Flora and Fauna Assessment

Proposed Subsidence Lines at Springvale Colliery, Newnes Plateau

Prepared by:

RPS AUSTRALIA EAST PTY LTD

241 Denison Street
Broadmeadow NSW 2292

T: +61 2 4940 4200
F: +61 2 4961 6794
E: newcastle@rpsgroup.com.au

Client Manager: Arne Bishop
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Prepared for:

CENTENNIAL – SPRINGVALE COAL PTY LTD

Wolgan Road,
Lidsdale NSW 2790

T: 02 6350 1672
M: 0438 748 083
E: Catherine.Suggate@centennialcoal.com.au
W: http://www.centennialcoal.com.au/

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Approval for Issue

Name	Signature	Date
Arne Bishop		8 December 2016

Executive Summary

RPS Australia East Pty Ltd (RPS) was engaged by Centennial Springvale Pty Ltd to undertake a Flora and Fauna Assessment of five proposed subsidence lines (X, GG, GGSW, GGE and BB), collectively referred to as the 'project area'. Centennial Springvale is proposing to carry out subsidence monitoring at five locations within existing leases and across mining Longwalls 420-422. The purpose of the proposed activity is to provide monitoring pre, during and post mining operations to allow the comparison between predicted and measured subsidence parameters for a given feature.

This Flora and Fauna Assessment will inform the Review of Environmental Factors (REF) prepared under Part 5 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) in relation to the proposed activity. This assessment outlines the occurrence, or likely occurrence, and potential for impact upon any threatened species, populations or ecological communities listed within the *Threatened Species Conservation Act* 1995 (TSC Act) and/or the *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act).

Field surveys were undertaken by an RPS ecologist on 26 and 28 September 2016. A variety of field survey techniques were employed over the course of the fieldwork for this assessment to record the suites of flora species and the fauna guilds likely to occur across the Project Areas.

Two threatened species, namely *Persoonia hindii and Boronia deanei* was detected at Subsidence Lines X and GGSW. These species are both listed as vulnerable under the TSC Act and *Boronia deanei* is also listed as vulnerable under the EPBC Act. Measures have been proposed to ensure all recorded plants will be avoided during installation and ongoing monitoring.

Previous local vegetation mapping in the region (DEC 2006b, RPS 2014) in conjunction with ground-truthing of the proposed subsidence lines identified six vegetation communities within the Project Areas. One vegetation community MU 50 Newnes Plateau Shrub Swamp was found to be commensurate with a TSC Act threatened ecological community, specifically *Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion*. This vegetation community is also commensurate with the federally listed (EPBC Act) EEC known as *Temperate Highland Peat Swamps on Sandstone*.

Potential impacts are expected to modify areas of native vegetation, potentially including the above-listed EEC. No individual threatened flora are being removed and are not expected to be impacted upon as a result of the project. The 7-part Test of Significance (TSC Act) and Assessment of Significance (EPBC Act) concluded that the activities involved in the installation of the subsidence lines, in unison with monitoring twice annually, are minor. Therefore, the project is not expected to have a significant impact on threatened species or EECs listed under the TSC Act or EPBC Act, or any other MNES.

Abbreviations

Abbreviation	Description
DECCW	NSW Department of Environment, Climate Change and Water (now OEH)
DEC	Department of the Environment and Climate (now OEH)
DoEE (formerly DoE and SEWPaC)	Department of the Environment and Energy
DoE	Department of the Environment
DPE	NSW Department of Planning and Environment
EEC	Endangered Ecological Community
EP&A Act	*Environmental Planning and Assessment Act* 1979
EP&AA Act 1997	*Environmental Planning and Assessment Amendment Act* 1997
EPBC Act	Commonwealth *Environment Protection Biodiversity Conservation Act 1999*
ha	Hectare
OEH	NSW Office of Environment and Heritage
REF	Review of Environmental Factors
RPS	RPS Australia East Pty Ltd
SEWPaC (now DoEE)	Department of Sustainability, Environment, Water, Population and Communities
TSC Act	NSW *Threatened Species Conservation Act 1995*

