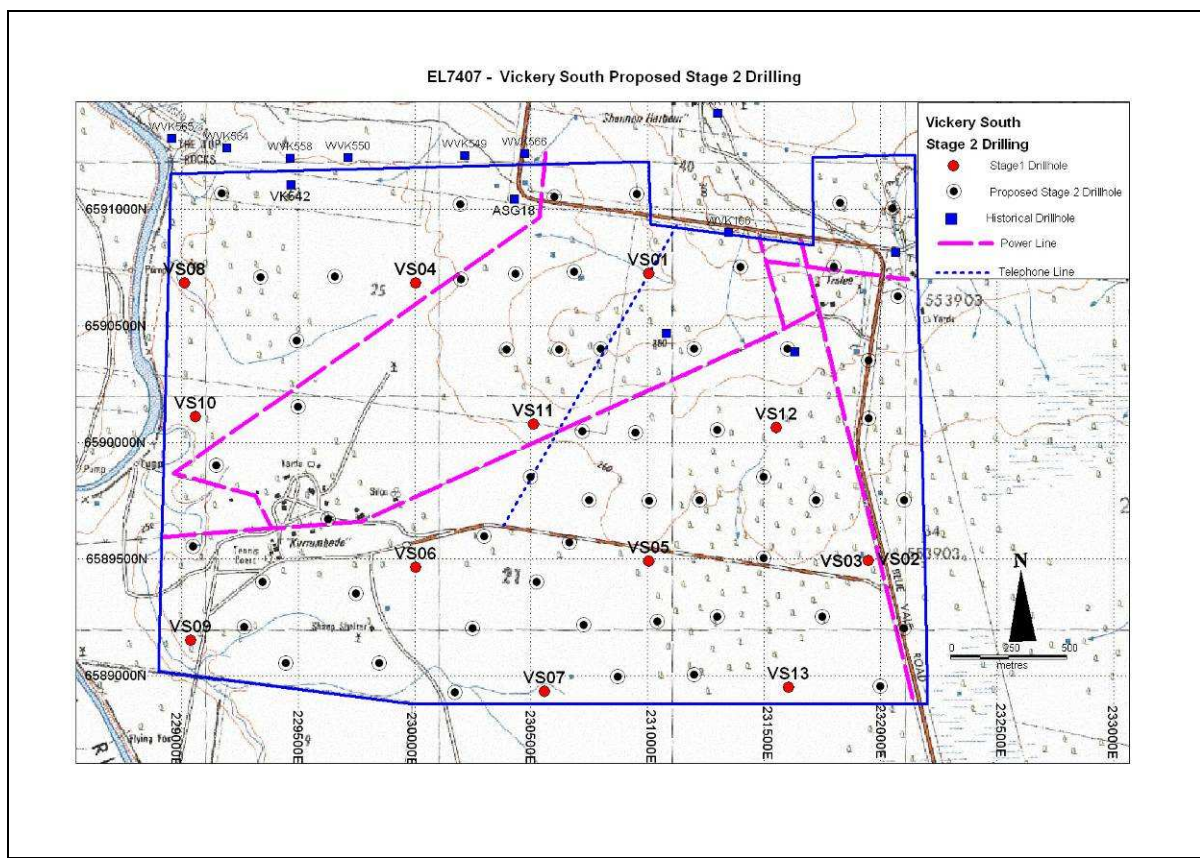
### **1.2.1 DRILLING**

This proposal provides for the drilling of a maximum of 55 vertical (200mm diameter) holes, spaced at approximately 300m-400m apart, throughout the whole of EL7407 (Figures 2 and

3) with the aim to upgrade the Inferred Resource to Measured Resource estimation compliant of JORC guidelines. The final number of and spacing of drill holes to be completed will depend upon an assessment of requirements to satisfy the JORC guidelines in regard to defining a Measured Resource and continuous geological evaluation during the drilling campaign. Hole depths will vary between 150m and 200m.

The exact drill site locations may require adjustment due to cultural and other factors. Adjustments to the drill hole locations are to be minimised but where necessary will be made upon consultation with the landholder.

Approximately twenty five (25) drill holes will be open hole drilled to confirm depths to basement and seam thickness. The remaining holes will be cored (or partly cored) to obtain preliminary indications of coal quality for JORC compliant resource estimation.



**Figure 3: Proposed Drill Hole Locations**

Drill hole at 230665mE 6589568mN and 229350mE 6589400mN, (PLS2\_16 and PLS2\_43, respectively in Table 2) is notably close to outbuildings of “Kurrumbede” property and may lie within the required 200m distance away from dwellings. Permission to drill this hole will be negotiated with the landowner and the hole may have to be moved to greater than 200m from any dwelling or not drilled. All other drill holes are at distances of greater than 200m from any dwelling.

The proposed coordinates of the drill sites are presented in Table 2.

