

APPENDIX 7

Centennial Coal
Newstan Colliery s75W Modification

Ecological Impact Assessment



September 2010

FUTURE POWER



Centennial Coal

Centennial Coal

Newstan Colliery S75W Modification

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HUNTER ECO



Colin Driscoll
Environmental Biologist
NPWS Scientific Licence S10565

September 2010

Executive Summary

Centennial Newstan Pty Limited (Centennial Newstan) owns and operates the Newstan Colliery. Newstan Colliery is located approximately 25 kilometres south-west of Newcastle and 140 kilometres north of Sydney within the Lake Macquarie Local Government Area. The Newstan Colliery pit top and surface facilities is located 4 kilometres north of the township of Toronto.

Centennial Newstan is seeking a modification to the existing Development Consent (DA 73-11-98) to allow for the recommencement of first workings bord and pillar mining in an area referred to as Main West located beyond the existing Development Consent boundary.

The mining method for the proposed Main West mining area (Project Area) will involve first workings bord and pillar mining only and be designed to result in less than 20 millimetres of subsidence on the surface (Seedsman 2010). Due to mining being designed to achieve less than 20 millimetres of surface subsidence, subsidence-related surface impacts are anticipated to be negligible.

There are six vegetation communities represented across the Ecology Investigation Area with a small portion of one Endangered Ecological Community (EEC) at the western edge of the Project Area. From the Atlas of NSW Wildlife several threatened flora and fauna species could occur in the Ecology Investigation Area or within the Project Area. Known threatened flora within the Project Area are *Acacia bynoeana*, *Grevillea parviflora* subsp *parviflora* and *Tetratheca juncea*. These three species are also listed as nationally threatened under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

A subsidence assessment predicts 20 millimetres would be the upper limit of subsidence resulting from the mining (Seedsman 2010) with no other potential habitat modification/clearing proposed. This level of subsidence is negligible as far as the threatened species habitat is concerned. A formal assessment found that there would be no impact on state or nationally threatened species or communities resulting from the mining and associated activity.

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Centennial Coal

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1.0 Introduction

Centennial Newstan Pty Limited (Centennial Newstan) owns and operates the Newstan Colliery. Newstan Colliery is located approximately 25 kilometres south-west of Newcastle and 140 kilometres north of Sydney within the Lake Macquarie Local Government Area. The Newstan pit top and surface facilities is located 4 kilometres north of the township of Toronto (**Figure 1**).

Newstan is an underground longwall coal mine producing thermal and semi soft coking coal for both the domestic and export markets. Underground mining at the Newstan Colliery has been undertaken in the Young Wallsend, Great Northern, Fassifern, Borehole and West Borehole coal seams and produces semi soft coking coal for both the domestic and export markets. The Newstan Colliery ceased underground mining production in 2009 however continues to operate the Newstan Colliery Surface Facilities Area for the handling and processing of coal from other Centennial operations.

Centennial Newstan is seeking a modification to the existing Development Consent (DA 73-11-98) to allow for the recommencement of first workings bord and pillar mining in an area referred to as Main West located beyond the existing Development Consent boundary.

The proposed Main West mining area (Project Area) would not involve any surface alteration but use the existing underground and surface infrastructure. The only surface change would be a small amount of subsidence over the proposed mining area estimated at a maximum of 20 millimetres (Seedsman 2010).

This report describes the ecology of the surface above and around the Project Area with particular attention given to threatened flora and fauna species and endangered ecological communities. The likelihood of any impact resulting from the proposed mining operation on these threatened species and communities is evaluated.

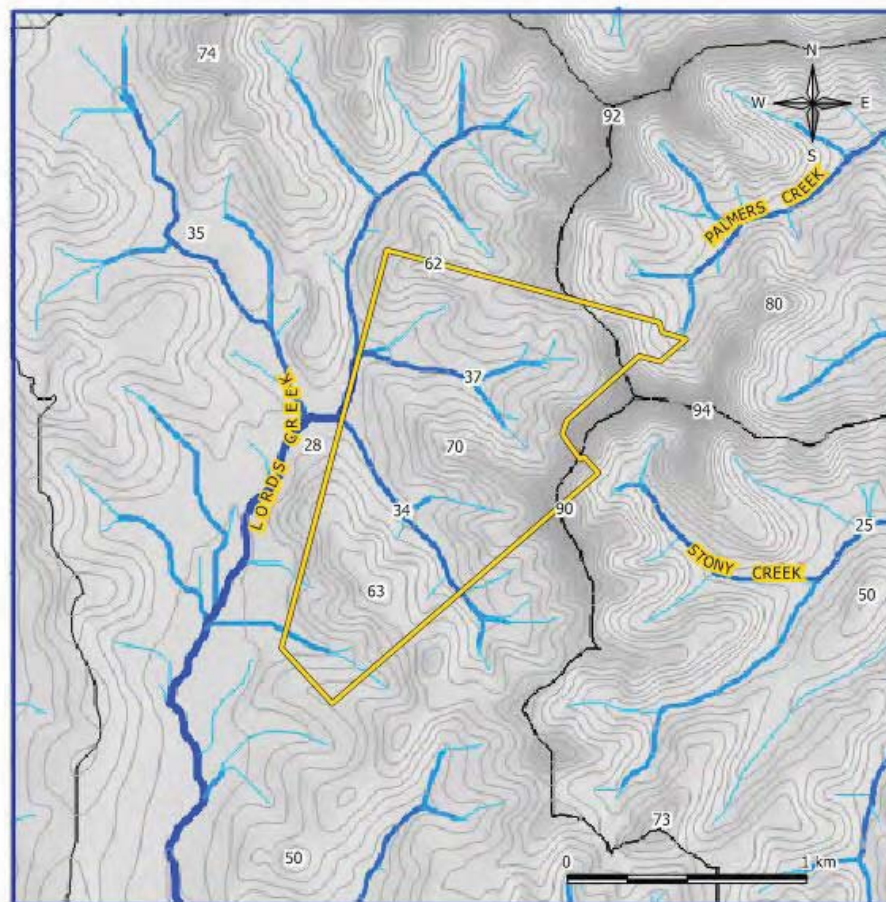
1.1 Geophysical description

The Project Area lies across almost completely vegetated habitat that is intersected by powerline easements and bush roads (**Figure 1**).