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1.0 Introduction

RPS Australia East Pty Ltd (RPS) was engaged by Centennial Springvale Pty Ltd to undertake a Flora and Fauna Assessment of five proposed subsidence lines; subsidence line X extension, subsidence line BB, subsidence line GG, subsidence line GGE and subsidence line GGSW (see **Figure 1**). The proposed subsidence lines cover areas being under-mined via longwall mining from longwalls 420-422. The purpose of the proposed activity is to provide monitoring pre, during and post mining operations to allow the comparison between predicted and measured subsidence parameters for a given feature.

This Flora and Fauna Assessment will inform a Review of Environmental Factors (REF) prepared under Part 5 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). This assessment outlines the occurrence, or likely occurrence, and potential for impact upon any threatened species, populations or ecological communities listed within the *Threatened Species Conservation Act* 1995 (TSC Act) and/or the *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act).

1.1 Terminology

The following definitions (**Table 1**) are used throughout this report.

Table 1 Terminology

Terms	Definition
GNSS	Global Navigation Satellite System
Locality	Surrounds the Project Areas for a distance of ten kilometres.
Subsidence Lines	The centre line of each subsidence line (refer to **Figure 2**).
Project Area	The subsidence line footprints and a surrounding area of approximately 10 metres either side of these impact areas (refer to **Figure 2**).

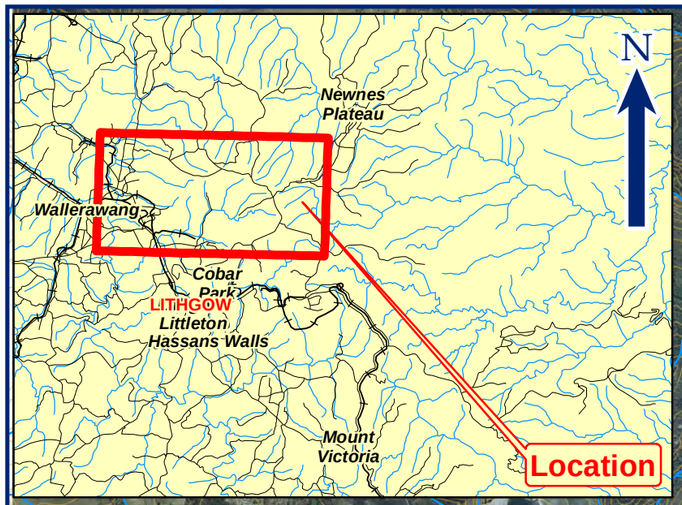
1.2 Description of the activity

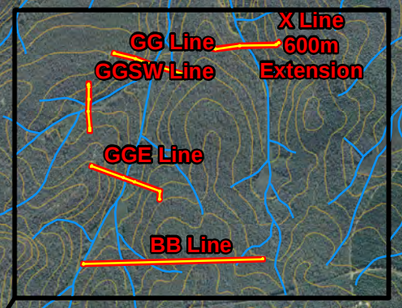
Centennial Springvale is proposing to carry out subsidence monitoring at five locations within existing leases across mining longwalls 420-422. The purpose of the proposed activity is to provide monitoring prior, during and post mining operations to allow the comparison between predicted and measured subsidence parameters for a given feature. Subsidence lines are installed to measure valley closure and upsidence (at the base of the valleys).