**Table 2: Coordinates of Proposed Drillholes**

Interim Drill Hole ID	Easting (MGA94)	Northing (MGA94)
PLS2_1	230622	6590397
PLS2_2	229172.6	6591066
PLS2_3	230200.4	6590697
PLS2_4	230197.6	6591020
PLS2_5	230600	6591050
PLS2_6	229270.8	6589204
PLS2_7	230434.3	6590720
PLS2_8	229340.1	6590706
PLS2_9	229496	6590434
PLS2_10	230720.1	6590045
PLS2_11	230396.8	6590397
PLS2_12	230800	6590400
PLS2_13	231200	6590400
PLS2_14	231950	6590350
PLS2_15	231600	6590400
PLS2_16	230665.3	6589568
PLS2_17	229500	6590150
PLS2_18	230950	6590040
PLS2_19	231950	6590100
PLS2_20	231400	6590750
PLS2_21	231800	6590750
PLS2_22	231825	6591025
PLS2_23	231225	6589750
PLS2_24	231725	6589750
PLS2_25	231500	6589500
PLS2_26	231300	6589250
PLS2_27	231750	6589250
PLS2_28	230873.2	6588991
PLS2_29	231200	6589000
PLS2_30	230750	6589750
PLS2_31	230300	6589595
PLS2_32	230523.8	6589398
PLS2_33	230250	6589200
PLS2_34	229850	6589050
PLS2_35	229050	6589550
PLS2_36	229660.6	6590709
PLS2_37	230685.5	6590729
PLS2_38	231300	6590050
PLS2_39	230725.9	6589213
PLS2_40	229750	6589350
PLS2_41	229450	6589050
PLS2_42	231043.5	6589230
PLS2_43	229350	6589400
PLS2_44	231008.8	6589747
PLS2_45	230954	6591064
PLS2_46	232100	6589200

Interim Drill Hole ID	Easting (MGA94)	Northing (MGA94)
PLS2_47	232000	6588950
PLS2_48	232100	6589750
PLS2_49	229150	6589900
PLS2_50	231500	6589850
PLS2_51	230500	6589850
PLS2_52	230175	6588925
PLS2_53	229628.8	6589666
PLS2_54	232050	6591000
PLS2_55	232075	6590625

The area is being used for agriculture, mainly grain crops and grazing (Photos 1 to 2). Unsealed public roads occur on the eastern and northern boundaries of the drilling area. Access to drill sites generally does not require any additional track work. Each drill site will be cleared (approx. 20m x 20m pad) where necessary and at sites where the drilling method requires them, two mud pits (3m long x 2m wide x 2m deep) plus a 1m x 1m x 1m pit to contain additional sand cuttings will be dug using a backhoe or excavator (Photo 3). Excavated material will be contained adjacent to each pit and topsoil separated from any subsoil, if applicable. If any vegetation is present it will be avoided where possible.



**Photo 1: Typical view of EL7407**



**Photo 2: Typical view of EL7407**



**Photo 3: Typical view of drill site with sumps**

The maximum area of clearing for the 55 drill sites is 2.2ha but as indicated, most of the area is flat, cleared agricultural/grazing land requiring no clearing and minimal site preparation. Clearing for protection from bush fire is not required.

Water for drilling purposes is sourced from local dams or Gunnedah Shire standpipe in consultation with the landowners or Gunnedah Shire and is supplied via the drilling contractor's water truck. Water based drilling fluids and polymers may be required to control swelling clays and/or to increase the stability of the various geological formations intersected but none of these are considered harmful to the immediate environment.

The drilling crews and associated contractors employed for this activity will be accommodated in the local motels in Boggabri or Gunnedah, approximately 15 and 25km respectively from the drill sites. A single 12 hour shift will be worked with one truck-mounted drill rig with two support vehicles (ie water truck and utility) is proposed to be utilised. One trailer may also be used to carry drill rods and other portable equipment (eg tool kits, generator, angle grinder, welding equipment).

Drilling will commence after completion of Stage 1 drilling and on approval of this REF. The Proposed Stage 2 drilling campaign is expected to take up to 160 days, including subsequent geophysical logging. Completion time will depend upon the final number of holes drilled.

Mitigation measures applied in regard to the drilling include:

- Site disturbance will be kept to a minimum as most drill sites are located within paddocks or adjacent to unsealed roads and fence lines.
- Existing tracks will be used wherever possible to access the drill sites.
- No trees will be cut in this project.
- Fauna will be unharmed.
- Garbage bins will be provided and littering will not be allowed.
- Any water extracted as well as drilling fluid medium will not be discharged into waterways.
- Drill holes will be grouted and capped (see Section 5) and drill sites rehabilitated progressively.

### ***1.3 Justification of the Activity***

Drilling to obtain representative samples that can be analysed is the only method applicable to be able to satisfy the requirements of the JORC Code which will enable an Inferred Resource to be upgraded to Measured Resource estimate. On the basis of this resource estimate, further Limit of Oxidation (LOX) drilling may be justified to upgrade the resource category to a point where a mining feasibility study may be completed to determine the economic viability of the project.

