Environment Protection and Biodiversity Conservation Act 1999

Referral Form

Important Note:

Please read the Referral Guide and associated Fact Sheets (available at http://www.deh.gov.au/epbc) carefully. The guide and Fact Sheets will help you to complete the form correctly and ensure that your referral is in a form that can be processed. The completed form, together with the required maps and any other information you may wish to submit, should be sent to the EPBC Act Referrals Section, Approvals and Wildlife Division, Department of the Environment and Heritage, GPO Box 787, Canberra, ACT, 2601 and/or by email to epbc.referrals@deh.gov.au (see Referral Guide for allowable electronic formats).

1. Contacts and proponent

1.1 Person making the referral

(Note: The term "person" can refer to an individual or a corporation)

The person making the referral can be either the person proposing to take the action, an agent acting on their behalf (eg, a consultant), or a government agency making the referral in relation to an action to be taken by another person. *(Include name, postal address, telephone, fax, email.)*

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1.2 Person(s) proposing to take the action

This is the person who proposes to carry out the action, or who is otherwise responsible for the action. If approval is necessary, this is the person to whom the approval will be granted, and they will be responsible for meeting any conditions of approval. (Include name postal address, telephone, fax, email – if same as person making the referral, write "as above".)

Centennial Hunter Pty Limited
Anvil Hill Project Office
Shop 14, Campbells Corner Building
Brook Street
MUSWELLBROOK NSW 2333
Ph: (02) 6543 2800
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Contact
Ms Sue Clark
Group Environment Manager, Centennial Coal
Email: sue.clark@centennialcoal.com.au

If a corporation is proposing to take the action, please ensure you provide the name of a contact officer for this matter.

1.3 Person(s) who will be the proponent for the action

The proponent is responsible for preparing all documentation for the assessment process, if the action requires approval. If the proponent is the same as the person proposing to take the action, write 'as above'. If the proponent is different from the person proposing to take the action, the signature of both is required (at Section 7.3). ***(Include name(s), postal address, telephone, fax, email)***

As above

If a corporation is the proponent for the action, please also provide the name of a contact officer for this matter.

2. Description of the proposal

2.1 Provide a *summary description* of the action (two or three sentences)

Centennial Hunter Pty Limited (Centennial) proposes to establish an open cut coal mine and ancillary facilities including a coal preparation plant (CPP) and rail loop. The proposal, known as the Anvil Hill Project (the Project), is based on a large, undeveloped coal reserve of approximately 150 million tonnes (Mt) that is suitable for production of thermal coal for both domestic and export markets. It is proposed to mine up to 10.5 million tonnes of run of mine (ROM) coal per annum using truck and shovel methods.

2.2 Details of the *location* of the project area
Where the project is of less than 1 km^2 in size, provide the location as a single pair of latitude and longitude references. Latitude and longitude references should be used instead of AMG and/or digital coordinates.

The attached **Figures A1** and **A2** show the location of the Project, relevant project boundaries, location of identified matters protected by the EPBC Act, including known habitat for listed threatened species and known habitat for listed migratory species located in the Study Area, and areas of remnant vegetation, streams and roads within and surrounding the Project Area.

The Project Area is located in the Wybong area, 20 kilometres west of Muswellbrook and approximately 10 kilometres north of the township of Denman (see attached **Figure B**).

Locality:
The coordinates for the approximate centre of the Project Area are E283093.28 N6423974.02 (MGA Zone 56). This equates to:

Latitude	32	degrees	18	minutes	05.86	seconds
Longitude	150	degrees	41	minutes	42.69	seconds

Where the project area is greater than 1 km^2, or any dimension is greater than 1 km, provide additional coordinates to enable accurate identification of the location of the project area.

The Project Area is approximately 3763 hectares (37.63 km^2) and is bounded by the following coordinates:

Coordinate 1	E278 677	N6422438	MGA Zone 56
Coordinate 2	E287618	N6420141	MGA Zone 56

Coordinate 3	E285403	N6427909	MGA Zone 56
Coordinate 4	E278568	N6425805	MGA Zone 56

This equates to:

			Coordinate 1			
Latitude	32	degrees	18	minutes	52.58	seconds
Longitude	150	degrees	38	minutes	52.66	seconds
			Coordinate 2			
Latitude	32	degrees	20	minutes	13.38	seconds
Longitude	150	degrees	44	minutes	32.47	seconds
			Coordinate 3			
Latitude	32	degrees	15	minutes	59.43	seconds
Longitude	150	degrees	43	minutes	14.13	seconds
			Coordinate 4			
Latitude	32	degrees	17	minutes	03.25	seconds
Longitude	150	degrees	38	minutes	51.31	seconds

Please provide a brief physical description of the project area, including the size of the development footprint or work area in hectares (a more detailed description is required at Part 3 of this form).

Definitions of key boundaries (see attached **Figure A1**):

- **Project Area -** represents the area on which all of the activities comprising the Project, including any potential controlled actions, are carried out.
- **Proposed Disturbance Area –** represents the proposed footprint for the Project. All land within this boundary (2238 hectares) may be directly impacted or disturbed in some way due to activities associated with the operations, such as mining, infrastructure or construction, at some time during the proposed 21 year approval period.
- **Proposed Offset Areas –** refers to land that is proposed as biodiversity offsets for the Project (1924 hectares).
- **The Study Area** includes all of the abovementioned areas and comprises 4162 hectares.

Attach an A4/A3 size map(s) showing the location and approximate boundaries of the area in which the project is to occur (this map, or a second attached map, should also show features mentioned in responses to questions in Part 3 of this referral, for example, conservation reserves, areas of remnant native vegetation, streams and roads).

2.3 Provide the *timeframe* in which the action is proposed to occur. Include start and finish dates where applicable.

Approval will be sought for a 21 year mine life, concurrent with the duration of a mining lease to be sought for the operation. If approved, Centennial is targeting commercial production by early 2008.

2.4 Provide a *description* of the action, including *all activities* proposed to be carried out as part of the proposed action.

The Project comprises the design, construction and operation of:

- an open cut coal mine;
- coal handling, crushing and stockpiling facilities and a coal preparation plant (washery);
- water management, supply and distribution infrastructure;
- handling and placement of overburden (rock);
- mine access road including a new intersection on Wybong Road, internal access roads and haul roads;
- a 66 kV transmission line and switchyard which are both within the Proposed Disturbance Area;
- infrastructure including offices, staff amenities, workshop, conveyors, and ancillary services; and
- a rail loop and rail loading infrastructure for the transport of all product coal.

To achieve consistent coal quality, scheduling has allowed for concurrent operation of four pits for most of the mine life. The proposed truck and shovel mining method will provide for an efficient operation in which environmental impacts can be minimised.

Rehabilitation will be scheduled to commence as soon as possible after mining disturbance, to minimise the disturbed area at any time.

The proposed final land use will include self sustaining indigenous vegetation communities, consisting of native and naturalised tree, shrub and grass species.

The extension of an electricity transmission line to the Project Area is a project which will be undertaken and assessed by Energy Australia.

A detailed description of the Project is provided within Section 2 of the Environmental Assessment (EA) included in the attached supporting information. The EA can be viewed at http://www.umwelt.com.au/anvil-hill/.

2.5 Provide an *explanation of the context* in which the action is proposed to take place, including any relevant planning framework (for example, relevant management plans or State or Local Government approvals). Indicate whether, and in what way, the action is *related to other actions or proposals* that may have already occurred, are occurring, or are likely to occur, at a future date. You should also provide the name(s) of the Local Council and/or Local Government Area the action will take place in, if relevant.

The Project is within the local government area of Muswellbrook, and on land subject to Muswellbrook Local Environmental Plan 1986 (NSW).

The Project is a Major Project for the purposes of the Environmental Planning and Assessment Act 1979 (NSW) (EP&A Act). The planning approval authority for the Project is therefore the NSW Minister for Planning. In January 2006 Centennial applied to the NSW Minister for Planning under Part 3A of the EP&A Act for planning approval for the Project. The EA was prepared for the purposes of assessment of the Project under Part 3A of the EP&A Act and in June 2006 Centennial lodged the EA with the Director General of the NSW Department of Planning for adequacy review prior to public exhibition. The Director General formed the opinion that the EA lodged by Centennial "adequately addressed" the assessment requirements for the Project and the EA was placed on public exhibition from 25 August 2006 until 6 October 2006. The Minister has not yet determined the application for approval of the Project. The EA is included with the supporting information and can be viewed at http://www.umwelt.com.au/anvil-hill/.

2.6 If you are considering making a referral of a stage or component of a larger action, you must provide information about the larger action and details of any interdependency between the stages/components and the larger action. If appropriate, you may also provide justification as to

why you believe it is reasonable for the proposed action, that is the subject of this referral, to be considered separately from the larger proposal (see the Referral Guide).

This Referral relates to the entire Anvil Hill Project. It does not relate to a stage or component of a larger action, rather considers the Project as a whole.

Section 74A of the EPBC Act provides that the Environment Minister may not accept a referred action that is a component of a larger action. If the Environment Minister does not accept the referral, he or she is not permitted to make a decision on whether the action is a controlled action. The Environment Minister may request the person proposing to take the action to refer the larger action for consideration under the EPBC Act (see also Fact Sheet).