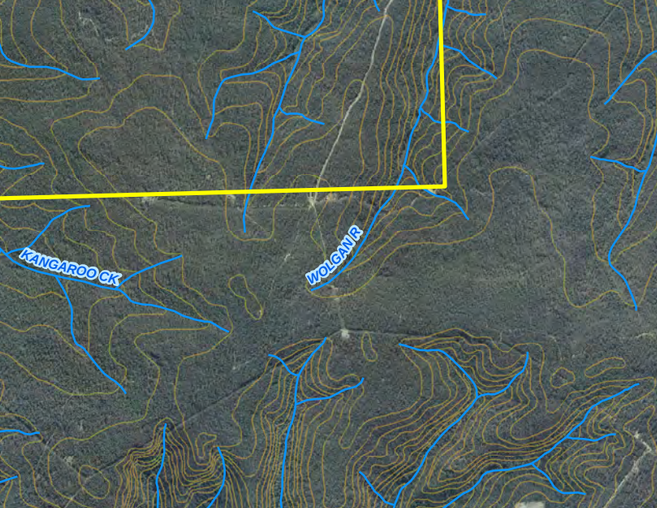
Depending on the ground surface conditions, a monitoring peg, star dropper driven to refusal or FENO mark is proposed to be installed along each line. Each site where one of these markers is installed is herewith referred to as a 'station'. Stations will be positioned along the line at a spacing interval of 15 m.

The spacing around each subsidence line monitoring station would be approximately 1m either side of the line. Each station requires line of sight between stations to accommodate straining/direct measuring between stations.

No trees with a trunk diameter of greater than 300 mm will be removed to accommodate any of the stations.







KANGAROO CK
WOLGAN R
CARNE CK
PIPERS FLAT CK
MARRANGAROO CK
BUNGLEBOORI CK
PADDYS CK

Legend

- Springvale Boundary
- Project Areas
- Subsidence Lines
- Drainage
- 10m Contours

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400 200 0 400 800 1,200 1,600 m

SCALE:1:38,000 AT A3 SIZE

TITLE : **FIGURE 1: SITE LOCATION**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **4/11/2016**

PURPOSE: **ECOLOGY**

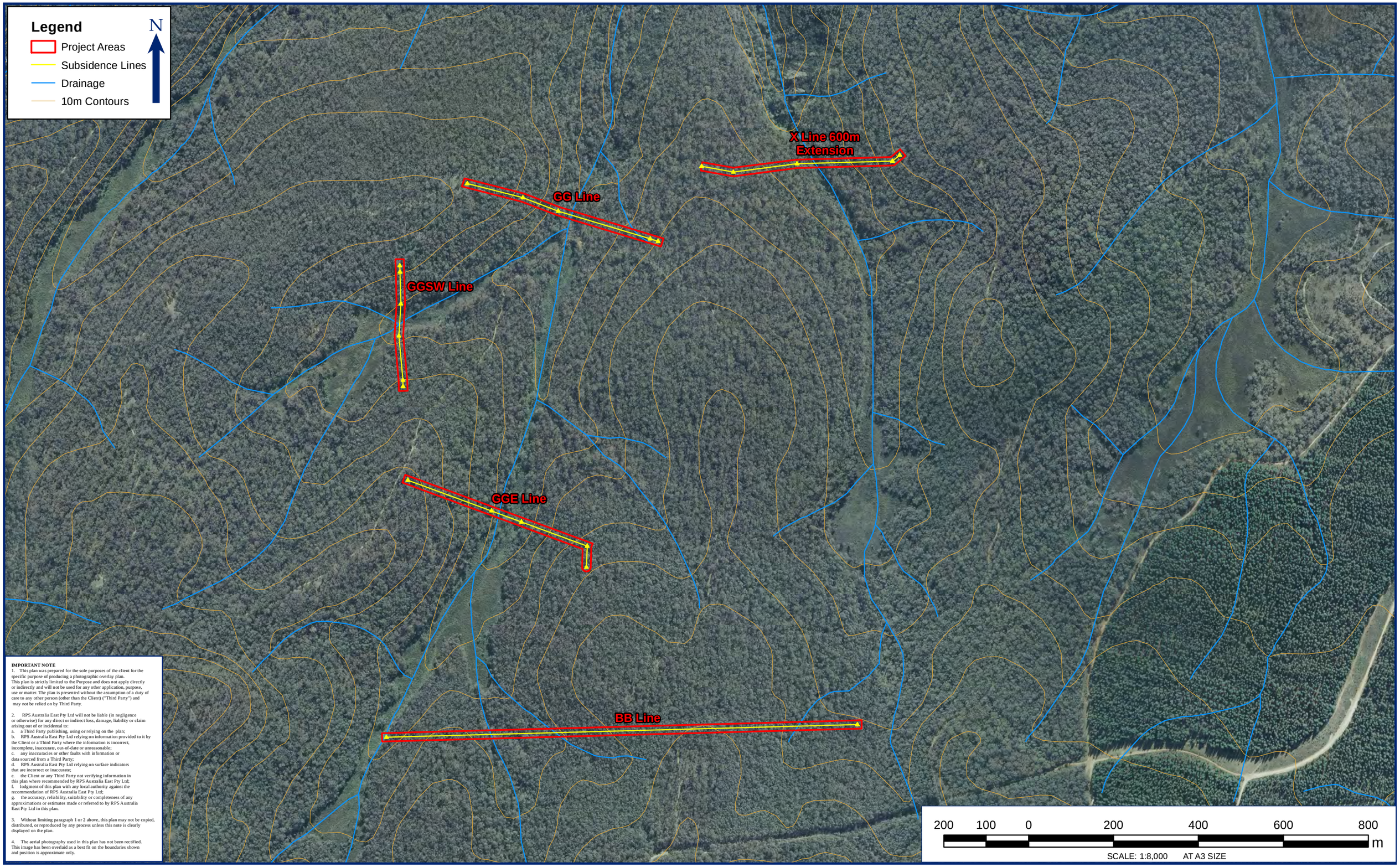
VERSION (PLAN BY): A A3 (james.hugo)