## **1.4 Evaluation of Alternatives**

The only method of testing for subsurface existence and quality of coal seam is to drill exploration holes aimed at intersecting overburden formations and the coal bearing sequence. Surface mapping of the base of sedimentary sequence by geophysical exploration are only able to provide an interpretative view of geological parameters and the discovery of coal relies on drilling.

Drilling of these holes is part of the approved work program for EL7407 as stipulated in the licence document.

## **2. Planning Context**

### **2.1 Licences and Approvals Required**

This proposal satisfies the definition of an activity under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act) for which a REF is required for determination by the determining authority, Industry and Investment NSW.

The State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 allows development for the purposes of mineral exploration to be carried out without consent, subject to certain exemptions.

Coalworks (Vickery South) Pty Ltd is the registered holder of EL7407 and under the terms of this authority, has the right to all the conditions and provisions contained in the Mining Act 1992. One such condition is the agreement for access to land covered by the authority. Affected landowners have been advised and a compensation agreement has been negotiated with Kurrumbede Pty Ltd and is being currently negotiated with Namoi Valley Coal.

Under Section 5A of the EP&A Act, consideration must be given to the effect on threatened species, populations or ecological communities or their habitats by way of the 'seven part' test.

Coalworks (Vickery South) Pty Ltd is also required to consult the register of Critical Habitat under the requirements of the Threatened Species Conservation Act 1995.

### **2.2 Zoning**

The proposed drilling will be located in the Gunnedah Shire Council area and as the land is rural, the application of SEPP 2007 overrides any zoning controls.

### **2.3 Stakeholder Consultation**

Key stakeholders relevant to the proposed drilling and ground magnetic survey include:

Industry and Investment NSW – as the licence has only just been granted the only previous exploration completed by the company has been the Stage 1 drilling programme.

Department of Water and Energy – application has been made for two groundwater monitoring bores.

Gunnedah Shire Council - initial contact with the council has been made.

Landowners (Kurrumbede and Namoi Valley Coal) – landholders have been informed of the project and agreements are being negotiated.

NSW Aboriginal Land Council – all exploration will be conducted on either freehold land or road reserve.

Community - ongoing community consultation is planned as the project develops.

General public – several ASX releases have been made and these are publicly available documents on the company's website <http://www.coalworks.com.au/>

### **3. Existing Environment**

The Vickery South Project EL7407 occurs within the Brigalow Belt South bioregion and is part of the Namoi Catchment Management Board (CMB) area. This bioregion is dominated by various landscapes that include alluvial fans and outwash slopes of Quaternary age. The project is within the Liverpool Plains Regional Vegetation Committee area and is 1.6kms south west of the south west corner of the Vickery State Forest. Vegetation is marked by plains grass on black earths with occasional box and wilga.

The project is located within the catchment of the Namoi River and the programme will create some disturbance to a small proportion of the catchment area. However this area is not prime agricultural land.

#### **3.1 Landforms and Geology**

The region is marked by undulating hills and sloping plains with alluvial channels and floodplains with extensive black earths on low angle slopes. Brown clays, alluvial soils and red or brown texture contrast soils on slopes below sandstone. The immediate landform in the project area is flat rural agricultural land characterised by cropping and grazing and sparse rural development. Rural activities comprise agricultural cropping, local roads and sheep grazing land.

The bioregion's bedrock comprises horizontally bedded Jurassic and Triassic quartz sandstone and shale with limited areas of conglomerate or basalts (Table 3). Today's landscape is dominated by Quaternary sediments in the form of alluvial fans and outwash slopes. The relative distribution of sediment from basalt or sandstone has a major impact on soil quality and vegetation.

Mapping by the NSW Geological Survey of the Maules Creek Formation and previous drilling have noted up to 25 coal seams, generally ranging in thickness from 1.5m to 3.5m, with typically low ash, high volatile, high specific energy, low sulphur thermal and coking coals.

In the Vickery South area, the main seams are (from top to bottom) the Gundawarra, Welkeree (thin), Shannon Harbour Upper, Shannon Harbour Lower, Stratford, Blue Vale (generally poor quality) and the Cranleigh seams. It is noted however that coal seam correlations are tentative at this stage only.

In the western part of the tenement, the Boggabri Ridge, a NNW-trending basement high of Lower Permian volcanics, has restricted the development of coal seams. Boreholes in this area reached basement at around 40-60m below surface (Figure 6).

In the eastern part of the release area, basement was reached at depths of around 180-230m. Overall, the average depth to basement is around 150m.