3. Description of the project area and the affected area
Note: You must include a *map(s)* clearly showing the location of the action, and any relevant features referred to in 3.1. (A general location map (eg, 1:250 000 scale) and a more detailed map showing the elements of the proposal may be appropriate. If available, an aerial photograph or other photograph of the site can be included.)

The attached **Figures A1** and **A2** show the location of the Project, relevant project boundaries, location of identified matters protected by the EPBC Act, including known habitat for listed threatened species and known habitat for listed migratory species located in the Study Area, and areas of remnant vegetation, streams and roads within and surrounding the Project Area.

3.1 Describe the affected area, referring, as appropriate, to attached maps. In particular, indicate on the map the location of any of the following features: World Heritage properties, Ramsar wetlands, listed threatened species or communities and/or known habitat for these species or communities, listed migratory species and/or known habitat for these species, Commonwealth marine areas and Commonwealth land, conservation reserves/parks, and areas of remnant native vegetation.

The Project Area is located in the upper Hunter Valley, on the margin of the valley floor (see **Figure B**). Surrounding the Project Area are predominantly two broad vegetation types: rugged escarpment woodlands and heaths; and valley floor woodlands and derived pastures (see **Figure C**). These in turn support the broad fauna habitat types of grassland, riparian, woodland, aquatic and escarpment habitat (see **Figure D**). Two national parks and one nature reserve lie within 15 kilometres of the Project Area. These comprise: Wollemi National Park, approximately ten kilometres south of the Project Area; Goulburn River National Park, approximately 15 kilometres to the west of the Project Area; and Manobalai Nature Reserve approximately 10 kilometres to the north-west of the Project Area. In addition to these conservation areas, Myambat Military Area (see **Figure E**), which supports a diverse array of native plants and animals, is situated about 3.5 kilometres to the south of the Project Area.

Figures A1 and **A2** of this Referral provide details on the location of identified matters protected by the EPBC Act. These matters include known habitat for listed threatened species and known habitat for listed migratory species, located within the Study Area.

Threatened Species -

Listed threatened species (under the EPBC Act) that have been recorded within the Study Area comprise:

- Lasiopetalum longistamineum;
- Brush-tailed rock wallaby (*Petrogale penicillata*);
- Large-eared pied bat (*Chalinolobus dwyeri*);
- Painted diuris (*Diuris tricolor*, synonym *D. sheaffiana*).

Two species proposed for listing under the EPBC Act were also recorded in the Study Area:

- *Commersonia rosea*; and
- *Pomaderris reperta*.

Of these species, only Painted diuris (*Diuris tricolor*) and Large-ear pied bat (*Chalinolobus dwyeri)* have been recorded within the Proposed Disturbance Area (see **Figures A1** and **A2**). The large-eared pied bat (*Chalinolobus dwyeri*) was recorded once in the Proposed Disturbance Area, as well as on three occasions in the Proposed Offset Areas (see **Figure A1**).

Subsequent to the lodgement of the EA, Painted diuris (*Diuris tricolor*) was recorded by Christine Phelps and the data were provided to Centennial on 4 October 2006 (at the end of its flowering period) indicating occurrences within the Proposed Disturbance Area in 14 locations (refer to **Figure A2**). Subsequent investigation by a qualified and experienced ecologist located only one of these sites, and although it had finished flowering and was therefore difficult to detect, one plant was present in the location shown on **Figure A2**.

The remaining species outlined above were recorded in the Proposed Offset Areas.

The record of the brush-tailed rock-wallaby (*Petrogale penicillata*) is regarded as historical, as evidence suggests that the population of this species occurring in the Study Area is probably extinct (see **Section 4.1** of this Referral for more detail). *Goodenia macbarronni* was assessed in the Ecological Assessment in Appendix 9 of the attached EA, but was subsequently de-listed on 14 December 2006 and therefore is not addressed in this referral.

In addition to the above mentioned threatened species recorded in or close to the Study Area, the following threatened species were recorded from the EPBC Protected Matters Search Tool undertaken on 16 January 2006 and updated on 8 January 2007:

- white-flowered wax plant (*Cynanchum elegans*);
- finger panic grass (*Digitaria porrecta*);
- *Ozothamnus tesselatus*;
- *Prostanthera cryptandroides*;
- *Rulingia procumbens*;
- Austral toadflax (*Thesium australe*); and
- spotted-tailed quoll (*Dasyurus maculatus maculatus*).

Of these species, only the spotted-tailed quoll (*Dasyurus maculatus maculatus*) was regarded as having a reasonable potential to occur in the Study Area, based on actual distribution, contemporary records and the presence of suitable habitat. No further assessment is made on the former species, however the spotted-tailed quoll (*Dasyurus maculatus maculatus*) is further addressed in **Section 4** of this Referral.

Migratory Species -

Listed migratory species (under the EPBC Act) that have been recorded within the Study Area include:

- rainbow bee-eater (*Merops ornatus*);
- white-bellied sea-eagle (*Haliaeetus leucogaster*);
- white-throated needletail (*Hirundapus caudacutus*); and
- satin flycatcher (*Myiagra cyanoleuca*).

Endangered Ecological Communities-

White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands is listed as a Critically Endangered Ecological Community under the EPBC Act 1999. Peake (2006) mapped MU 11 Upper Hunter White Box – Ironbark Grassy Woodland broadly between Aberdeen and Wingen, north of Scone, but indicated that it occurred more extensively to the north of those areas. Peake (2006) indicated that this community more or less corresponded with White Box –

Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands, and should therefore be generally regarded as an EEC. As this EEC covers very broad geographical distributions, its characteristic species lists may not be highly indicative of the nature of the EEC where they occur at the margins of their ranges, such as in the Upper Hunter Valley. For this reason, a comparison of the vegetation communities in the Study Area against Peake's (2006) MU11 Upper Hunter White Box – Ironbark Grassy Woodland was made, as this community is indicative of the EEC.

MU 11 Upper Hunter White Box – Ironbark Grassy Woodland is a mid-high woodland with an open canopy dominated by narrow-leaved ironbark (*Eucalyptus crebra*), white box (*Eucalyptus albens*) or white box – grey box intergrade (*Eucalyptus albens - moluccana*) (Peake 2006). There may be a sparse shrubby understorey comprising kangaroo thorn (*Acacia paradoxa*), native olive (*Notelaea microcarpa* var. *microcarpa*), water bush (*Myoporum montanum*), western golden wattle (*Acacia decora*), eastern cottonbush (*Maireana microphylla*) and blackthorn (*Bursaria spinosa* subsp. *spinosa*), while the ground cover is moderately dense to dense, occasionally sparse, and dominated by grasses and herbs (Peake 2006).

Peake (2006) indicated that Upper Hunter White Box – Ironbark Grassy Woodland typically occurs on gently undulating slopes and hills which surround the floodplains of the upper Hunter Valley, occurring on relatively low rainfall areas on clay and earth soils that are usually associated with Permian and Carboniferous geologies. Peake (2006) recognised a variant dominated by slaty box (*Eucalyptus dawsonii*) and a variant dominated by spotted gum (*Corymbia maculata*).

The most likely vegetation community in the Study Area that could potentially conform to White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands is Forest Red Gum Riparian Woodland. An analysis of the diagnostic species list of Upper Hunter White Box – Ironbark Grassy Woodland (Peake 2006) was undertaken, using a comparison of the level of sharing of the key diagnostic species of Peake (2006) against those recorded in the target vegetation community. The target vegetation community was much more similar to MU 13 Hunter Floodplain Red Gum Woodland Complex of the Hunter Remnant Vegetation Project (Peake 2006) than it was to Upper Hunter White Box – Ironbark Grassy Woodland.

Based on the above assessment, the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands are not present in the Study Area.

The locations of each of these protected matters are identified on **Figures A1** and **A2** of this referral. The likely impact is discussed further in **Section 4** of this Referral.

3.2 Provide a *description of important features* of the project area and the affected area and show these on the attached map, including (if relevant to the project area or affected area) information about:

(a) soil and vegetation characteristics;

Soils

The broad soil landscapes as described by Kovac and Lawrie (1991) within the Project Area and Study Area is shown in **Table 1**, together with the associated soil units, as mapped by GSS Environmental (2006).

Table 1 - Soil Landscapes and Soils Units within the Study Area and Project Area

Soil Landscape	Location within Study Area	Associated Soil Units
Sandy Hollow	Dominant soil landscape associated with drainage lines and gentle slopes throughout the Study Area, except for the north-eastern corner and far south-eastern margins.	Yellow Solodics Brown Solodics Deep Sands Alluvial Soils
Castle Rock	Minor soil landscape associated with undulating low hills in north-eastern corner of the Study Area.	Yellow Solodics Brown Clay

Soil Landscape	Location within Study Area	Associated Soil Units
		Alluvial Soils
Dartbrook	Minor soil landscape associated with the undulating slopes and low hills in the far eastern margin of the Study Area.	Brown Clays
Lees Pinch	Minor soil landscape associated with steep outcropping sandstone hills in centre of the Study Area (Anvil Hill), along with far southern and western margins.	Shallow Sands (Siliceous)
Hunter	Minor soil landscape associated with flat alluvial plains of the Hunter River in the far south-eastern margins of the Study Area.	Black Alluvial Clay

Source: Kovac & Lawrie (1991), GSS Environmental (2006).