PATH: S:\Centennial\All Jobs\133312 Springvale Subsidence Lines REF\10 - Drafting\Arcgis Map Documents\Eco\133312 Figure 1 - Project Area B 20161104.mxd

CLIENT: **CENTENNIAL**

JOB REF: **133312**

RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762)
241 DENISON STREET BROADMEADOW PO BOX 428 HAMILTON NSW 2303
T: 02 4940 4200 F: 02 4961 6794 www.rpsgroup.com.au



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TITLE : **FIGURE 2: PROJECT AREAS**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **4/11/2016**

PURPOSE: **ECOLOGY**

VERSION (PLAN BY): A A3 (james.hugo)

PATH: S:\Centennial\All Jobs\133312 Springvale Subsidence Lines REF\10 - Drafting\Arcgis Map Documents\Eco\133312 Figure 2 - Project Areas 20161104.mxd

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RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762)
241 DENISON STREET BROADMEADOW PO BOX 428 HAMILTON NSW 2303
T: 02 4940 4200 F: 02 4961 6794 www.rpsgroup.com.au

1.2.2 Construction Activities

Ground works will be undertaken to prepare the proposed subsidence lines, including minor clearing of grasses and low lying vegetation, small trees and logs that are within the path of the proposed subsidence monitoring lines to allow direct measuring between survey marks.

Primary equipment to be used during clearing activities will include:

- brush hooks
- whipper snipper
- chainsaws

It is expected to take approximately two to three days to clear each line and install survey marks. Timeframes are dependent on the amount of vegetation to be cleared along the final actual route together with the topography or slope of the area.

1.2.3 Monitoring Activities

Monitoring of the subsidence monitoring lines involves measuring changes in elevations between each survey mark using a non-intrusive surveying technique. The technique of differential levelling allows the surveyor to carry an elevation from a known reference point to other points by use of a precisely levelled telescope and graduated vertical rods.

The monitoring of the survey marks will be undertaken by a team of two people, and will occur at a frequency dependent upon the requirements for subsidence development data in order to implement subsidence and mine operation plans.