**Table 3: Stratigraphic Section, Oaklands Area**

Period	Group	Formation	Lithologies
QUATERNARY			Alluvial deposits of silt and clay
TERTIARY		Nandewar Volcanics, undiff sediments	Basalts, dolerites, sandstones
JURASSIC		Orallo/ Purlawaugh Formations, Pilliga Sandstone	Quartz pebble sandstone and minor basalts
TRIASSIC		Deriah/ Napperby/ Digby Formations	Lithic sandstone, siltstone and conglomerate
PERMIAN	Black Jack Group	Trinkey/ Wallala/ Benelabri Formations and Hoskissons Coal	Claystone, quartz sandstone and coal
	Millie Group	Watermark/ Porcupine Formations	Silty fossiliferous sandstone with basal conglomerate
	Bellata Group	Maules Creek Formation	Carbonaceous claystone, siltstone and coal
		Goonbri Formation	Carbonaceous siltstone and coal
		Leard Formation	Flinty claystone, sandstone
	Werrie Basalt/ Boggabri	Basaltic lavas, rhyolitic to dacitic	

		Volcanics	lavas, tuffs
CARBONIFEROUS		Currabubula Formation and others	Conglomerates, feldspathic arenites

### **3.2 Climate**

The Gunnedah area experiences warm summers and cool winters. Mean temperatures range from 3° C to 34° C. Annual mean rainfall is 617mm, with a monthly maximum of 71mm. The heaviest rainfalls usually occur between December and February.

Plant growth is most vigorous in summer but can occur all year, although germination may be limited to the period from spring to early autumn.

## **4. Environmental Impacts and Management**

### **4.1 Air**

There are two potential impacts on air quality from the proposed programme and these are related to dust emission from use of dirt access roads and dust and exhaust emissions generated by the drilling operations.

#### **4.1.1 MITIGATION MEASURES**

The dust generated by the mobilisation of drilling and ancillary vehicles travelling to and from a location will vary depending upon road and weather conditions. On public improved roads dust will not be a significant issue. In consultation with landowners, speed limits may be imposed to minimise dust when passing homesteads.

Movement of equipment on unsealed and poorly formed roads or tracks may potentially have more impact upon dust generation. Dust will be minimised by driving very slowly in these instances and speed limits will be enforced.

Exhaust emissions from the drilling rig and associated plant will be temporary and is not expected to lead to significant deterioration of air conditions on or adjacent to the site.

Consideration will be given as to any interaction between agricultural and mining land uses.

### **4.2 Water**

The project lies within the Namoi CMB area. The Namoi Catchment in north west NSW is bounded by the Great Dividing Range in the east, the Liverpool Ranges and Warrumbungle Ranges in the south, and the Nandewar Ranges and Mt. Kaputar to the north.

The Namoi River is located immediately to the west of the western boundary of EL7407 and the Lower Namoi Groundwater Source is adjacent to this river. The groundwater is contained in the unconsolidated alluvial sediment aquifers associated with the Namoi River and its tributaries. A water sharing plan is current (since 2006) for the Lower Namoi Groundwater Source and a licensing system in force. Bores drilled through the unconsolidated alluvial sediments into the underlying Great Artesian Basin (GAB) are tapping a different groundwater source and are not part of this plan.

No planned drill holes are located within 40m of any defined watercourse<sup>1</sup>.

#### 4.2.1 MITIGATION MEASURES

All meteoric water will be directed around each drill site through proper drainage so that water does not flow from adjacent areas onto the drill site or from the drill site onto adjacent areas. Drill sites will not be constructed within 80m of any natural stream or watercourse.

All liquid waste and cuttings resulting from drilling and completion operations will be collected in appropriate liquid and solid waste containers and will be moved and disposed of after the operations. The drilling mud will be mixtures of water and bentonite and no particular mitigation activity is planned. Drilling fluids are composed of natural ingredients, mainly bentonite which is not classified as a hazardous material. Bentonite is not considered a pollutant of aquifers as it will tend to seal around the hole rather than infiltrate into the aquifer.

Either a portable tank will be used for drill mud circulation or a small pit will be dug to recirculate the mud used. If an in ground pit is used, the topsoil removed during the pit construction will be removed and stored separately. Any pit will be no more than 12m<sup>2</sup>. All in ground pits will be fully lined with waterproof thick polypropylene liners. These pits will be fenced using builder's barricade mesh (Photo 4) to exclude livestock and other animals. After drilling the pits will be allowed to dry out, the mud and liner will be removed, and then the pits will be backfilled (with the topsoil being replaced last) and re-contoured to the original contour of the land, and the fencing removed once it is no longer required to protect vegetation regrowth from stock.

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<sup>1</sup> Considered to be any defined channel where water flows intermittently or permanently.



**Photo 4: Typical barricading of sump during use**

Water for drill purposes will be sourced from local dams or Gunnedah Shire standpipe located in the vicinity of EL7407, subject to approval from the landholder or council before drilling. There is considered to be negligible impact on ground water levels from drawdown as a result of the drilling operations.

During the drilling programme subsurface waters and multiple aquifers are anticipated and procedures adopted will be as provided for in “EDG01 Borehole Sealing Requirements on Land: Coal Exploration”. All intersected potential aquifers will be sealed from bottom of hole to the next aquitard or top of hole if required, by an approved grouting mixture and records will be kept of depths, hole diameter and grouting method. At completion of each hole, all casing will be removed, where possible and each hole will be grouted to surface or to 15m above the top aquifer, or as required to meet best practice standards. The final grouting will be depth tested to ensure that all aquifers are sealed.