The landform is undulating with ridgetops at around 90 metres Australian Height Datum (AHD) elevation and valleys at around 10 – 20 metres AHD (**Figure 2**). The Project Area lies almost entirely across the catchment feeding into Lords Creek.

The geology of the Project Area is almost entirely made up of Permian conglomerate sandstone and tuff (DMR 1999) and the soils are the Awaba erosional landscape and Warners Bay residual landscape (Murphy 1993).





- | | | |
|-------------------------------------|---------------|---------------------------|
| Ecology Investigation Area boundary | Major streams | Main catchment boundaries |
| Proposed Main West Mining Area | Minor streams | Spot heights |
| | 5 m contours | |

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Figure 2 Topography

2.0 Methods

The ecology of the immediate area (Ecology Investigation Area) containing the Project Area was assessed (**Figure 1**). The potential for ecological impacts by the subsidence was determined based around vegetation communities classified and mapped across the Ecology Investigation Area. Any threatened species of flora or fauna were recorded during the field work. Using the vegetation communities as habitat surrogates, the potential threatened flora and fauna species occurring were determined based on current available knowledge of their habitat requirements.

Given that there would be no habitat clearing and that the only impact would be subsidence up to a maximum predicted 20 millimetres (Seedsman 2010), no fauna trapping or targeted field searches for fauna were conducted. For the purposes of an impact assessment, all fauna species that would be likely to occur in the surface habitat types were assumed to be present. Records from any relevant previous studies were included.

2.1 Vegetation community mapping

Recent ground-truthed vegetation mapping of the area (Hunter Eco 2008) was used for this assessment and augmented by collection of field data to fill in any blanks. The vegetation community map was prepared using the ground-truthing methods described in DECC (2008a). In principle the method involves recording the dominant species in the canopy, shrub and ground structural layers at a number of locations across an area. These data points are termed Rapid Data Points (RDP). This data is then given a community code that matches the classification found in the Hunter and Central Coast Regional Environment Management Strategy (HCCREMS, NPWS 2000) model. The RDP data is then extrapolated across the Ecology Investigation Area in a GIS and the polygons refined using aerial photographic interpretation all the while remaining true to the RDP ground-truthed data.

2.2 Threatened species and communities - NSW State

Threatened species and communities considered here were those listed in the NSW *Threatened Species Conservation Act 1995* (TSC Act).

The threatened species present in any area are dependent on the habitat types represented. As a guide to the threatened species that might be present in the Ecology Investigation Area data was obtained from the NPWS Atlas of NSW Wildlife for an area within 10 km of the Project Area.

The species listed in the 10 km data were assessed against their known habitat preferences (DECC 2008b) and the habitat found to be present as a result of the vegetation mapping. The location of any threatened species observed during the field work was recorded.

2.1 Threatened species and communities - Commonwealth

Threatened species and communities considered here were those listed in the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Potential Commonwealth listed threatened species were extracted using the protected matters search tool* for an area extending out 10 km from the Project Area.

*<http://www.environment.gov.au/erin/ert/epbc/index.html>

3.0 Threatened species assessment results

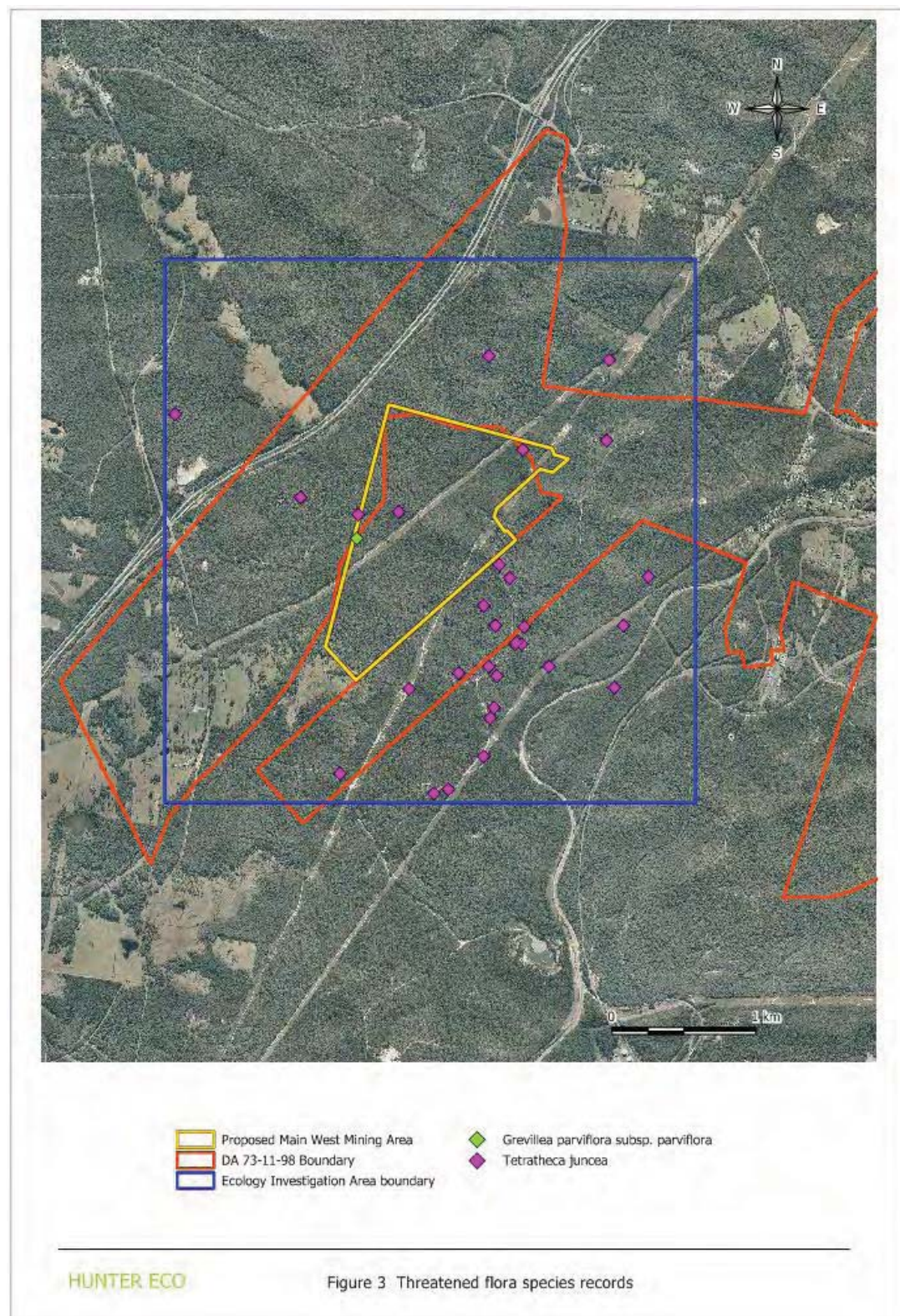
3.1 Probable threatened species – NSW State