The team will drive to the nearest available access, and then proceed to the survey lines on foot, carrying the necessary monitoring equipment.

1.3 Scope of the Study

The scope of this Flora and Fauna Assessment report is to:

- Identify existing vegetation communities within each Project Area;
- Assess the status of identified plant species and vegetation communities under relevant legislation;
- Identify existing habitat types within the Project Areas and assess the habitat potential for threatened species, populations, or ecological communities known from the local area;
- Through preliminary research, identify threatened fauna potentially using resources within the Project Areas;
- Employ targeted habitat survey techniques to identify fauna, in particular threatened species potentially using the Project Areas; and
- Provide information to enable compliance with applicable assessment requirements contained under the TSC Act, EP&A Act and EPBC Act, and any other relevant state, regional and local environmental planning instruments.

1.4 Qualifications and Licensing

1.4.1 Qualifications

This report was written by Joe May BSc. MtSc. and Joe Brennan BSc. of RPS, and reviewed by Lauren Eather BSc. of RPS.

1.4.2 Licensing

Research was conducted under the following licences:

- NSW National Parks and Wildlife Service Scientific Investigation Licence S100536 (Valid 30 November 2016);
- Animal Research Authority (Trim File No: 16/361) issued by NSW Department of Primary Industries (Valid 21 March 2017);
- Animal Care and Ethics Committee Certificate of Approval (Trim File No: 16/361) issued by NSW Department of Primary Industries (Valid 21 March 2019); and
- Certificate of Accreditation of a Corporation as an Animal Research Establishment (Trim File No: 01/1522 & Ref No: AW2001/014) issued by NSW Agriculture (Valid 22 May 2017).

2.0 Methodology

2.1 Desktop Research

2.1.1 Database Interrogation

Two database searches were undertaken to identify State and Commonwealth records of threatened entities and MNES. Databases interrogated for this purpose were:

- Review of fauna and flora records contained in the OEH Atlas of NSW Wildlife within a 10 km radius of the Project Area; and
- Review of fauna and flora records contained in the DoEE Protected Matters Search (DoEE 2016) within a 10 km radius of the Project Area.

2.1.2 Literature Review

A review of relevant information was undertaken to provide an understanding of ecological values occurring or potentially occurring in the Project Area and local area. Reports, vegetation maps, topographic maps, aerial photography and literature reviewed included, but were not limited to, the following:

The following databases and maps were reviewed:

- Aerial Photograph Interpretation (API) and literature reviews to determine the broad categorisation of vegetation within the Project Area;
- DEC (2006) *The Vegetation of the Western Blue Mountains*. Unpublished report funded by the Hawkesbury – Nepean Catchment Management Authority. Department of Environment and Conservation, Hurstville;
- Fauna monitoring reports for the subsidence management plan area at Springvale Colliery (2004 - 2012). Unpublished reports to Springvale Coal Pty Limited from Mount King Ecological Surveys (MKES) (2004 - 2008) and Biodiversity Monitoring Services (BMS) (2009 -2012); and
- Springvale Mine Extension Project Flora and Fauna Assessment Report (RPS 2014).

2.1.3 Likelihood of Occurrence

The list of threatened species, populations and ecological communities (threatened biodiversity) identified as potentially occurring was determined through a likelihood of occurrence analysis.

Five ‘likelihood of occurrence’ categories were attributed to threatened biodiversity (as shown in **Table 1**). Habitat descriptions were generally taken from the online Threatened Species Profile Database (TSPD) (OEH 2016). The likelihood of occurrence assessment is provided in **Appendix 1**.