### **4.3 Soils**

The soils in the Gunnedah Shire are some of the most richly fertile in Australia. In 1976 they were categorised by the Department of Conservation and Management into six mapping units:

- Cracking Clay Soils - Black Earths, Red, Brown and Grey Clays.
- Skeletal Soils associated with steep topography - Lithosols
- Duplex and "Gravelly Soils" - Solodic soils and gravelly red brown earths.
- Clay and Loam Soils associated with river flood plains - Red, Brown and Grey clays, covered by a thin layer of recent alluvium.
- Highly Erodible Hard setting loam soils - Red, Brown Earths, Structured loams and Non Calcic Brown soils.
- Clay Loam soils with Red Clay subsoils, Neutral to Alkaline pH - Euchrozems

Within EL 7407 the main soil types are most likely to be clay and loam soils associated with the alluvial plains of the Namoi River.

For the proposed drilling programme the only site preparation required is a mud pit which will be dug out on the site.

- topsoil stocks are protected by their removal and stockpiling for replacement during site rehabilitation.
- the subsoil material excavated in the construction of the mud pits is stockpiled separately for replacement prior to topsoil replacement. The mud pits will be approximately 2 x 4 metres with a depth of 2m.
- fencing of the site will occur where directed by the landholder.

#### **4.3.1 MITIGATION MEASURES**

At the completion of the drilling operations, the drill holes will be plugged and abandonment procedures will be implemented.

The site rehabilitation process will include:

- replacement of stockpiled topsoil
- return of natural/previous land contours
- reseeding if required in consultation with landholders

All sites will be inspected by the geologist in charge following rehabilitation to ensure that all rehabilitation work has been completed successfully. Any necessary remediation will be carried out promptly following this inspection.

## **4.4 Noise and Vibration**

The proposed programme will generate noise as a result of:

- drilling activity
- movement of trucks and vehicles
- field portable generator

All equipment used for mobilisation and powering of the drilling rig uses mufflers on the prime movers. The muffling of the engines combined with the distance from habitation and towns and the limited duration of the drilling and completion of operations is unlikely to create any significant noise impacts for residents.

#### **4.4.1 MITIGATION MEASURES**

It is not anticipated that there will be any significant noise impacts for residents in the area, however the following measures will be undertaken:

- identification of all potentially affected noise recipients (rural residences, noise sensitive equipment)

- notification of all affected residences and other parties in advance of the activities commencing
- noise and vibration monitoring may be undertaken subject to the nature of any expressed concerns
- A noise impact assessment may be carried out in accordance with the NSW Industrial Noise Policy. This would include modelling scenarios utilising numerous meteorological conditions and operational scenarios.

#### **4.5 Flora and Fauna**

A number of searches have been carried out:

- A search of the Department of Environment and Conservation Atlas of NSW Wildlife to determine which threatened flora and fauna listed under the Threatened Species Conservation Act 1995 have been recorded in the area. The results indicate that 5 faunal species (2 avian and 3 mammals) and no floral species are listed as either vulnerable or endangered (Table 4).
- A search of the Department of Environment, Water, Heritage and the Arts to determine whether any nationally listed threatened species are likely to occur within the project area. This also included world heritage properties, national heritage places and wetlands of international significance. A number of threatened species are listed whose habitats will need to be accurately located to determine any impact on the project area.
- Obtaining the list of Endangered Ecological Communities using the Department of Environment and Climate Change web site. The list includes those known and protected to occur within the Namoi CMA and Liverpool Plains Part B Sub-region. There are 3 identified Endangered Ecological Communities within the Liverpool Plains Part B Sub Region which 6 may be considered relevant to the Vickery South Project Area. In addition, 47 animals and 8 plant species are known to be endangered or vulnerable.
- Compilation of the list of potentially threatened aquatic species through the NSW Fisheries web site. There are 6 endangered species and 2 vulnerable species recognised within the freshwater environment within the region.

**Table 4: Threatened Faunal Species**

Aves	Map	Scientific Name	Common Name	Legal Status	Count	Info
Pomatostomidae						
	<input type="checkbox"/>	<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V	1	<a href="#">Species</a> <a href="#">Description</a> <a href="#">PDF file</a>
Psittacidae						
	<input type="checkbox"/>	<i>Neophema pulchella</i>	Turquoise Parrot	V	2	<a href="#">Species</a> <a href="#">Description</a> <a href="#">PDF file</a>
Mammalia	Map	Scientific Name	Common Name	Legal Status	Count	Info
Emballonuridae						
	<input type="checkbox"/>	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	V	1	<a href="#">Species</a> <a href="#">Description</a> <a href="#">PDF file</a>
Molossidae						
	<input type="checkbox"/>	<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	V	1	<a href="#">Species</a> <a href="#">Description</a> <a href="#">PDF file</a>
Phascolarctidae						
	<input type="checkbox"/>	<i>Phascolarctos cinereus</i>	Koala	V	3	<a href="#">Species</a> <a href="#">Description</a> <a href="#">PDF file</a>

#### 4.5.1 MITIGATION MEASURES

The likelihood of disturbing actual or potential habitat associated with species sighted in the area is low because the scale of cultivation occurring locally and the presence of remnant vegetation suitable for inhabitation by birds and mammals. Drill hole sites have been laid out to avoid disturbance to undisturbed remnant vegetation. Reconnaissance will be carried out prior to commencing drilling to confirm this and to ensure there will be no disturbances to habitats.