Table 1 lists the species of threatened flora recorded in the Atlas of NSW Wildlife from within 10 km of the Project Area. The likelihood of occurrence within the Project Area, given the habitat types present, is evaluated.

Table 1 Threatened species from the Atlas of NSW Wildlife

Scientific Name	Common Name	Status	Likelihood of presence
FLORA			
<i>Acacia bynoeana</i>	Bynoe's Wattle	E1	Suitable habitat
<i>Angophora inopina</i>	Charmhaven Apple	V	Suitable habitat
<i>Cryptostylis hunteriana</i>	Leafless Tongue Orchid	V	Suitable habitat
<i>Grevillea parviflora</i> subsp. <i>parviflora</i>	Small-flower Grevillea	V	Suitable habitat
<i>Maundia triglochinoides</i>		V	No suitable habitat
<i>Melaleuca biconvexa</i>	Biconvex Paperbark	V	No suitable habitat
<i>Tetradlea juncea</i>	Black-eyed Susan	V	Suitable habitat
BIRDS			
<i>Pandion haliaetus</i>	Osprey	V	Possible use of large trees for nesting purposes.
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V	Suitable foraging habitat in the <i>Allocasuarina</i> species.
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V	A possible winter migrant from tall mountain forests and woodlands.
<i>Climacteris picumnus</i>	Brown Treecreeper	V	Generally unsuitable habitat with the shrub and ground layers too dense.
<i>Xanthomyza phrygia</i>	Regent Honeyeater	E1	Small amount of suitable foraging habitat in flowering Swamp Mahogany
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	Suitable habitat
<i>Glossopsitta pusilla</i>	Little Lorikeet	V	Suitable foraging habitat in flowering eucalypts and bloodwoods
<i>Lathamus discolor</i>	Swift Parrot	E1	Small amount of suitable foraging habitat in flowering Swamp Mahogany
<i>Ninox strenua</i>	Powerful Owl	V	Suitable foraging habitat throughout; possibility of breeding hollows in some large trees.

<i>Tyto novaehollandiae</i>	Masked Owl	V	Suitable habitat in the open woodlands of the MU30 and MU31 communities along with suitable breeding hollows.
<i>Tyto tenebricosa</i>	Sooty Owl	V	Generally unsuitable habitat with the bird preferring dense mesic gullies.
MARSUPIALS			
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	Probable foraging habitat.
<i>Petaurus norfolcensis</i>	Squirrel Glider	V	Suitable habitat
<i>Petaurus australis</i>	Yellow-bellied Glider	V	Prefers tall mature eucalypt forests in nutrient rich soils, no suitable habitat
<i>Phascolarctos cinereus</i>	Koala	V	Marginal habitat, very few eucalypt feed tree species
MEGACHIROPTERAN BATS			
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	Foraging habitat wherever eucalypts or bloodwoods blossom across the subject site.
MICROCHIROPTERAN BATS			
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	V	A variety of forest types. Suitable habitat present.
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	A variety of forest types. Suitable habitat present.
<i>Miniopterus australis</i>	Little Bentwing-bat	V	A variety of forest types. Suitable habitat present.
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V	A variety of forest types. Suitable habitat present.
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	A variety of forest types. Suitable habitat present.
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V	A variety of forest types. Suitable habitat present.
<i>Kerivoula papuensis</i>	Golden-tipped Bat	V	A variety of forest types. Suitable habitat present.
AMPHIBIANS			
<i>Crinia tinnula</i>	Wallum Froglet	V	No suitable habitat
<i>Mixophyes balbus</i>	Stuttering Frog	E1	No suitable habitat
REPTILES			
<i>Hoplocephalus stephensii</i>	Stephens' Banded Snake	V	Eucalypt forest, possible suitable habitat