The Yellow Solodics, associated with the Sandy Hollow and Castle Rock soil landscapes, are the dominant soil unit and cover the majority of the Study Area. Other soil units within the Study Area are associated with major drainage lines, rocky outcrops and the alluvial plain of the Hunter River. Broad areas of intergrading occur between the dominant yellow solodic and other soil units including the alluvial soils associated with major drainage lines and Brown Clays within the eastern extent of the Study Area.

Vegetation

In total, 597 plant species were recorded from detailed surveys completed within the Study Area. These comprised trees, tree mallees, shrubs, forbs, grasses, sedges, rushes, reeds, ferns, lithophytes, epiphytes, mistletoes, vines and twiners. Of the plants recorded, 95 (15.9%) were not native to the Study Area. Six noxious weed species (1% of the flora of the Study Area), were recorded.

Seventeen vegetation communities were recorded in the Study Area (see **Figure C**). These comprise those listed in **Table 2** below.

Table 2 – Vegetation Communities of the Study Area

Vegetation Community	Area in Proposed Disturbance Area (ha)	Area in Proposed Offset Areas (ha)	Area in Study Area (ha)
Woodland	**1251**	**879**	**2130**
Slaty Box Woodland	245	282	527
Ironbark Woodland Complex	886	512	1398
Bulloak Woodland	100	0.4	100
Sheltered Grey Gum Woodland	0.0	79	79
Red Ash Sheltered Forest	0.0	0.7	0.7
Drooping Sheoak Woodland	0.8	1	2
Mixed Species Revegetation/Plantation	0.0	0.8	0.8
Paperbark Woodland	19	3	23
Riparian and Floodplain	**53**	**31**	**84**
Exotic Rushland	0.0	0.2	0.2
Swamp Oak Riparian Forest	1.0	20	21
River Oak Riparian Forest	0.0	0.6	0.6
Rough-barked Apple Woodland	0.3	11	11
Forest Red Gum Riparian	51	0.0	51

Vegetation Community	Area in Proposed Disturbance Area (ha)	Area in Proposed Offset Areas (ha)	Area in Study Area (ha)
Woodland			
Shrubland	**0.2**	**127**	**127**
Tall Mixed Shrubland Complex	0.0	52	52
Weeping Myall Woodland	0.1	0.9	1
Coast Myall Exposed Woodland	0.2	74	74
Grassland	**934**	**887**	**1821**
Disturbed Grassland	934	887	1821
TOTAL	**2238**	**1924**	**4162**

Eleven of these vegetation communities are present in the Proposed Disturbance Area, while 16 occur within the Proposed Offset Areas. All except three are naturally-occurring, although most have been significantly modified during the past 180 years through extensive management, including clearing and regeneration. Most vegetation communities are widespread in the local area, while some occur much more extensively across a range of over 100 kilometres. Some communities, however, have a more restricted local occurrence being known only to occur locally within the Study Area or within a short distance of the Study Area.

A detailed description of all flora results, including descriptions of the vegetation communities within the Study Area is provided within Section 4 of the Ecological Assessment in Appendix 9 of the attached EA.

An analysis of aerial photographs dating back to 1967 (see **Figure F**) and to the 1930s (see **Figure G**) shows that the vegetation of the Study Area has been extensively cleared and modified. Some areas, such as the core of woodland vegetation that was present and still exists around Anvil Hill, Wallaby Rocks, Limb of Addy Hill and the Western Rocks in the 1930s is likely to be "old growth" vegetation. For the most part, however, the vegetation is regrowth that has occurred since extensive clearing.

Two flora species listed under the Schedules of the EPBC Act were recorded within the Study Area. These species included Painted diuris (*Diuris tricolor*, synonym *D. sheaffiana*), and *Lasiopetalum longistamineum*. Of these, only Painted diuris (*Diuris tricolor*) occurs within the Proposed Disturbance Area.

In addition to these species, *Commersonia rosea* and *Pomaderris reperta* (both nominated to be listed as Endangered under the EPBC Act) were recorded within the Study Area. Both were recorded within the Proposed Offset Areas only.

A number of TSC Act listed species were recorded within the Study Area, and these are discussed in detail within the Ecological Assessment in Appendix 9 of the attached EA.

(b) water flows, including rivers, creeks and impoundments;

The Project Area is located within the catchments of Anvil Creek, Clarks Gully, Big Flat Creek, Sandy Creek and Wybong Creek (see **Figure H**). Descriptions of the features and condition of each of these waterways are provided within Section 7 of the Ecological Assessment in Appendix 9 of the attached EA. Both Anvil Creek and Clarks Gully flow into Big Flat Creek. Big Flat Creek flows into Wybong Creek which is a tributary of the Goulburn River. The Goulburn River joins the Hunter River approximately 4.8 kilometres downstream from Denman. Sandy Creek drains to the Hunter River at Denman.

The Proposed Offset Areas are located entirely outside of the proposed mine water management system, and the majority of the area to the south and west of the Proposed Disturbance Area is located upslope or outside of the affected catchment area.

(c) the presence of outstanding natural features, including caves;

The Project Area contains a number of significant geological features, particularly Anvil Hill, Wallaby Rocks, Limb of Addy Hill and other unnamed escarpments and outcrops (see **Figure I**). Anvil Hill rises approximately 70 metres above the surrounding area at its highest point. It is located at the centre of the Study Area and consists of two hills connected by a saddle. Wallaby Rocks rises to a height of 264 metres Australian Height Datum (mAHD), being approximately 100 metres above the surrounding area, and contain a visually dominant escarpment along the western side. The rocky area located in the south of the Study Area, known as Limb of Addy Hill, rises to a height of 302 mAHD, which is also approximately 100 metres above the surrounding area.

A number of caves, cracks and overhangs have been identified scattered along these escarpments. Where possible, these caves and overhangs have been investigated for signs of faunal use. None of these features are located within the Proposed Disturbance Area, although Anvil Hill will form an 'island' of undisturbed land within the proposed mine.

(d) gradient;

The topography of the Study Area varies from lower slopes towards the Hunter River (<10% slope), through undulating and hilly lands (10-20% slope) to rocky outcrops associated with Anvil Hill, Wallaby Rocks and Limb of Addy Hill (20-40% slope).

(e) any buildings or other infrastructure;

There are currently 27 residences within the Study Area. Centennial owns or has reached a purchase agreement in relation to 22 of these residences within the Study Area. The locations of these are provided on **Figure J**. Associated buildings and infrastructure such as farm sheds, access roads and power lines are present within the Study Area. A 500 kV TransGrid powerline crosses the Study Area in a south-east/north-west direction.

(f) any marine areas;

There are no marine areas associated with the Project Area or associated affected area.

(g) kinds of fauna in the area; and

The Study Area comprises woodland, shrubland, riparian and derived grassland habitats, as well as a number of farm dams and rocky outcrops. A total of 188 fauna species were recorded within the Study Area, with 166 species being recorded within the Proposed Disturbance Area, and 179 species being recorded in the Proposed Offset Areas. The total species count comprised 122 bird species, 13 reptiles, nine amphibians and 44 mammals.

A detailed description of the fauna identified within the Study Area is provided within **Section 5** of the Ecological Assessment in Appendix 9 of the attached EA.

Two fauna species listed as Vulnerable under the EPBC Act were recorded within the Study Area. These comprised the brush-tailed rock wallaby (*Petrogale penicillata*) and large-eared pied bat (*Chalinolobus dwyeri*). The large-eared pied bat (*Chalinolobus dwyeri*) was recorded on one occasion in the Project Area, and on three occasions in the Proposed Offset Areas (see **Figure A1**). The brush-tailed rock-wallaby (*Petrogale penicillata*), which was recorded only in the Proposed Offset Areas through scat analysis, is regarded as extinct in the Study Area (see **Section 4.1** of this Referral). In addition to these, four migratory species as listed under the EPBC Act were recorded within the Study Area, comprising the rainbow bee-eater (*Merops ornatus*), white-bellied sea-eagle (*Haliaeetus leucogaster*), white-throated needletail (*Hirundapus caudacutus*), and satin flycatcher (*Myiagra*

cyanoleuca). A number of species representing JAMBA/CAMBA-listed family groups were also recorded within the Study Area.

A number of TSC Act listed species have been recorded within the Study Area, and these have been dealt with in detail within the Ecological Assessment in Appendix 9 of the attached EA.

A total of 24 aquatic fauna species were recorded during the aquatic survey of the Study Area and adjoining areas, comprising three vertebrate and 21 invertebrate species. No threatened aquatic species were recorded during the assessment and none are expected to occur.

The condition assessment completed as part of the Ecological Assessment showed that there is in general higher quality of habitat present for most of the key threatened fauna species in the Proposed Offset Areas, except for the Riparian/Floodplain formation, where the relative quality of the habitat is significantly poorer.

(h) the current state of the environment in the area, including information about the extent of erosion, whether the area is infested with weeds or feral animals and whether the area is covered by native vegetation or crops.