There is a potential for the introduction of weeds and pests to the area via the entry of vehicles and other equipment. This possibility will be minimised by:

- All vehicles and plant will be washed down prior to entry to the exploration area to remove all soils and organic matter.
- Reconnaissance of all proposed drill sites to identify any weeds present
- Determination of any additional measures to be taken, including the wash down of vehicles between drill sites

In assessing the impact of the proposed programmes in relation to Part 5A of the Environmental Planning and Assessment Act 1979, Table 5 sets out a summary of the criteria and their assessment.

**Table 5: Risk Assessment of Proposed Programme and Mitigation**

Assessment Factor	Application to:	
	Fauna	Flora
<b>A. Proposed Programme</b>		
Adverse effect (risk of extinction) on threatened species	Minimal risk	None
Adverse effect (risk of extinction) on endangered population	Minimal risk	None
Adverse effect (risk of extinction) on endangered ecological community	Minimal risk	None
Habitat likely to be removed, modified, fragmented either due to programme or in longer term	Minimal risk	Minimal risk
<b>B. Proposed Mitigation</b>		
Likelihood of adverse effect on habitat	Nil	Nil
Consistent with actions of a recovery plan <sup>2</sup>	Yes	Yes
Part of a key threatening process <sup>3</sup>	No	No

## **4.6 Chemical and Hazardous Substance Management**

Protection of the surface and subsurface environment is an important consideration in drilling activities. Chemicals typically carried by a drilling operation include, diesel, oils, greases, hydraulic fluids and drilling fluids.

In the case of subsurface waters and aquifers, the holes will be grouted between the base and the top of the aquifer to ensure sealing. Drilling fluids are composed of natural ingredients, mainly bentonite which is not classified as a hazardous material. Bentonite is not considered a pollutant of aquifers as it will tend to seal around the hole rather than infiltrate into the aquifer.

### **4.6.1 MITIGATION MEASURES**

Material Safety Data Sheets (MSDS) will be held by each contractor on site. The amount of chemicals and any hazardous substances stored and used on site will be kept to the minimum required to maintain operations efficiently. Transport, storage and handling of these substances will be in accordance with relevant NSW and/or Commonwealth legislation.

## **4.7 Contaminated Land**

The only potential pollutants on the site will be engine fuels and oils which are monitored regularly. Drilling additives acceptable for use are biodegradable or inert and the stabilisation/weight additive is a widely used farm fertiliser.

<sup>2</sup> See Part 4 of the Threatened Species Conservation Act 1995

<sup>3</sup> See Schedule 3 of the Threatened Species Conservation Act 1995

#### 4.7.1 MITIGATION MEASURES

At each drilling site, strict environmental procedures will cover the recirculation of drilling fluids, provision of spill kits, constant monitoring of all activities and subsequent rehabilitation of the site.

Any spills of fuel or oil will be treated by removal of any contaminated soil and either treated on site (with the landowner's approval) or transported to a registered treatment facility. Spills will be reported in accordance with regulatory and licensing requirements.

Vehicles will be checked regularly for oil leaks.

### **4.8 Waste Minimisation and Management**

Staff will be housed at accommodation in nearby towns.

Each drill site will create solid and liquid waste during drilling eg drill cuttings, drilling fluids and this will require treatment and/ or disposal.

#### 4.8.1 MITIGATION MEASURES

All waste generated in the drilling sites will be collected and disposed of at the approved local council sites. Water based drilling fluids are contained within sumps on site to be later removed and treated as general waste. Domestic waste will be regularly collected in appropriate bins and in order to not attract vermin will be disposed of in a licensed waste management facility.

### **4.9 Natural Resource Use**

The only demand on resources will be water for use in the preparation of drilling fluid. The quantity of water is estimated to be around 10,000 litres per drill hole. Water required will be obtained from local dams or bore holes approved by local landowners and/or the Gunnedah Council.

Any electricity requirements will be obtained from on-site generation.

#### 4.9.1 MITIGATION MEASURES

No mitigation measures are required on the resource use.

### **4.10 Impact on the Community**

Gunnedah has a population of 7,500 and is the nearest town apart from Boggabri which has a population of about 1000. The project area contains alluvial plains which are extensively cultivated.