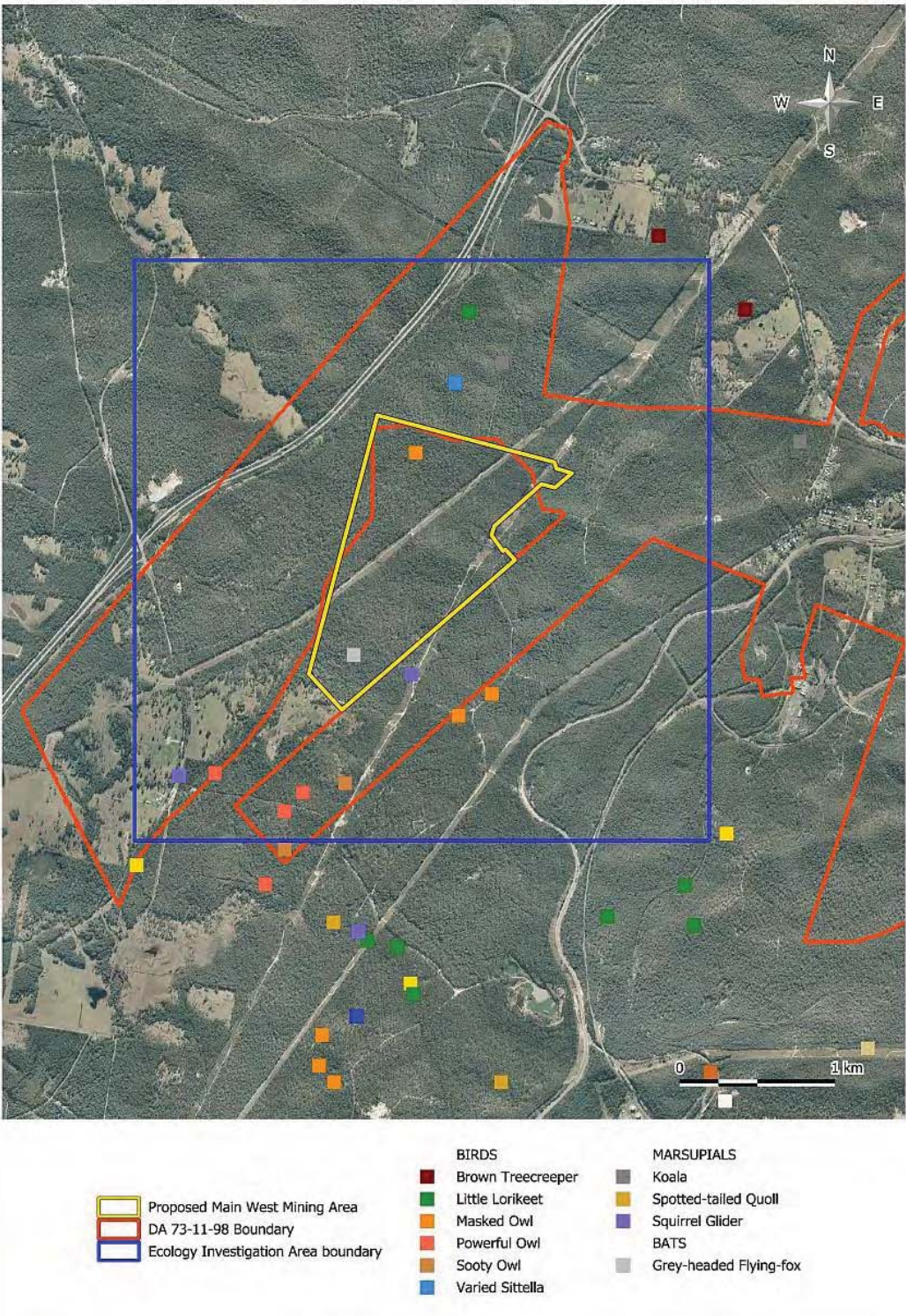


Figure 4 Threatened fauna species records
(Indicative locations only, not actual Atlas data)

3.2 Probable threatened species – Commonwealth

Table 2 lists the species of threatened flora obtained from the protected matters search tool for the area within 10 km of the Project Area.

Table 2 Commonwealth listed species from the protected matters search tool (extracted 6/7/10)

Species	Common Name	Status	Likelihood of presence
	FLORA		
<i>Acacia bynoeana</i>	Bynoe's Wattle	V	Potentially suitable habitat
<i>Angophora inopina</i>	Charmhaven Apple	V	Potentially suitable habitat
<i>Cryptostylis hunteriana</i>	Leafless Tongue-orchid	V	Suitable habitat
<i>Grevillea parviflora</i> <i>subsp. parviflora</i>	Small-flower Grevillea	V	Present in Project Area
<i>Melaleuca biconvexa</i>	Biconvex Paperbark	V	Limited suitable habitat in Swamp Sclerophyll forest
<i>Rhizanthella slateri</i>	Eastern Underground Orchid	E	No suitable habitat. Nearest records are 60 km away
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	V	No suitable habitat
<i>Tetradlea juncea</i>	Black-eyed Susan	V	Present in Project Area
	BIRDS		
<i>Rostratula australis</i>	Australian Painted Snipe	E	No suitable habitat – a wetland species
<i>Anthochaera phrygia</i>	Regent Honeyeater	V	Suitable foraging habitat in flowering Swamp Mahogany
<i>Lathamus discolor</i>	Swift Parrot	E	Suitable foraging habitat in flowering Swamp Mahogany
	MARSUPIALS		
<i>Dasyurus maculatus maculatus</i>	Spotted-tailed Quoll	E	Suitable habitat
<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo (SE mainland)	V	Suitable habitat
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	V	No suitable habitat. Needs rocky escarpments
	MEGACHIROPTERAN BATS		
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	Foraging habitat wherever eucalypts or bloodwoods blossom across the subject site.
	MICROCHIROPTERAN BATS		
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	Suitable habitat
	AMPHIBIANS		
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	No suitable habitat – needs heath or open forest in sandy soils
<i>Litoria aurea</i>	Green and Golden Bell Frog	V	No suitable habitat – needs open reedy swamps/dams
<i>Litoria littlejohni</i>	Littlejohn's Tree Frog	V	No suitable habitat – needs sandstone woodland & heath habitat at higher altitudes
<i>Mixophyes iteratus</i>	Giant Barred Frog	E	No suitable habitat – needs deep damp leaf litter in wet forest

3.3 Migratory species – Commonwealth

In addition to listed threatened species, migratory birds are also a matter of Commonwealth significance. **Table 3** lists the migratory species, all birds, obtained from the protected matters search tool for a 10 km area centred on the Project Area.

Table 3 Commonwealth listed migratory species from the protected matters search tool (extracted 6/7/10)

Scientific Name	Common Name	Likelihood of occurrence
<i>Anthochaera phrygia</i>	Regent Honeyeater	Suitable foraging habitat in flowering Swamp Mahogany
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Forages along lakes and waterways but could be suitable nesting habitat in tall eucalypts
<i>Hirundapus caudacutus</i>	White-throated Needletail	An aerial forager not coming to ground
<i>Merops ornatus</i>	Rainbow Bee-eater	No suitable habitat. Needs sandy eroded banks for nesting and forages in open woodland
<i>Monarcha melanopsis</i>	Black-faced Monarch	Suitable habitat particularly in riparian areas
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	Suitable habitat
<i>Rhipidura rufifrons</i>	Rufous Fantail	Suitable habitat

4.0 Field survey results

4.1 Vegetation communities

The vegetation communities present within the Project Area are detailed in **Table 4**. A map of the vegetation across the entire Ecology Investigation Area is shown in **Figure 5**.