In general, prior European land use within the Study Area has resulted in deeply entrenched watercourses that have been subject to scouring, gullying and bank collapse. There is also evidence of the loss of topsoil from ridges, spurs, slopes and floodplains; the mixing of soil on limited areas of floodplain and lower slope due to cultivation; trampling of the ground surface by hard hoofed animals; and the general loss of the integrity of the pre-existing vegetation communities.

European land use practices have had less adverse effect on the general Anvil Hill, Wallaby Rocks, Limb of Addy Hill and Western Rocks areas which are within the Study Area, but outside the Proposed Disturbance Area. These areas have retained sufficient vegetation to limit the effects of erosion, but have been subject to selective bulldozing for roads and fence lines, and erosion is present in areas where this has occurred.

In addition, soil landscape data indicates that moderate gully erosion is likely in drainage lines within the Sandy Hollow and Castle Rock soil landscapes, while all soil landscapes within the catchment are likely to show some sheet and rill erosion on slopes (Kovac and Lawrie, 1991).

A large proportion of the Study Area is covered by native woodland, some relatively natural in condition and most modified by previous clearing. About 44% of the Study Area is covered by derived grassland, which is mostly used for cattle grazing, although a small area in the south-east of the Study Area supports irrigated paddocks.

Of the plants recorded, 95 (15.9%) were not native to the Study Area. Six noxious weed species (1%), were recorded. One weed, sharp rush (*Juncus acutus* subsp. *acutus*) forms extensive infestations along parts of Big Flat Creek, Anvil Creek and Clark's Gully, within the Study Area. Several other weeds, including some noxious species such as African boxthorn (*Lycium ferocissimum*) and blackberry (*Rubus fruticosus* sp. agg.), form small infestations.

Of the fauna species recorded, 13 (7%) were non-native species. These included three bird species and 10 mammal species. Of particular significance to the environment are the numbers of probable rusa deer (*Cervus timorensis*) and goats (*Capra hircus*) present in the Study Area. These species impose a severe grazing pressure, particularly on rocky outcrops, and may have contributed to the local extinction of the brush-tailed rock-wallaby (*Petrogale penicillata*).

The Proposed Disturbance Area and Proposed Offset Areas are very similar in terms of the degree of fragmentation. However, as evidenced by the 1930s aerial photograph (see **Figure G**), the Proposed Offset Areas support vegetation that is much older and more likely to be old growth vegetation.

3.3 What is the *tenure* of the project area (for example is it freehold, leasehold or some other tenure)? If practicable, show on the attached map.

Land ownership and the location of residences within and surrounding the Project are shown in **Figure K**. The majority of land within the Study Area is either owned by Centennial or secured by a right to purchase by Centennial.

There are a number of Crown Roads located within the Proposed Disturbance Area, as well as a small area of Crown land (see **Figure K**). Centennial will seek approval from the NSW Department of Lands for the transfer of Crown land reserves and closure of Crown roads within the Proposed Disturbance Area. This approval will be sought prior to the commencement of the Project.

Mining Tenements
The Study Area is covered by a number of tenements held by Centennial under the *Mining Act* 1992 (NSW), as shown in **Figure L**. These tenements are:

- Assessment Lease 9 (AL9) granted in November 2004, which covers the majority of the area;
- Mining Lease Application 220 (MLA 220) which covers a small area within AL9 where it was previously proposed to extract a bulk sample. This bulk sample is no longer required;
- Exploration Licence 5552 (EL5552) renewed in May 2006 to cover some areas previously included in EL5552, which are not covered by AL9.

Centennial will submit a Mining Lease Application for the Project.

3.4 What are the current and/or proposed *land uses* for the project area?

Existing Land Use
The existing land use of the Project Area is depicted within **Figure J**. The majority of the Project Area is currently being used for low intensity grazing. Interspersed with grazing uses are areas of rural residential land use and areas of bushland.

Proposed Land Use
The proposed land use for the Proposed Disturbance Area is for an open cut coal mine and ancillary facilities, as discussed in **Section 2.1** of this Referral. The Proposed Offset Areas will extend beyond the Proposed Disturbance Area into the remainder of the Study Area.

Proposed Final Land Use
The proposed final land use will primarily include self sustaining indigenous vegetation communities, consisting of native and naturalised plants, in addition to sustainable agricultural land uses.

4. Nature and extent of the likely impacts of the action

4.1 Describe, as relevant to your project, the nature and extent of *likely impacts* on the following matters protected by the EPBC Act:

- **the world heritage values of a declared World Heritage property; or**

Wollemi National Park, located about 10 kilometres to the south of the Project Area, is part of the Greater Blue Mountains World Heritage Site. Mt Royal National Park and Barrington Tops National Park, located 50 and 55 kilometres to the east-north-east of the Project Area, are part of the Central Eastern Rainforest Reserves World Heritage Site.

Given the distance of these sites from the Project Area, there are no potential impacts on World Heritage Properties.

- **the ecological character of a declared Ramsar wetland; or**

There have been no declared Ramsar wetlands identified within or in proximity to the Study Area. The closest declared Ramsar wetland is at the Hunter Estuary Wetlands, between Maitland and Newcastle, some 105 kilometres to the east-south-east of the Project Area. The Project Area is situated in the mid- to upper reaches of the Hunter catchment, but is located approximately 200 or more kilometres upstream of the Ramsar site. In addition, the Project includes a water management system designed to minimise downstream impacts, and will disturb less than 3% of the Wybong Creek catchment and 1% of the Sandy Creek catchment at any stage of mining (refer to Section 5.2 of the attached EA. As a result, the Project will pose no impact on declared Ramsar wetlands.

- **the members of a listed threatened species (except a conservation-dependent species) or any threatened ecological community, or their habitat, or**

Table 3 identifies those listed threatened species that have been recorded within the Study Area.

Table 3 – Listed Threatened Species Recorded from the Study Area and Likelihood of Significant Impact

Common Name	Scientific Name	TSC Act 1995	EPBC Act 1999	Total Number of Records	Proposed Disturbance Area	Proposed Offset Areas	Significant Negative Impact Likely
	Commersonia rosea	E	E (Nominated)	1	0	1	no
Painted diuris	*Diuris tricolor*	V	V	15	14[2]	1	no
	Lasiopetalum longistamineum	V	V	12	0	12	no
	Pomaderris reperta	E	E (Nominated)	16	0	16	no
Brush-tailed rock-wallaby[1]	*Petrogale penicillata*	E	V	4	0	4	no
Large-eared pied bat	*Chalinolobus dwyeri*	V	V	4	1	3	no

Note 1: the brush-tailed rock-wallaby (*Petrogale penicillata*) is regarded as being extinct in the Study Area.

Note 2: Based on records provided by Christine Phelps on 4 October 2006. One record has been confirmed by a qualified ecologist on 20 October 2006

A detailed assessment of the potential impact of the Project on these species is contained within **Appendix G** (Assessment of Significance – Commonwealth EPBC Act 1999) of the Ecological Assessment, in Appendix 9 of the attached EA.

This assessment was undertaken prior to the reported identification on 4 October 2006 of 14 additional records of painted diuris (*Diuris tricolor*) in the Proposed Disturbance Area by Christine Phelps (see **Section 3.1**). At the time of lodgement of the EA only one record of Painted diuris (*Diuris tricolor*) was known to occur within the Proposed Offset Areas, however due to the difficulty in detecting this species it was assumed that the species was likely to occur over much of the Proposed Disturbance Area and a substantial proportion of the Proposed Offset Areas because of the presence of extensive suitable habitat.

This assessment was also completed for species listed under the EPBC Act that were considered to have potential habitat within the Study Area. In preparing this referral there has been further

assessment of the potential impact of the Project on EPBC Act listed species and following are the details of the current assessment.

Painted Diuris (*Diuris tricolor*):

Painted diuris (*Diuris tricolor*) was recorded on a single occasion within the Proposed Offset Areas. As discussed in **Section 3.1** and above, it has also been recorded subsequent to EA lodgement by Christine Phelps in 14 more or less contiguous locations in the Proposed Disturbance Area (refer to **Figure A2**). A subsequent inspection of these sites by a qualified and experienced ecologist confirmed that one of sites contained a single individual of painted diuris (*Diuris tricolor*). Individuals were not observed at the other identified sites within the Proposed Disturbance Area. This was most likely due to the subsequent ecological survey being undertaken during the post-flowering period, which makes individuals very difficult to detect.

Based on the presence of suitable habitat, it is likely that painted diuris (*Diuris tricolor*) occurs more extensively across the Proposed Disturbance Area, as well as within a substantial proportion of the Proposed Offsets Area.

The records of painted diuris (*Diuris tricolor*) within the Study Area are likely to form part of a larger known population of this species located within the Wybong District. This Wybong District population is considered to be an important population of the species, as it is known to contain many hundreds of plants (T. Peake unpubl. data). As such it is likely that this species occurs more widely across the Study Area. However, when compared to the large known population in the Wybong District, it is not likely that the known occurrences in the Study Area, as well as the loss of further potential habitat within the Proposed Disturbance Area, will result in a significant impact on an important population of this species.

***Commersonia rosea*:**

A single record of *Commersonia rosea* was identified within the Proposed Offset Area, which will not be negatively impacted by the Project. Furthermore, the species will not be significantly impacted by dust or changes in hydrology. This species is nominated to be listed as Endangered under the EPBC Act, however a determination had not been made prior to completion of this documentation. The Project is likely to have a beneficial impact on this species through the establishment of long-term protected biodiversity offset areas.