There are dwellings within 100m of the closest drilling sites and as such permission will be sort from the occupier to conduct this drill hole else the hole will be moved in accordance with agreement from the landholder. The proposed drilling program will only be operated only during daylight hours and location of these close holes will be negotiated with the occupiers concerned. If it is deemed necessary to change the operational hours to two 12 hours shifts, Coalworks will seek advice from the DII and landowners to address any concerns and conduct a risk assessment.

Potential impacts include disturbance to farming activities and livestock and potential bushfire risks to flora, fauna, stock and personnel. Increase in local traffic is expected to be minimal as most activity will be confined to two periods early morning and evening. The activities will utilise existing tracks and roads where possible although some access through private land will be required.

Local businesses will benefit from the regular and long term (6 months) requirements of drilling contractors, including accommodation, supermarkets, hardware supplies.

#### **4.10.1 MITIGATION MEASURES**

Prior to the commencement of drilling, landowners will be consulted and advised of the planned activities. Any requests for rescheduling will be accommodated where possible. Immediate neighbours will also be advised of the impending programmes.

Access roads will be maintained in a condition satisfactory to the DPI and landowners and where unfenced roads are present, all staff and contractors will be advised of the hazards associated.

The erection of temporary fencing around the drilling sites will avoid the potential for injury to livestock. In addition a cleared buffer will be maintained outside the drilling pad to maintain an effective barrier against bushfire.

Liaison with the local rural fire service will be maintained and a fire control pump and hoses kept on site. Open fires will be prohibited and any necessary hot work procedures will be in place.

### **4.11 Visual Assessment**

The regional landscape is dominated by wide vistas of flat lying rural properties with scattered pastoral infrastructure such as bores, tanks, dams, fences, roads and homesteads. The proposed drilling sites are visible from the nearest residences and some sites are close to public roads and other farm infrastructure.

The drilling period at each site is expected to average 2-5 days and all sites will be maintained in a tidy appearance during the drilling period and after the operation the sites will be rehabilitated.

It is anticipated that there will be minimal visual impact as a result of the proposed programmes.

#### 4.11.1 MITIGATION MEASURES

Coalworks will monitor the appearance of all sites and respond quickly to any concerns or complaints from the general public.

### **4.12 Heritage**

The exploration drill holes are located on the edge of farm lands currently under cultivation, and grazing lands. The proposed sites possess no known special attributes in connection with aesthetic, anthropological, archaeological, architectural, cultural, scientific, social or other special values.

#### 4.12.1 ABORIGINAL HERITAGE

An assessment of the existing information relating to the Aboriginal cultural heritage of the project area was undertaken and included a search of the NSW State Heritage Register and Inventory, the Australian Heritage Database, the Register of the National Estate and the Singleton and Musswelbrook Council LEP.

No Indigenous Protected Areas have been recorded and no indigenous or European sites have been recorded in these databases within the project area. Any sites which may have existed in the immediate vicinity of the drilling are likely to have been disturbed by agricultural activities.

#### 4.12.2. OTHER CULTURAL HERITAGE

A search of European heritage sites did not indicate any listed occurrences within the vicinity of the project area.

#### 4.12.3 MITIGATION MEASURES

While agricultural activities may have masked evidence of unrecorded artefacts, pre-drilling inspections will be carried out by Coalworks and representatives of the local Aboriginal community. If a potential heritage site is located, work will cease at this location and a 100m buffer zone cordoned off. The relevant Local Aboriginal Land Council and DECC will be contacted and an appropriate plan developed to preserve the site.

### **4.13 Landuse**

The proposed programmes will be carried out on properties which are used for cropping and cattle grazing. Access compensation agreements have not been finalised with the affected landowner but cordial relations have been established and will be maintained as a matter of priority. All drill sites will be rehabilitated in accordance with agreed procedures.

#### 4.13.1 MITIGATION MEASURES

Regular consultation with landowners and the broader community will be maintained to keep stakeholders informed and to attend to any queries or concerns.

A written access compensation agreement will be completed prior to any exploration commencing on the ground.

#### **4.14 Cumulative Environmental Impacts**

Due to the short duration of the drilling program and the strict controls conducted by the operator, no cumulative environmental impact is anticipated as a consequence of the drilling or ground magnetic survey programs.

#### **4.15 Summary of Mitigation Measures**

Mitigation measures will include but not be limited to:

##### Dust

- speed limits imposed when passing homesteads or on tracks

##### Water

- meteoric water directed around each drill site
- drill sites not constructed within 40m of any natural stream or watercourse.
- liquid waste and cuttings from drilling collected/ moved and disposed of responsibly.
- earthen pits for drilling fluids fenced, allowed to dry then backfilled and re-contoured.
- Drill holes grouted where potential aquifers are intersected.

##### Soils

- drill holes plugged and abandonment procedures implemented (Section 5)

The site rehabilitation process will include:

- replacement of stockpiled topsoil
- return of natural/previous land contours
- reseeding if required in consultation with landholders
- sites inspected following rehabilitation and any necessary remediation carried out promptly following this inspection.