Table 4 Vegetation communities mapped across the Project Area

Name	Area (ha)
Undefined Riparian Community	2
MU9 Coastal Ranges Open Forest	3
MU15 Coastal Foothills Spotted Gum - Ironbark Forest	4
MU30 Coastal Plains Smooth-barked Apple Woodland	116
MU31 Coastal Plains Scribbly Gum Woodland	5
MU37 Swamp Mahogany – Paperbark Forest (EEC)	3

MU9 Coastal Ranges Open Forest

Canopy: Scattered tall *Eucalyptus pilularis* with *Corymbia gummifera*, *Angophora costata* and *Eucalyptus piperita* as the community merges towards riparian areas.

Shrubs: generally open shrub layer with varying proportions of *Pultenaea villosa*, *Podolobium ilicifolium*, *Doryanthes excelsa*, *Dodonaea triquetra* and *Leptospermum polygalifolium*.

Ground: The grasses *Themeda australis* and *Entolasia stricta*.

MU15 Coastal Foothills Spotted Gum – Ironbark Forest

Canopy: dominated by *Corymbia maculata* and *Eucalyptus globoidea* along with locally abundant *Eucalyptus piperita*, *Eucalyptus umbra*, *Eucalyptus paniculata* or *Eucalyptus punctata*.

Shrubs: varying proportions of *Dodonaea triquetra*, *Doryanthes excelsa*, *Pultenaea villosa*, *Acacia ulicifolia*, *Acacia terminalis*, and *Podolobium ilicifolium*.

Ground: dominated by *Entolasia stricta*, *Themeda australis* and *Imperata cylindrica*.

MU30 Coastal Plains Smooth-barked Apple Woodland

Canopy: dominated by *Angophora costata*, *Eucalyptus capitellata* and *Corymbia gummifera* along with locally abundant *Eucalyptus piperita*, *Eucalyptus umbra*, *Eucalyptus resinifera* and *Allocasuarina torulosa*. Disturbance areas frequently had a dense midstorey of *Allocasuarina littoralis*.

Shrubs: the shrub content varied with position in the landscape with elevated drier areas being dominated by *Banksia spinulosa*, *Dillwynia retorta*, *Pultenaea retusa*, *Lambertia formosa* and *Podolobium ilicifolium*. On the sheltered lower slopes the dominant shrubs were *Leptospermum trinervium*, *Leptospermum polygalifolium* and *Doryanthes excelsa*.

Ground: dominated in varying proportions by *Entolasia stricta*, *Themeda australis*, *Joycea pallida* and *Xanthorrhoea latifolia*.

MU31 Coastal Plains Scribbly Gum Woodland

Canopy: dominated by *Eucalyptus haemastoma*, *Eucalyptus capitellata* and *Corymbia gummifera*. Disturbed areas frequently had a dense midstorey of *Allocasuarina littoralis*.

Shrub: The shrub content varied with position in the landscape with elevated drier areas being dominated in varying proportions by *Banksia spinulosa*, *Banksia obtusifolia* and *Lambertia formosa*. Along with *Isopogon anemonifolius*, *Hakea laevipes*, *Persoonia levis* and *Bossiaea obcordata*. On sheltered lower slopes, upper drainage lines and drainage basins dominant species were *Hakea bakeriana*, *Leptospermum trinervium*, *Leptospermum polygalifolium*, *Leptospermum juniperinum*, *Melaleuca sieberi* and *Gahnia clarkei*.

Ground: dominated in varying proportions by *Entolasia stricta*, *Themeda australis*, *Ptilothryx deusta*, *Xanthorrhoea latifolia*, *Joycea pallida* and *Anisopogon avenaceus*.

MU37 Swamp Mahogany – Paperbark Forest (EEC)

The composition of this community is consistent with the listed Endangered Ecological Community (EEC) *Swamp Sclerophyll Forest on Coastal Floodplains*. Winning (2008) conducted a detailed assessment of the vegetation of Stony Creek and drew the same conclusion.

Canopy: Scattered *Eucalyptus robusta* with a mid-canopy of *Melaleuca linariifolia*, *Melaleuca styphelioides*, *Melaleuca sieberi* and in places mesic species such as *Syzygium oleosum*, *Acmena smithii* and *Glochidion ferdinandi*.

Shrub: dominated by *Leptospermum polygalifolium*, *Leptospermum juniperinum* and *Gahnia clarkei* and *Prostanthera incisa*.

Ground: ground cover was generally sparse due to the dense shrub and canopy layers however sedges such as *Empodisma minus* were present in some areas.