***Lasiopetalum longistamineum*:**

Lasiopetalum longistamineum was recorded at 12 locations within the Proposed Offset Areas, which will not be negatively impacted by the Project. Furthermore, the species will not be significantly impacted by dust or changes in hydrology. It is possible that further examples of this species could be present within the Proposed Disturbance Area, however habitat for this species is restricted to sandstone outcrops, the majority of which occur within the Proposed Offset Areas. It is not considered likely that an 'important population' of this species is present within the Proposed Disturbance Area. The Project will not result in a significant negative impact on an 'important population' of this species. The Project is likely to have a beneficial impact on this species through the establishment of long-term protected biodiversity offset areas.

***Pomaderris reperta*:**

A number of records of *Pomaderris reperta* came from the Proposed Offset Areas, which will not be negatively impacted by the Project. Furthermore, the species will not be significantly impacted by dust or changes in hydrology. This species is nominated to be listed as Endangered under the EPBC Act, however a determination had not been made prior to completion of this documentation. The Project will not result in a significant negative impact on an important population of this species. The Project is likely to have a beneficial impact on this species through the establishment of long-term protected biodiversity offset areas.

Large-eared Pied Bat (*Chalinolobus dwyeri*):

The large-eared pied bat (*Chalinolobus dwyeri*) was recorded on three occasions within the Proposed Offset Areas, and once in the Proposed Disturbance Area. There were a small number of records for this species, and it is unlikely that a roosting or breeding colony of this species is present within the Proposed Disturbance Area. It is not considered that these records represent an 'important population' of this species within the Study Area. The Project will not result in a significant negative impact on an 'important population' of this species. The Project is likely to have a beneficial impact on this species through the establishment of long-term protected biodiversity offset areas.

***Bothriochloa biloba*:**

Bothriochloa biloba was recorded on a single occasion, to the south of the Study Area. This record will not be disturbed as a result of the Project. Although it could possibly occur in the Project Area, extensive surveys over several seasons and years did not record it. The Project will therefore not result in a significant impact on an 'important population' of this species.

Brush-tailed Rock-wallaby (*Petrogale penicillata*):

The brush-tailed rock wallaby (*Petrogale penicillata*) was recorded within the Proposed Offset Areas, from the positive identification of a number of scats found in caves and overhangs on the Limb of Addy Hill. No fresh scats were collected, despite repeat visits to identified sites. Despite the large amount of seasonal field survey (including targeted field survey for this species), no brush-tailed rock-wallabies were observed or recorded through any other means. It is highly likely that these scats are from an extinct population of this species from the Proposed Offset Areas. Accordingly, an 'important population' of this species is not present within the Study Area, and therefore the Project will not result in a significant impact on an 'important population' of this species.

Conclusion:

Most threatened species occurring in the Study Area are likely to be beneficially impacted by the project, through the establishment of a protected biodiversity offset area. It is considered that the detailed impact mitigation strategy proposed as part of the Project (as summarised in **Section 5.1** of this Referral and further detailed in Section 9 of the Ecological Assessment in Appendix 9 of the attached EA) will ameliorate any negative impact on listed species within the Proposed Disturbance Area, including Painted diuris (*Diuris tricolor*) and Large-eared pied bat (*Chalinobus dwyeri)*.

- **the members of a listed migratory species or their habitat; or**

Table 4 identifies those listed migratory species that have been recorded within the Study Area.

Table 4 – Listed Migratory Species Recorded from the Study Area and Likelihood of Impact

Species Name	EPBC Act 1999	Total Number of Records	Proposed Disturbance Area	Proposed Offset Areas	Likely Negative Impact
rainbow bee-eater (*Merops ornatus*)	M	16	7	9	No
white-bellied sea-eagle (*Haliaeetus leucogaster*)	M	1	1	0	No
white-throated needletail (*Hirundapus caudacutus*)	M	1	0	1	No
satin flycatcher (*Myiagra cyanoleuca*)	M	1	1	0	No

A detailed assessment of the potential impact of the Project on these species is contained within Appendix G (Assessment of Significance – Commonwealth EPBC Act 1999) of the Ecological Assessment, in Appendix 9 of the attached EA. This assessment was also completed for migratory species listed under the EPBC Act that were considered to have potential habitat within the Study Area.

Conclusion:

The Assessment of Significance concluded the following:

- It is not considered that the Study Area provides important habitat or an ecologically significant proportion of the entire populations for the rainbow bee-eater, white-bellied sea-eagle, white-throated needletail or satin flycatcher. The Anvil Hill Project is unlikely to result in a significant impact on identified or potential migratory species within the Study Area.

In addition to these listed migratory species, **Table 5** identifies those species listed under the JAMBA/CAMBA and Bonn agreement lists that have been recorded within the Study Area. These species were also considered in the Ecological Assessment in Appendix 9 of the attached EA as a precautionary measure.

Table 5 – JAMBA/CAMBA and Bonn Agreement Species Recorded within the Study Area

stubble quail (*Coturnix pectoralis*)	pallid cuckoo (*Cuculus pallidus*)
Australian wood duck (*Chenonetta jubata*)	fan-tailed cuckoo (*Cacomantis flabelliformis*)
Pacific black duck (*Anas superciliosa*)	Horsfield's bronze-cuckoo (*Chrysococcyx basalis*)
grey teal (*Anas gracilis*)	southern boobook (*Ninox novaeseelandiae*)
Australian pelican (*Pelecanus conspicillatus*)	white-throated nightjar (*Eurostopodus mystacalis*)
straw-necked ibis (*Threskiomis spinicollis*)	forest kingfisher (*Todiramphus macleayii*)
black-shouldered kite (*Elanus notatus*)	sacred kingfisher (*Todiramphus sanctus*)
whistling kite (*Haliastur sphenurus*)	dollarbird (*Eurystomus orientalis*)
Brown goshawk (*Accipiter fasciatus*)	crested shrike-tit (*Falcunculus frontatus*)
collared sparrowhawk (*Accipiter cirrhocephalus*)	magpie-lark (*Grallina cyanoleuca*)
wedge-tailed eagle (*Aquila audax*)	rufous fantail (*Rhipidura rufifrons*)
little eagle (*Hieraaetus morphnoides*)	black-faced cuckoo-shrike (*Coracina novaehollandiae*)
brown falcon (*Falco berigora*)	Richard's pipit (*Anthus novaeseelandiae*)

Australian hobby (*Falco longipennis*)	welcome swallow (*Hirundo neoxena*)
Peregrine falcon (*Falco peregrinus*)	tree martin (*Hirundo nigricans*)
nankeen kestrel (*Falco cenchroides*)	rufous songlark (*Cincloramphus mathewsi*)
black-fronted dotterel (*Elseyornis melanops*)	silvereye (*Zosterops lateralis*)
masked lapwing (*Vanellus miles*)	

These are non-threatened species that are not listed on the DEH Protected Matters Database. They are, however, listed under the schedules of the JAMBA/CAMBA and Bonn agreements as marine or migratory species. As a precautionary measure, a general assessment of the potential impact of the Project on these species has been provided below.

An area of *important habitat* is:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; or
- habitat utilised by a migratory species which is at the limit of the species range; or
- habitat within an area where the species is declining.

None of the above-listed species are considered to have a distribution that focuses specifically on the Hunter Valley. There are no obvious concentrations of records of any of these species to suggest an ecologically significant proportion of the population of the species is using habitat within the local area (Barrett et al. 2003). The Study Area is not at the limit of the known distribution for these species, and there is no evidence to suggest these species are declining in this area. It is unlikely that the Study Area forms an area of important habitat for these species, nor is it likely that local records of these species represent an ecologically significant proportion of the entire population of these species.

A *population*, in regards to migratory species, relates to the entire population.

It is likely that the Study Area contains sub-populations of the species listed above, however this is not considered to be an ecologically significant proportion of the total population of these species.

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- **substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of *important habitat* of the migratory species; or**

The Project will require the removal of approximately 1304 hectares of native vegetation within the Project Area. This will result in fragmentation of the Project Area. However, it is not considered that the Project Area provides an area of *important habitat* for the migratory species listed above.

- **result in invasive species that is harmful to the migratory species becoming established in the area of *important habitat* of the migratory species; or**

The Project will not result in invasive species that are harmful to these species becoming established in their habitat. Indeed, it is likely that monitoring and management requirements of the Project will result in the reduction of such invasive species within this habitat.

- **seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an *ecologically significant proportion* of the population of the species.**

The Project will require the removal of approximately 1304 hectares of native vegetation within the Project Area. However, it is not considered that the Study Area provides an ecologically significant proportion of the entire populations for the above-listed species.

- **the environment in part of the Commonwealth marine area; or**

There have been no Commonwealth marine areas identified within the Study Area. The Project will pose no likely impact on Commonwealth marine areas.

- **the environment on Commonwealth land.**

There are no areas of Commonwealth land located within the Study Area. The Myambat Military area is located approximately 3 kilometres south of the Study Area and 4 kilometres south of the Proposed Disturbance Area. The Project will not have a detrimental impact on the environment of the Myambat Military area, as potential impacts from vibration, noise, dust or light will be negligible at this location.