##### Noise

- identification of all potentially affected noise recipients
- notification of all affected residences and other parties in advance of the activities commencing
- noise and vibration monitoring undertaken.

##### Fauna/ Flora

- drill hole sites laid out to avoid disturbance to undisturbed remnant vegetation or faunal habitats.
- vehicles and plant washed down prior to entry to the exploration area
- reconnaissance of all proposed drill sites to identify any weeds present
- determination of any additional measures to be taken

#### Chemical/ Hazardous Waste

- Material Safety Data Sheets (MSDS) held by each contractor on site.
- chemicals and any hazardous substances kept to the minimum.
- transport, storage and handling of these substances in accordance with relevant NSW and/or Commonwealth legislation.

#### Contaminated Land

- strict environmental controls in force.
- spill kit available on site
- spills of fuel or oil treated by removal of any contaminated soil and either treated on site or transported to a registered treatment facility.
- spills reported in accordance with regulatory and licensing requirements.
- vehicles checked regularly for oil leaks.

#### Waste

- waste collected and disposed of at the approved local council sites.
- water based drilling fluids contained within sumps and later removed and treated as general waste.
- domestic waste regularly collected in appropriate bins and disposed of in a licensed waste management facility.

#### Impact on Community

- landowner consulted and advised of the planned activities.
- immediate neighbours will also be advised of the impending programmes.
- access roads maintained in a condition satisfactory to the DPI and landowners.
- erection of temporary fencing around the drilling sites.
- liaison with the local rural fire service will be maintained
- fire control pump and hoses kept on site.
- open fires will be prohibited
- hot work procedures will be in place if any hot work required.

#### Visual Assessment

- appearance of all sites monitored
- concerns or complaints from the general public promptly attended to.

#### Cultural Heritage

- pre-drilling inspections will be carried out
- If a potential heritage site is located,
- work will cease at this location
  - 100m buffer zone cordoned off.
  - relevant Local Aboriginal Land Council and DECC contacted
  - appropriate plan will be developed to preserve the site.

#### Land Use

- regular consultation with landowners and the broader community

## 5. Rehabilitation Works

Drill holes will be rehabilitated progressively. There may be two stages of rehabilitating drill holes, due to the requirement to keep holes open for geophysical logging. Usual practice is to geophysically log the holes are logged immediately after drilling is completed, while the rig is still on site. In this case, Stage 1 rehabilitation is omitted.

If this is not possible, then the hole is logged later, in which case two stage rehabilitation is required.

### Stage 1 - Holes Open

- 80 to 100mm screw type PVC casing is placed down the hole
- PVC is left protruding above the surface
- The surface around the hole will be tidied, and left in a safe condition.
- The hole is geophysically logged within two weeks of completion of drilling

### Stage 2 - Holes Backfilled

- Any screw type PVC casing is retrieved
- The hole is grouted to designated levels (using cement with 5% bentonite, SG ~1.4). Holes will be backfilled to at least 15m above the top of any coal seam or any aquifer. Volumes will be calculated and the volume of grout placed down the hole will be recorded, and the depth of grouting checked.
- cement filled to top of hole
- cement cap placed at least 0.5m below surface and below the level of ploughing
- surface around the hole will be restored, including backfilling any sumps.
- area will be re-seeded where vegetation has been damaged unless approval has been given by the landowner.

## 6. Summary of Impacts and Conclusions

Drilling of the proposed holes is an essential programme to determine the magnitude of any Measured Resource which in turn will permit further drilling that potentially will enable mining pre-feasibility studies to be completed. Subsequent exploitation of any resources will increase the state's reserves and revenue and provide impetus for future exploration in the region.

Consultation with landowners is ongoing and is an essential part of identification of any additional impacts of this drilling.

The proposed drilling activities and potential environmental impacts are common to previous drilling programmes by Coalworks and it is considered that any potential impacts can be successfully mitigated by carrying out the management strategies outlined in this document.

Part 5A of the EPA 1979 lists seven factors to be considered and this assessment has concluded that:

- There are no known threatened species, endangered populations or endangered ecological communities that would be impacted by the planned activities.
- No critical habitats will be cleared
- By implementing the strategies outlined in this document
  - dust generation will be limited to specific times of day and will not impact the visual or air quality unduly
  - water quality is not expected to be compromised by the drilling operations
  - rehabilitation of drill sites will effectively result in minimal evidence of the drilling having been completed
  - the potential noise impacts will be short term
  - impact on fauna and flora will be minimal and the potential introduction of weeds will be minimal
  - the adverse effect on land use and the local community will be short term and minimal whilst there will be a significant commercial gain for the broader community
  - impact on heritage values will be avoided
  - there will be no significant cumulative environmental impacts

## **7. References**

Emery, KA, 1985, Rural Land Capability Mapping, Soil Conservation Service of NSW

NSW Government BioNet system web site, <http://www.bionet.nsw.gov.au>

Australian Bureau of Meteorology web site, <http://www.bom.gov.au/>