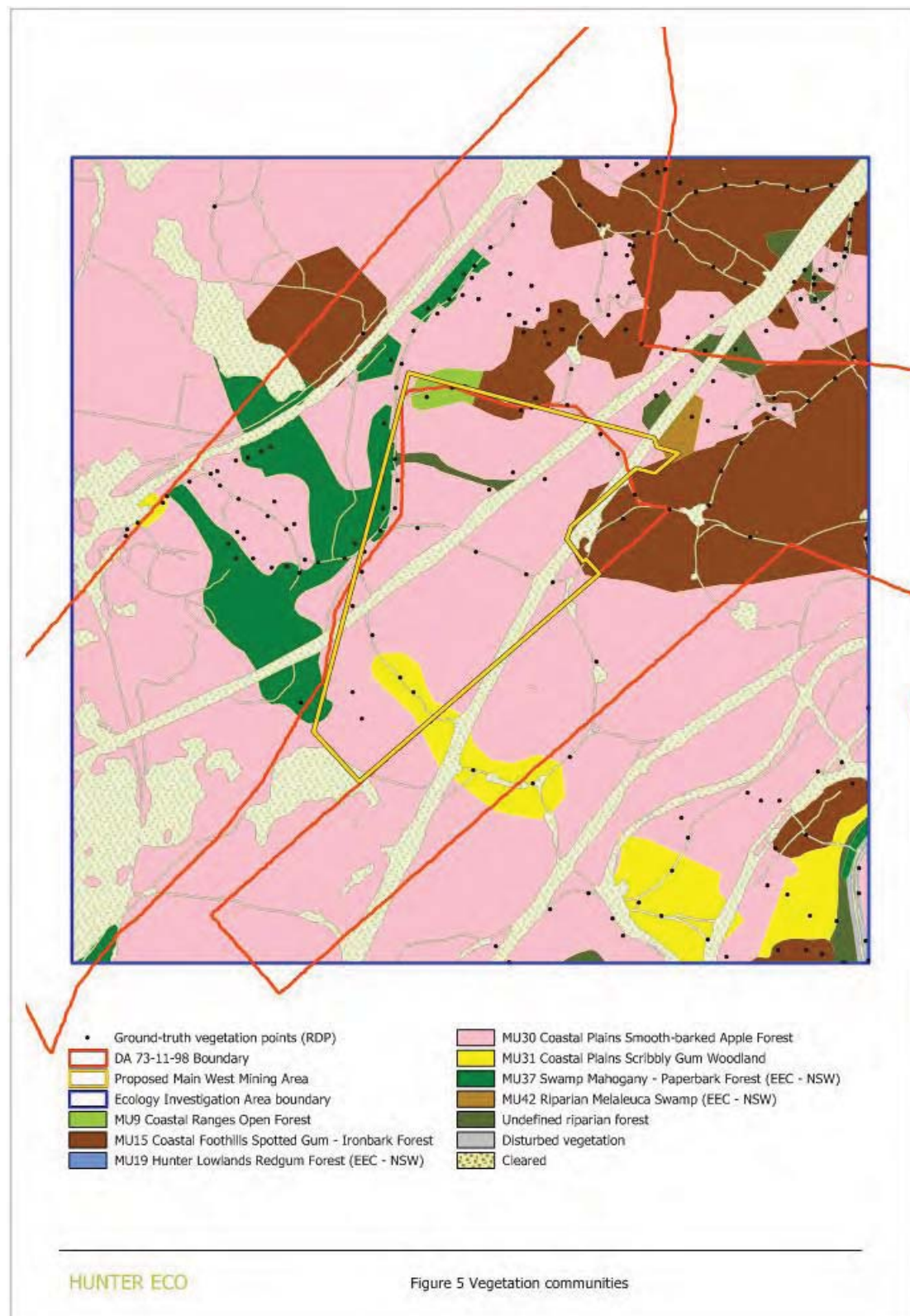
Undefined Riparian

This is a community of the lower slopes and upper drainage lines. It is described as undefined because there is no equivalent in the NPWS (2000) classification.

Canopy: dominated in varying proportions by *Eucalyptus piperita*, *Eucalyptus resinifera* and *Angophora costata*. A mid canopy of the paperbarks *Melaleuca linariifolia* and *Melaleuca styphelioides* was also present in wetter areas.

Shrub: dominated in varying proportions by *Acacia longifolia*, *Callicoma serratifolia*, *Leptospermum polygalifolium*, *Leptospermum juniperinum* and *Gahnia clarkei*.

Ground: dominated by *Themeda australis* and *Entolasia stricta* and in more moist areas a variety of sedges.



4.2 Threatened flora

From the field surveys, two threatened flora species: *Tetratheca juncea* and *Grevillea parviflora* subsp. *parviflora* were recorded within the Ecology Investigation Area (**Figure 3 above**).

4.1 Threatened fauna

The Atlas of NSW Wildlife shows that sixteen threatened fauna species: 8 birds, 3 marsupials, 1 megachiropteran bat, 2 microchiropteran bats, 1 amphibian and 1 reptile have been recorded within the Ecology Investigation Area (**Figure 4 above**).

5.0 Subsidence impact

Subsidence would need to result in major changes to the surface hydrology of an area for a significant impact to occur to ecosystems. The subsidence expected across the Project Area would be only in the order of 20 millimetres (Seedsman 2010).

Detailed assessment of the impact of the expected levels of subsidence on specific threatened species can be found in Appendix 1, NSW listed threatened species, and Appendix 2, Commonwealth listed threatened species.

5.1 Vegetation communities

The three main vegetation communities MU15, MU30 and MU31 are hardy, dry sclerophyll vegetation and such a small change in the surface would have no impact on their viability.

Groundwater Dependent Ecosystems (GDE's) and riparian vegetation can be impacted to varying degrees by subsidence where stream flow is altered through bed cracking or ponding. *Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands* is a key threatening process listed in schedule 3 of the NSW TSC Act.

The riparian vegetation would be dependent on both stormwater flow along the drainage line as well as basal flow originating from shallow groundwater seeping down the ridges to the drainage lines. This vegetation would be groundwater dependent.

Downstream impacts should also be considered as GDE's develop as a result of the cumulative increase in groundwater water availability. The overall slopes on the subject site are such that subsidence of the range predicted would not result in any diversion of water from the existing drainage lines meaning that there would be no impact on downstream GDE's.

Mining depth (minimum 70 m) is well below the reach of the roots of any surface vegetation meaning that the loss of deep groundwater from the mine would not impact on that surface vegetation. Any threat to vegetation would come from the loss of water in the upper alluvium as a result of cracking, particularly in the Lords Creek catchment within the mining area. The bord and pillar mining method (as opposed to longwalls) would be very unlikely to result in such cracking (GHD 2010; Seedsman 2010). Furthermore, referring back to Section 4.1 of this report, vegetation communities, there was only about 2 ha of undefined riparian vegetation mapped that could be possibly classed as being groundwater dependent.

5.2 Threatened flora

Table 1 indicates that there is potentially suitable habitat for 5 threatened flora species and **Figure 3** shows that of these, two have been confirmed as present in the area that would be subject to subsidence. Surface deformation of up to 20 millimetres would not alter the habitat of these species.

5.3 Threatened fauna

The threatened fauna species shown to be using the Project Area (**Figure 4**) are highly mobile and would not be impacted upon by small surface changes that would not result in any habitat changes.

5.4 Habitat connectivity

As there would be no vegetation clearing there would be no change to habitat connectivity as a consequence of the underground mining and associated small level of surface deformation.

6.0 References

- DEC (2004) Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft), New South Wales Department of Environment and Conservation, Hurstville, NSW.
- DECC (2008a) *Vegetation of the Cessnock-Kurri Region, Survey, Classification & Mapping, Cessnock LGA, New South Wales*, Department of Environment and Climate Change (NSW), Sydney.
- DECC (2008b) <http://threatenedspecies.environment.nsw.gov.au/tsprofile/>
- DECC & DoP (2005) Draft Guidelines for Threatened Species Assessment under Part 3A of the *Environmental Planning and Assessment Act 1979*.
- DMR (1999) Lower North East Region 1:250,000 scale equivalent geology (Iner5ge_p (polygons) and Iner5ge_l (lines or arcs) geological coverage comprising the area covered by parts of the Dorrigo, Tamworth, Hastings, Singleton and Newcastle 1:250 000 sheet areas, Hunter Coalfield and Newcastle Coalfield Regional Geology 1:100 000 sheet areas and part Sydney 1:250 000 sheet area. CRA project Lower North East. NSW Department of Mineral Resources.
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- Seedsman (2010) *Centennial Newstan Pty Limited Subsidence Assessment Main West Area*. Report prepared for Centennial Coal by Seedsman Geotechnics. October 2010.