Conclusion:

The result of the above assessment on JAMBA, CAMBA and Bonn Agreement species recorded in the Study Area is that there will be no significant detrimental impact on these species as a result of the project.

Other considerations

The greenhouse gas emissions which would be generated by the Project, as well as the emissions which would be generated by third parties who may burn the coal, are calculated and assessed in the attached Response to Submissions – Part A (also shown at HTTP: //www.umwelt.com.au/anvil-hill/). A reading of the document assists the consideration of whether the Project is likely to have indirect impacts on matters protected by Part 3 of the EPBC Act as a result of any possible contribution to greenhouse gas emissions. Mining and use of coal is only one amongst many sources contributing to greenhouse gas emissions. The other sources include industry, motor vehicle use, burning of other fossil fuels, decomposition, clearing and burning of vegetation and waste disposal. The amount and concentration of greenhouse gases in the atmosphere, and any resultant adverse impacts on matters protected by Part 3 of the EPBC Act, are the consequence of human activities on a global scale over a long period of time. If the additional contribution of greenhouse gases in the atmosphere arising from the Project, and the combustion of coal by third parties, is to have an adverse impact on a matter of national environmental significance, any such impact is likely to be negligible or extremely small and is therefore not likely to be significant.

4.2 Indicate if your action is:

(a) a nuclear action; or

The proposed Project does not constitute a nuclear action.

(b) will be taken by the Commonwealth or by a Commonwealth agency; or

The proposed Project will not be taken by the Commonwealth or by a Commonwealth agency.

(c) will be taken in a Commonwealth marine area; or

The proposed Project will not be taken in a Commonwealth marine area.

(d) will be taken on Commonwealth land.

There are no areas of Commonwealth land located within the Study Area. The Myambat Military area is located approximately 3 kilometres to the south of the Study Area. The Project will not have a detrimental impact on the environment of the Myambat Military area, as potential impacts from vibration, noise, dust or light will be negligible at this location.

If your action falls into one of these categories, provide details about the impact of your action on the environment generally (ie, in addition to the specific matters addressed above in 4.1).

5. Measures aimed at avoiding or reducing significant impacts on matters protected under the EPBC Act

5.1 Describe any specific measures proposed as part of the action to avoid or lessen significant impacts on matters protected under the EPBC Act. Include a timeframe or workplan for implementation of any relevant measures.

Examples of relevant measures may include the timing of works to avoid critical periods for listed species, avoidance of habitat important for listed species from direct and indirect impacts, application of specific design measures to avoid or reduce impacts, or adoption of specific work practices to reduce or avoid impacts (see Referral Guide, Fact Sheet and 'Particular Manner' Guideline at http://www.deh.gov.au/epbc).

Specific measures included as part of the Project that are designed to mitigate the impact on matters protected under the EPBC Act fall under two categories:

- Standard impact mitigation strategies that are commonly included in projects of this type; and
- Biodiversity Offset Strategy.

Detailed information on each of these strategies is provided within Section 9 of the Ecological Assessment in Appendix 9 of the attached EA, and brief details of each are provided below.

Standard Impact Mitigation Strategies

The Standard Impact Mitigation Strategy includes the rehabilitation, revegetation and regeneration of the post-mining landscape (within the Proposed Disturbance Area), as well as general management strategies for fencing, weed control, feral animal control and bushfire. This strategy also includes a detailed tree felling procedure to minimise impacts on fauna species during the construction phase of the Project. The management of aquatic habitat will also be addressed as part of this strategy.

1. Post-mining Revegetation and Regeneration

The primary objective of mine revegetation and regeneration will be to create a stable final landform with acceptable post-mining land use capability. All revegetation and regeneration works will be scheduled to commence as soon as practicable after mining disturbance, in order to minimise the disturbed area at any time and hence reduce the ecological impact of the Project.

The majority of the Proposed Disturbance Area, including the open cut mining areas and overburden emplacement areas, will be progressively revegetated and regenerated to self-sustaining indigenous vegetation communities. The proposed final revegetation plan for the post-mining areas (see **Figure M**) identifies the final conceptual composition of the post-mining vegetation communities, as well as the progressive rehabilitation that will be completed per mine stage. This plan provides a suitable degree of heterogeneity within the vegetation of the post-mining landscape, thus allowing for the re-establishment of a variety of vegetation types and formations (see **Table 6**). This approach will greatly increase the value of this revegetation for fauna species, particularly key threatened species.

The post-mining vegetation community composition of the Proposed Disturbance Area will be different to the current composition. In general, opportunities to alter the extent of current vegetation communities have been used to increase the representation of desired vegetation communities, or decrease the extent of undesirable vegetation communities. For example, the revegetation and regeneration works will aim to reduce the area of Grassland within the post-mining landscape, replacing this mostly with woodland communities, as well as riparian communities where suitable. This will provide increased fauna habitat within the post-mining Study Area, while still retaining small pockets of Grassland throughout the landscape. Such an increase in woodland vegetation will benefit many threatened species identified within the Study Area, particularly small woodland birds and bat species. Given that most of the cleared areas within the Study Area support land of poor capability, the revegetation and regeneration of this area over time will not significantly impact the extent of high quality grazing land in the region. Furthermore, it is proposed to retain areas of high land capability in the south-east of the Study Area as grazing land, with limited woodland revegetation.

Table 6 – Indicative composition by Vegetation Community of Final Revegetation of Mined Areas and comparison against Pre-mining Areas

Community Name	Formation	Indicative Amount to be Cleared over mine life (ha)	Cumulative Area of Rehabilitation Available per Mine Stage (ha)				Total Area to be Revegetated (ha)	Net Change in Post-Revegetation Extent (ha)
			Year 5	Year 10	Year 15	Year 20		
Slaty Box Woodland	Woodland	245	20	80	214	253	309	+64
Ironbark Woodland Complex	Woodland	886	67	183	524	826	1526	+640
Bulloak Woodland	Woodland	100	0	0	0	0	0	-100
Sheltered Grey Gum Woodland	Woodland	0	0	13	30	36	117	+117
Drooping Sheoak Woodland	Woodland	1	0	0.2	28	28	28	+27
Paperbark Woodland	Woodland	19	0	0.1	3	17	23	+4
	Total	**1251**					**2003**	
Forest Redgum Riparian Woodland	Riparian/Floodplain	51	0	0	6	28	29	-22
Swamp Oak Riparian Forest	Riparian/Floodplain	1	0	0	0	0	0	-1
Rough-barked Apple Woodland	Riparian/Floodplain	0	6	7	16	16	24	+24
	Total	**52**					**53**	
Weeping Myall Woodland	Shrubland	0	0	0	0	0	17	+17
Coast Myall Exposed Woodland	Shrubland	<1	0	0	0	0	0	-<1
	Total	**<1**					**17**	
Grassland	Grassland	934	1	5	17	23	114	-820
	Total	**934**					**114**	

2. General Biodiversity Management Strategies

A number of general management strategies will be employed across the Study Area to limit the impact of the Project on flora and fauna species. These comprise:

- **Fencing** - Areas of retained vegetation within the Proposed Offset Areas, corridor areas and pre-mining Proposed Disturbance Area will be appropriately protected from human-induced impacts. The type of fencing used will consider the need for facilitation of fauna movement. Fencing will also be used as part of the revegetation strategy to control impacts such as grazing and to allow vegetation to regenerate naturally.
- **Weed Species** - A Weed Management Strategy will be incorporated into the Ecological Management Plan, to detail types of weeds present, required control methods and frequencies, as well as monitoring requirements.
- **Introduced Fauna Species** - A Pest Species Management Strategy will be incorporated into the Ecological Management Plan to assess target species present, required control methods and frequencies, as well as monitoring requirements.
- **Bushfire Management** - Centennial recognises its obligations in relation to the management of bushfire risk in relation to the Project and will undertake detailed assessments of site specific risk and potential ignition sources to determine the appropriate management strategies. Specific bushfire risk management and controls may include:
  - Hazard reduction works including the creation and maintenance of firebreaks and asset protection zones.
  - Maintenance of fire fighting water supply throughout the life of the Project and the use of water carts, fire extinguishers and hose reels.
  - Incorporation of bushfire control techniques in emergency preparedness training of staff.
- **Adaptive Management** - A strong positive feedback loop between monitoring and adaptive management will be established. The management of the ecological components of the Project will be responsive to any new ecological data that may arise through the ecological monitoring of the Study Area, or any other studies completed as part of the Project.
- **Tree Felling Procedure** - A detailed Tree Felling Procedure will be implemented to minimise the potential for impact on native fauna species (including threatened species) as a result of the clearing of hollow-bearing trees. This procedure will be provided within the Ecological Management Plan, and will consider a number of factors, including seasonal considerations, the opportunity for salvage and re-use of existing hollows, and the salvage of specific habitat features such as hollow logs, fallen timber and rocks to relocate to other parts of the Study Area. The procedure will detail the necessary pre-clearing activities, requirements during clearing operations, and post-clearing requirements.
- **Management of Aquatic Habitat** - A number of strategies will be assessed for incorporation into the design of the reconstruction of the channel to provide for instream aquatic habitat to mitigate the impact from the removal of Anvil Creek and Clarks Gully.