Appendix 1 - Species and Communities, Impact Assessments NSW State Assessment

The disturbance

Predicted subsidence across the Project Area of up to 20 millimetres comprising of surface deformation only (no cracking, Seedsman 2010).

Impact assessment

This section examines the possible impact of the predicted level of subsidence on threatened species and endangered communities. An impact assessment is conducted as provided for in the *Draft Guidelines for Threatened Species Assessment* (DECC & DPI 2005).

A review of threatened species profiles (DECC 2008b) shows that there were threatened species that could be found within the Project Area under different conditions to those prevailing at the time of this investigation or could be found in similar habitat in the immediate region. An impact assessment was applied to these species.

FLORA

Tetratheca juncea

a) How is the proposal likely to affect the lifecycle of a threatened species and/or population?

No threatened populations were present.

To affect the lifecycle of a plant species, an impact would need to significantly adversely impact on growing conditions, lower pollinator population and activity or restrict dispersal vectors. The expected level of subsidence would not result in alteration to overall habitat attributes and in turn, there would be no affect on the lifecycle of *Tetratheca juncea*.

b) How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The expected level of subsidence would not result in alteration to overall habitat attributes.

c) Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

Tetratheca juncea is not at the limit of its distribution at this location. The species is found from Wyong to Bulahdelah.

d) How is the proposal likely to affect current disturbance regimes?

There would be no alteration to current disturbance regimes as no habitat clearing would be involved and the expected level of subsidence would not alter the existing habitat.

e) How is the proposal likely to affect habitat connectivity?

The existing connectivity would be maintained.

f) How is the proposal likely to affect critical habitat?

No critical habitat was present.

*Acacia bynoeana***a) How is the proposal likely to affect the lifecycle of a threatened species and/or population?**

No threatened populations were present.

To affect the lifecycle of a plant species, an impact would need to significantly adversely impact on growing conditions, lower pollinator population and activity or restrict dispersal vectors. The expected level of subsidence would not result in alteration to overall habitat attributes and in turn, there would be no affect on the lifecycle of *Acacia bynoeana*.

b) How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The expected level of subsidence would not result in alteration to overall habitat attributes.

c) Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

Acacia bynoeana is not at the limit of its distribution at this location. The species is found from Nowra to North Rothbury.

d) How is the proposal likely to affect current disturbance regimes?

There would be no alteration to current disturbance regimes as no habitat clearing would be involved and the expected level of subsidence would not alter the existing habitat.

e) How is the proposal likely to affect habitat connectivity?

The existing connectivity would be maintained.

f) How is the proposal likely to affect critical habitat?

No critical habitat was present.

*Cryptostylis hunteriana***a) How is the proposal likely to affect the lifecycle of a threatened species and/or population?**

No threatened populations were present.

To affect the lifecycle of a plant species, an impact would need to significantly adversely impact on growing conditions, lower pollinator population and activity or restrict dispersal vectors. The expected level of subsidence would not result in alteration to overall habitat attributes and in turn, there would be no affect on the lifecycle of *Cryptostylis hunteriana*.

b) How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The expected level of subsidence would not result in alteration to overall habitat attributes.

c) Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

Cryptostylis hunteriana is not at the limit of its distribution at this location. The species is found from Victoria to Queensland.

d) How is the proposal likely to affect current disturbance regimes?

There would be no alteration to current disturbance regimes as no habitat clearing would be involved and the expected level of subsidence would not alter the existing habitat.

e) How is the proposal likely to affect habitat connectivity?

The existing connectivity would be maintained.

f) How is the proposal likely to affect critical habitat?

No critical habitat was present.

*Grevillea parviflora subsp parviflora***a) How is the proposal likely to affect the lifecycle of a threatened species and/or population?**

No threatened populations were present.

To affect the lifecycle of a plant species, an impact would need to significantly adversely impact on growing conditions, lower pollinator population and activity or restrict dispersal vectors. The expected level of subsidence would not result in alteration to overall habitat attributes and in turn, there would be no affect on the lifecycle of *Grevillea parviflora subsp parviflora*.

b) How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The expected level of subsidence would not result in alteration to overall habitat attributes.

c) Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

Grevillea parviflora subsp parviflora is not at the limit of its distribution at this location. The species is found from Sydney to Cessnock.

d) How is the proposal likely to affect current disturbance regimes?

There would be no alteration to current disturbance regimes as no habitat clearing would be involved and the expected level of subsidence would not alter the existing habitat.

e) How is the proposal likely to affect habitat connectivity?

The existing connectivity would be maintained.

f) How is the proposal likely to affect critical habitat?

No critical habitat was present.

ENDANGERED ECOLOGICAL COMMUNITIES

Swamp Sclerophyll Forest on Coastal Floodplains (SSFCF)

a) *How is the proposal likely to affect the lifecycle of a threatened species and/or population?*

Not applicable.

b) *How is the proposal likely to affect the habitat of a threatened species, population or ecological community?*

A small portion of a larger area of the SSFCF community can be found at the edge of the first workings area. This community is dependent on residual groundwater and periodic inundation. The 20 mm of subsidence would have no impact on the hydrology of the area and so no impact on this community both within and outside of the mining area.

c) *Does the proposal affect any threatened species or populations that are at the limit of its known distribution?*

Not applicable.

d) *How is the proposal likely to affect current disturbance regimes?*

There would be no alteration to current disturbance regimes.

e) *How is the proposal likely to affect habitat connectivity?*

Habitat connectivity would not be altered.

f) *How is the proposal likely to affect critical habitat?*

No critical habitat was present.

FAUNA

A generic test has been prepared for the following fauna species that were considered as occurring or likely to occur across the subsidence area:

Birds:

- Gang-gang Cockatoo;
- Glossy Black-Cockatoo;
- Little Lorikeet;
- Masked Owl;
- Osprey;
- Powerful Owl;
- Regent Honeyeater;
- Swift Parrot; and
- Varied Sittella.

Marsupials:

- Spotted-tailed Quoll; and
- Squirrel Glider.

Megachiropteran Bats:

- Grey-headed Flying-fox.

Microchiropteran Bats:

- Eastern Freetail-bat;
- Eastern Bentwing-bat;
- Eastern False Pipistrelle;
- Greater Broad-nosed Bat; and
- Little Bentwing-bat.

These species are highly mobile, have large home ranges or are itinerant opportunists.

a) *How is the proposal likely to affect the lifecycle of a threatened species and/or population?*

No threatened populations were present.

In order to significantly impact on the lifecycle of any of these species there would need to be a substantial loss of habitat or habitat quality such that foraging resources were reduced, roosting or denning habitat was lost or exposure to predators was increased. The level of expected subsidence would not impact negatively on any of these necessary habitat attributes to the extent of affecting the lifecycle of these species.

b) How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

There would be no alteration to the habitat for any of these threatened species.

c) Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

None of these species would be at the limit of their known distribution.

d) How is the proposal likely to affect current disturbance regimes?

Current disturbance regimes would not be altered.

e) How is the proposal likely to affect habitat connectivity?

Habitat connectivity would not be altered.

f) How is the proposal likely to affect critical habitat?

No critical habitat was present.

Appendix 2 – Species and Communities, Impact Assessments Commonwealth Assessment

The disturbance

Predicted subsidence across the Project Area of up to 20 millimetres comprising of surface deformation only (no cracking, Seedsman 2010).

Impact assessment

This section examines the possible impact of the predicted level of subsidence on threatened species and endangered communities. Matters of National Environmental Significance protected under the EPBC Act 1999 are as follows:

- World Heritage properties;
- National heritage places;
- Wetlands of international importance (Ramsar wetlands);
- Threatened species and ecological communities;
- Migratory species;
- Commonwealth marine areas; and
- Nuclear actions (including uranium mining).

There are two relevant Matters of National Environmental Significance for the proposed Project: Threatened species (there are no nationally listed EEC's present); and, Migratory species.

Impact assessment criteria are provided in the EPBC Act Policy Statement 1.1 (EPBC 2006).

FLORA

Vulnerable species

The following vulnerable species were considered as possibly occurring in the Project Area:

- *Acacia bynoeana*;
- *Angophora inopina*;
- *Cryptostylis hunteriana*;
- **Grevillea parviflora subsp. parviflora*;
- *Melaleuca biconvexa*;
- *Syzygium paniculatum*; and
- **Tetratheca juncea*.

*Known to occur

Significant impact criteria

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

- **lead to a long-term decrease in the size of an important population of a species;**

The expected level of subsidence would not have any impact on habitat that would lead to a long-term decrease in the population size of these species.

- **reduce the area of occupancy of an important population;**

The expected level of subsidence would not have any impact on habitat that would lead to a reduction in the area of occupancy of these species.

- **fragment an existing important population into two or more populations;**

No habitat clearing is involved so no population fragmentation would occur.

- **adversely affect habitat critical to the survival of a species;**

There would be no impact on habitat critical to the survival of the species.

- **disrupt the breeding cycle of an important population;**

The breeding cycles of these species would not be disrupted by the subsidence.

- **modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

There would be no alteration to habitat resulting from the expected level of subsidence.

- **result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;**

There would be no habitat alteration resulting from the expected level of subsidence that would result in invasive species becoming established.

- **introduce disease that may cause the species to decline; or**

No diseases would be introduced.

- **interfere substantially with the recovery of the species.**

The expected level of subsidence would not interfere with the recovery of the species.

FAUNA

Critically endangered and endangered species

Two endangered species were considered as possibly occurring in the Project Area:

- Swift Parrot; and
- Spotted-tailed Quoll.

Significant impact criteria

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

- **lead to a long-term decrease in the size of a population;**

The expected level of subsidence would not have any impact on habitat or foraging resources that would lead to a long-term decrease in the population size of these species.

- **reduce the area of occupancy of the species;**

The expected level of subsidence would not have any impact on habitat or foraging resources that would lead to a reduction in the area of occupancy of these species.

- **fragment an existing population into two or more populations;**

No habitat clearing is involved so no population fragmentation would occur.

- **adversely affect habitat critical to the survival of a species;**

There would be no impact on habitat critical to the survival of the species.

- **disrupt the breeding cycle of a population;**

The breeding cycles of these species would not be disrupted by the subsidence.

- **modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

There would be no alteration to habitat resulting from the expected level of subsidence.

- **result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;**

There would be no habitat alteration resulting from the expected level of subsidence that would result in invasive species becoming established.

- **introduce disease that may cause the species to decline; or**

No diseases would be introduced.

- **interfere with the recovery of the species.**

The expected level of subsidence would not interfere with the recovery of the species.

Vulnerable species

Three vulnerable species were considered as possibly occurring within the Project Area:

- Regent Honeyeater;
- Grey-headed Flying-fox; and
- Large-eared Pied Bat.

Significant impact criteria

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

- **lead to a long-term decrease in the size of an important population of a species;**

The expected level of subsidence would not have any impact on habitat or foraging resources that would lead to a long-term decrease in the population size of these species.

- **reduce the area of occupancy of an important population;**

The expected level of subsidence would not have any impact on habitat or foraging resources that would lead to a reduction in the area of occupancy of these species.

- **fragment an existing important population into two or more populations;**

No habitat clearing is involved so no population fragmentation would occur.

- **adversely affect habitat critical to the survival of a species;**

There would be no impact on habitat critical to the survival of the species.

- **disrupt the breeding cycle of an important population;**

The breeding cycles of these species would not be disrupted by the subsidence.

- **modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

There would be no alteration to habitat resulting from the expected level of subsidence.

- **result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;**

There would be no habitat alteration resulting from the expected level of subsidence that would result in invasive species becoming established.

- **introduce disease that may cause the species to decline; or**

No diseases would be introduced.

- **interfere substantially with the recovery of the species.**

The expected level of subsidence would not interfere with the recovery of the species.