Biodiversity Offset Strategy

The Biodiversity Offset Strategy was developed to supplement the standard impact mitigation strategies to provide further mitigation for the predicted impacts of this Project. The components of this strategy are intended to combine with the existing standard mitigation strategies, to achieve the overall goal of no net loss of flora and fauna values in the area in the medium to long term.

1. Mitigation through the Protection of the Proposed Offset Areas

The Proposed Offset Areas is proposed as an immediate ecological outcome to offset the impacts of the Project. It will assist in the protection of a diverse range of threatened flora and fauna species, two endangered populations and one EEC, and will link in with the Conceptual Corridor Strategy, habitat augmentation and Ecological Management Plan to provide for the continued viability of the biodiversity of the Wybong Uplands area. The proposed Conservation and Enhancement Areas will have their viability as a conservation area secured in the long term. The mechanism for securing this

conservation will be determined in consultation with DoP, DEC and DPI as part of the NSW approval process.

2. Revegetation and Regeneration Strategy

Revegetation and regeneration will contribute significantly towards the progressive rehabilitation of previously mined areas, provision of corridors, habitat augmentation and impact 'softening' strategies. The overall benefits will be to replace habitat lost from the Proposed Disturbance Area. Additional habitat will also be established within the Proposed Offset Areas and corridor areas. **Table 7** provides the indicative final composition of vegetation communities following augmentation of habitat within the Proposed Offset Areas.

Table 7 - Indicative Final Composition of Vegetation within the Proposed Offset Areas following Habitat Augmentation Works

Community Name	**Formation**	**Extent of Existing Vegetation (ha)**	**Extent of Vegetation following Augmentation (ha)**	**Net Change in Vegetation Extent (ha)**
Slaty Box Woodland	Woodland	281	392	+111
Ironbark Woodland Complex	Woodland	507	777	+270
Bulloak Woodland	Woodland	0	0	0
Sheltered Grey Gum Woodland	Woodland	79	79	0
Red Ash Sheltered Forest	Woodland	1	1	0
Mixed Species Revegetation/Plantation	Woodland	1	1	0
Drooping Sheoak Woodland	Woodland	1	6	+5
Paperbark Woodland	Woodland	3	3	0
Total		**873**	**1259**	**386**
Exotic Rushland	Riparian/ Floodplain	0		0
Swamp Oak Riparian Forest	Riparian/ Floodplain	20	22	+2
River Oak Riparian Forest	Riparian/ Floodplain	1	6	+6
Rough-barked Apple Woodland	Riparian/ Floodplain	11	60	+49
Forest Redgum Riparian Woodland	Riparian/ Floodplain	0	23	+23
River Red Gum Floodplain Woodland	Riparian/ Floodplain	0	22	+22
Total		**32**	**133**	**101**
Weeping Myall Woodland	Shrubland	1	30	+29
Tall Mixed Shrubland Complex	Shrubland	52	52	0
Coast Myall Exposed Woodland	Shrubland	74	74	0
Total		**127**	**156**	**29**
Grassland	Grassland	872	357	-515
Total		**872**	**357**	**-515**

In all cases, the following will be applicable to all revegetation activities, as well as regeneration where relevant:

- All revegetation and regeneration will be established as soon as possible to minimise lag time in habitat replacement;
- All replanting within revegetation areas will be appropriately designed with structural and floristic diversity suitable to complement nearby existing vegetation communities;
- All revegetation will use species from an acceptable level of local provenance;
- All revegetation and regeneration areas will be subject to appropriate regular management (weeding, replacement of failed plantings, bushfire protection);
- All revegetation and regeneration areas will be subject to appropriate regular monitoring (success/failure) and a positive feedback loop to Centennial and relevant government agencies; and
- All areas of revegetation and regeneration will be appropriately protected.

3. Conceptual Corridor Strategy

In addition to the net increase in treed vegetation area shown in **Table 7**, a Conceptual Corridor Strategy has also been developed to address the reduction in movement opportunities for flora and fauna species as a consequence of the clearing associated with the mining process. This Strategy aims to identify existing corridors within the landscape and to retain this existing function wherever possible. Where this has not been possible, alternative corridor options have been provided to ensure adequate access and egress throughout the Project Area during the construction and operation of the mine, as well as in the post-mining landscape. A total of eight corridor options have been considered as part of the corridor strategy which is discussed in detail in Section 9.5.4.3 of the Ecological Assessment in Appendix 9 of the attached EA.

4. Wybong Uplands Land Management Strategy

Centennial proposes to establish a land management strategy which will achieve its corporate sustainability goals. The Strategy "Wybong Uplands Land Management Strategy" (WULMS) will target sustainable land management across the broader landscape of the Wybong area and will not be limited to the Study Area. Land management within the Proposed Disturbance Area will complement the Strategy. The Strategy will be managed by a committee, the structure of which is yet to be determined. The committee is proposed to include members from the community, Centennial, relevant land management groups and/or agencies.

The aim of the Strategy is long term sustainable land management within the Wybong area. Actions to achieve this aim may include dryland salinity mitigation, drought proof farming, sustainable agriculture, demonstration farms, riparian zone management and ecological corridors.

Centennial will commit to funding for the Strategy of $100,000 per year for 5 years. WULMS may seek further funding through government environmental grants.

Amongst other objectives, it is expected that the WULMS strategy will be used to work with landholders in the area of Corridor Option 7 in an endeavour to achieve ecological corridor outcomes in the area. Any works proposed within this area as part of the WULMS strategy will complement works completed for ecological corridors within the Study Area.

5. Habitat Augmentation Strategy

The augmentation of existing vegetation within the Proposed Offset Areas will contribute greatly to increasing the quality of habitat for threatened species in this area. Augmentation strategies will also be applied to corridors and other areas of revegetation or regeneration. The aim of habitat augmentation will be to increase to a high level the specific habitat features for key threatened species, thereby improving the quality of the habitat so it is able to support greater numbers of those species. Specific habitat features are those that can be a limiting factor to population thresholds, and will

include habitat features such as tree hollows and specific foraging resources. This strategy will involve activities such as:

- Installation of nest boxes;
- Salvage and re-erection of hollows;
- Salvage and replacement of habitat features such as hollow logs, fallen timber and boulders; and
- Planting of specific habitat resources within existing vegetation to increase the quality of habitat.

6. Aquatic Strategy

The drainage line to be constructed as part of the final landform where Anvil Creek now exists will be designed and constructed to provide a stable channel with a natural appearance that blends in with any adjoining riparian areas. Native trees and shrubs will be planted along the drainage alignment to enhance the long term stability of the drainage system and to provide suitable habitat for native fauna.

Sedimentation and other dams will be designed to allow for the establishment of aquatic sedge and rush vegetation around the perimeter. Habitat re-creation initiatives are detailed in Section 9.4.4 of the Ecological Assessment in Appendix 9 of the attached EA.

During mining, the provision of adequately designed water management structures, that is dams with shallow verges allowing the colonisation of aquatic macrophytes and sedges, will ensure that habitat for the range of macroinvertebrate species recorded during the aquatic survey will remain within the Proposed Disturbance Area.

7. Ecological Monitoring

A comprehensive ecological monitoring program will be developed with the aim of assessing the success of the mitigation measures, and will include the collection of systematic floristic data from permanent plots; photo monitoring at permanent plots; assessment of flora and fauna species diversity and abundance; assessment of habitat losses or gains; incidence of weeds and feral animals; the security of protected areas; the ongoing revegetation and regeneration of vegetation communities; the resilience of ecosystems; and landscape function analysis to assess the biogeochemical functioning of the landscape.

The ecological monitoring program, which will occur pre- and post-mining across the Study Area and external corridors, will involve the monitoring of retained vegetation, revegetation and regeneration, fauna species and their habitat, target threatened species and aquatic habitat.

A detailed set of completion criteria will be developed in order to provide an assessment framework for the success of the ecological and rehabilitation management measures. These criteria will relate to the objectives of the retention of existing vegetation, revegetation and regeneration activities, fauna habitat, habitat augmentation and landscape function analysis.

Key Outcomes

In conclusion, the ecological survey identified the presence of a diversity of threatened and migratory flora and fauna species. These occur variously within the Proposed Disturbance Area, Proposed Offset Areas, or both. A high diversity of vegetation communities and both highly intact and highly fragmented fauna habitats were recorded.

Most threatened species occurring in the Study Area are likely to be beneficially impacted by the project, through the establishment of a protected biodiversity offset area. It is considered that the detailed impact mitigation strategy proposed as part of the Project (as summarised in **Section 5.1** of this Referral and further detailed in Section 9 of the Ecological Assessment in Appendix 9 of the attached EA) will ameliorate negative impacts on listed threatened species within the Proposed Disturbance Area including Painted diuris (*Diuris tricolor*) and Large-Eared Pied Bat (*Chalinobus*

dwyeri). Based on these mitigation measures, it is expected that there will be no net loss of flora and fauna value in the area in the medium to long term

6. Information sources

6.1 List relevant references

You should also attach a copy of any relevant reports or documents that support the arguments and conclusions made in this referral. For example, any flora and fauna surveys or desktop investigations should be provided.

Barrett, G., Silcocks, A., Barry, S., Cunningham, R., and Poulter, R. (2003) The New Atlas of Australian Birds, Royal Australian Ornithologists Union, Melbourne.

Kovac, M. and Lawrie, J.W. (1991). Soil Landscapes of the Singleton 1:250000 Sheet. Soil Conservation Service of NSW, Sydney.

Peake, T. C. (2006) The Vegetation of the Central Hunter Valley, New South Wales. A Report on the Findings of the Hunter Remnant Vegetation Project. Final Draft Hunter – Central Rivers Catchment Management Authority, Paterson.

Resource and Conservation Assessment Council (2002). Targeted Flora Survey and Mapping, NSW Western Regional Assessments - Brigalow Belt South Bioregion (Stage 2). NSW National Parks and Wildlife Service.

Umwelt (2006a) Ecological Assessment, Anvil Hill Project. Prepared for Centennial Hunter Pty Limited, June 2006. http://www.umwelt.com.au/anvil-hill/; and

Umwelt (2006b) Environmental Assessment, Anvil Hill Project. Prepared for Centennial Hunter Pty Limited, August 2006. http://www.umwelt.com.au/anvil-hill/.

Umwelt (2006c) Response to Submissions – Part A, Anvil Hill Project. Prepared for Centennial Hunter Pty Limited, October 2006. http://www.umwelt.com.au/anvil-hill/.

Umwelt (2006d) Response to Submissions – Part B, Anvil Hill Project. Prepared for Centennial Hunter Pty Limited, November 2006. http://www.umwelt.com.au/anvil-hill/.

Umwelt (2006e) Response to Submissions – Part C, Anvil Hill Project. Prepared for Centennial Hunter Pty Limited, December 2006. http://www.umwelt.com.au/anvil-hill/.

6.2 For information given in sections 3 and 4 of this referral, please indicate:

(a) the source of the information; and

The information contained within this Referral Form has been sourced from the following documents:

- Umwelt (2006a) Ecological Assessment, Anvil Hill Project. Prepared for Centennial Hunter Pty Limited, June 2006. http://www.umwelt.com.au/anvil-hill/; and

- Umwelt (2006b) Environmental Assessment, Anvil Hill Project. Prepared for Centennial Hunter Pty Limited, August 2006. http://www.umwelt.com.au/anvil-hill/.

(b) how recent the information is; and

The Ecological Assessment was completed in June 2006, and the Environmental Assessment was completed in August 2006. These documents included results from field surveys of parts of the Study Area completed by HLA Envirosciences during 2002, and field survey for the Ecological Assessment (Umwelt 2006) was completed over 2004 and 2005. These surveys are discussed in Section 3 of the Ecological Assessment in Appendix 9 of the attached EA. An additional field investigation of painted diuris (*Diuris tricolor*) was undertaken on 20 October 2006.

(c) how the reliability of the information was tested; and

The reliability of the information has been tested via detailed internal review; detailed presentations to, and consultation with, the NSW Department of Planning, and Department of Environment and Conservation (DEC); and the report has been reviewed for adequacy by the NSW Department of Planning, Department of Environment and Conservation, Department of Natural Resources, Department of Primary Industries and Muswellbrook Council. The NSW Department of Planning accepted the EA as adequate for exhibition and assessment under Part 3A of the NSW Environmental Planning and Assessment Act. The ecological assessment was subject to further review by the Independent Hearing and Assessment Panel as part of the NSW Department of Planning Part 3A assessment process.

(d) any uncertainties in the information.

There are currently no uncertainties regarding the accuracy of the information provided within these documents.

7. Signatures and Declarations

Section 489 of the EPBC Act states that the provision of false or misleading information is an offence punishable on conviction by imprisonment and fine.

7.1. Signature of person making the referral

I, BARBARA CROSSLEY **(*full name*), declare that the information contained in this form is, to my knowledge, true and not misleading.**

Signature B Crossley

Date 9 JANUARY 2007

7.2. Signature of person proposing to take the action

I, SUE CLARK **(*full name*), declare that the information contained in this form is, to my knowledge, true and not misleading.**

Signature Sue Clark

Date 10 JANUARY 2007

7.3. Declaration of person nominated as proponent in Section 1.3, if different from person proposing to take the action

I, ...(*full name*), being (or agent acting on behalf of) the person nominated in Section 1.3 of this referral form as the nominated proponent agree to be designated as the proponent for the action described above if it is decided that the action requires approval under Part 9 of the EPBC Act.

Signature

Date

Signature of person proposing to take the action

Date

Fill in Section 7.4 if you believe that the proposal is not likely to have a significant impact on matters protected by the EPBC Act and that the proposal is therefore not a controlled action. Fill in Section 7.5 if you believe that the proposal is likely to have a significant impact on a protected matter and that the proposal is therefore a controlled action. (Note: This Section must be completed in *all cases* except where the referral is made by a State or Territory or a Commonwealth agency in relation to an action to be taken by another person.)

7.4. ***If you think your proposed action is not likely to have a significant impact on any of the matters listed in the table below, then you should select and complete the following statement and you should not mark any of the boxes in the table below.***

I, Barbara Crossley *(full name*), being the person making this referral believe that the action described in this referral is not a controlled action.

Briefly provide reasons why you believe your proposed action is not a controlled action:
(Note: For an explanation of the term "controlled action", see the Referral Guide.)

The Project is unlikely to have significant impacts on any threatened species or migratory species listed under the EPBC Act. While recorded through scat identification, the brush-tailed rock-wallaby (*Petrogale penicillata*) is regarded as locally extinct in the Study Area. The large-eared pied bat (*Chalinolobus dwyeri*) depends on caves for roosting, and all caves are confined to the Proposed Offset Areas, and are unlikely to be significantly affected by operations in the Proposed Disturbance Area. The amount of potential foraging habitat proposed to be removed will not significantly impact this species.

Painted diuris (*Diuris tricolor*) was recorded on one occasion in the Proposed Offset Areas and on 14 occasions in the Proposed Disturbance Area. While this species will be impacted by the proposed development, it is also likely to occur more extensively in a substantial proportion of the Proposed Offset Areas, and so be protected in that area. All other known local occurrences are on roadsides in the Wybong district. This species will not be significantly impacted by the proposal.

Commersonia rosea, *Pomaderris reperta* and *Lasiopetalum longistamineum* have been recorded only within the Proposed Offset Areas. Virtually all of their potential habitat occurs within the Proposed Offset Areas, and as a result all three species could benefit significantly from the protection of this land and its management for biodiversity purposes.

The spotted-tailed quoll (*Dasyurus maculatus maculatus*) and *Bothriochloa biloba* were not recorded in the Study Area. While *Bothriochloa biloba* was recorded to the south of the Study Area, and there is potential habitat for both species in the Proposed Disturbance Area and the Proposed Offsets Areas, they will not be significantly impacted by the proposal.

While several other threatened species could potentially be present in the Study Area, most would be restricted to the Proposed Offset Areas, and none would be significantly impacted by the proposal.

No migratory species have important habitat present in the Study Area, and none will be significantly impacted by the proposal.

In summary, most threatened and migratory species known to occur or with the potential to occur in the Study Area are likely to be beneficially impacted by the project, through the establishment of a protected biodiversity offset area. There is no significant impact on the Painted diuris (*Diuris tricolor*). Further, the detailed impact mitigation strategy proposed as part of the Project (as summarised in **Section 5.1** of this Referral) will ameliorate the likely impacts on these species. Consequently, the declaration of a "controlled action" is not warranted for these species.

OR

7.5. ***If you think that your proposed action is likely to have a significant impact on any of the matters listed in the table below, then you should select and complete the following statement. You must then mark 'Yes' against those matters on which you think it will have a significant impact, in the table below.***

I …….*(full name*), being the person making this referral and the person proposing to take the action (or agent acting on behalf of the person) believe that the action described in this referral is a controlled action because of the following provisions of the Act:

Significant Impact Likely	**Controlling Provision**
No	**World Heritage property** **(Sections 12 and 15A - significant impacts on the values of a World Heritage property)**
No	**Ramsar Wetland** **(Sections 16 and 17B - significant impacts on the ecological character of a Ramsar wetland)**
No	**Threatened species or ecological communities** **(Section 18 and Section 18A - significant impacts on a listed threatened species or a listed threatened ecological community)**
No	**Migratory species** **(Sections 20 and 20A - significant impacts on a listed migratory species)**
No	**Nuclear action** **(Sections 21 and 22A - nuclear actions)**
No	**Commonwealth marine area** **(Sections 23, 24 and 24A - actions relating to the Commonwealth marine area and fishing in coastal waters managed by the Commonwealth)**
No	**Commonwealth land** **(Sections 26 and 27A - actions relating to Commonwealth land)**
No	**Commonwealth action** **(Section 28 - actions by the Commonwealth having a significant impact on the environment)**

Briefly provide reasons why you believe your proposed action is a controlled action:
(Note: For an explanation of the term "controlled action", see the Referral Guide.)

If the person making this referral is, or is representing, a *small business* (a business having fewer than 20 employees), please provide an estimate of the time taken to complete this form.

Please Include

- **The time spent reading the instructions, working on the questions and obtaining the information; and**
- **The time spent by all employees in collecting and providing this information.**

hours minutes

END OF FORM