Table 1 Likelihood of Occurrence of Criteria

Likelihood Rating	Description
1	The habitat of this species does not exist within the site. Not observed and unlikely to occur.
2	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.
3	Habitat of moderate value exists within the site (e.g. presence of suitable macro habitat predictor such as vegetation formation or PCT in low to medium condition). Some of the micro-habitat conditions necessary for incidence are present. While not observed the species may occur.
4	Habitat of moderate to high value exists within the site (e.g. presence of suitable macro habitat predictor such as PCT in good condition). Micro-habitat conditions necessary for incidence are present within the site. Species likely to occur.
5	Habitat of moderate to high value exists within the site (e.g. presence of suitable macro habitat predictor such as PCT in good condition). Micro-habitat conditions necessary for incidence are present within the site. Species known to occur.

2.2 Field Survey

Field surveys were undertaken by an RPS ecologist on 26th and 28th September 2016. A variety of field survey techniques were employed over the course of fieldwork for this assessment to determine the suites of flora species and the fauna guilds likely to occur across the Project Areas.

Trapping and other intensive survey techniques were not conducted due to the relatively small sizes of the proposed footprint and limited likely disturbance. Targeted habitat searches and assessment of previous surveys were used to assess the Project Area in place of trapping surveys.

2.2.1 Vegetation Mapping

RPS (2014) vegetation mapping was used as a base data layer for the Project Area and was validated/refined during field surveys.

2.2.2 Threatened Flora Survey

A search for threatened flora species was undertaken in conjunction with visual ground-truthing of vegetation along each subsidence line.

Assessment of the potential for the vegetation communities to constitute Endangered Ecological Communities (EECs) as listed within the TSC Act and/or the EPBC Act was undertaken. The floristic composition, geomorphologic characters, and geographic distribution were considered when determining whether an EEC was present.

2.2.3 Habitat Assessment

An assessment of the relative habitat value present within the Project Areas was undertaken. This assessment focused primarily on the identification of specific habitat types and resources within the Project Areas favoured by known threatened species from the region. The assessment also considered the potential value within the Project Areas (and surrounds) for all major guilds of native flora and fauna. Habitat assessment included:

- Presence, size and types of tree hollows;
- Presence of rocks, logs, caves, rocky outcrops, leaf litter, overhangs and crevices;
- Vegetation complexity, structure and quality;
- Presence of freshwater or estuarine aquatic habitats, noting permanency;

- Connectivity to adjacent areas of habitat;
- Extent and types of disturbance; and
- Presence of foraging opportunities such as flowering eucalypts, fruits, seeds or other nectar bearing native plants.

The location of any notable fauna habitat features, such as hollow-bearing trees and wombat burrows, were recorded using a Trimble Differential GPS.

2.2.4 Diurnal Fauna Survey

The Project Areas were traversed on foot and any threatened species and evidence of fauna presence observed were recorded. Opportunistic sightings of indirect evidence of fauna presence were noted. Such indicators included:

- Scats and scents (predator scats were collected for contents analysis);
- Nests;
- Burrows;
- Feather, fur remains, skin and skeletal material of vertebrate fauna;
- Tracks, scratches and diggings;
- Whitewash, regurgitation pellets and prey remains from owls; and
- Chewed *Allocasuarina* cones, indicative of feeding by *Calyptorhynchus lathami* (Glossy Black-cockatoo).

2.3 Survey Limitations

The detectability of plants, and the further ability to accurately identify plants to a species level, varies greatly with the time of year, the prevailing climatic conditions, and the presence of reproductive material (e.g. flowers, fruit, and seed capsules). Consequently, the survey conducted for the Project Areas should not be regarded as conclusive evidence that certain protected plants do not occur within the Project Areas.

The limitations to the fauna surveys conducted in the Project Areas include:

- The survey period not coinciding with the period that some migratory or nomadic species occur in the locality;
- Species with large home ranges (e.g. owls and raptors) not present in this part of their home range during the survey period;
- The difficulty in detecting certain species during the survey period (e.g. cryptic species, species present in the Project Areas at very low densities);
- Biological factors such as sex, age-class, and breeding biology, which may influence species' habitat use and detectability during different times of the year;
- The lack of suitable climatic conditions necessary for the presence and/or detectability of certain species (e.g. amphibians following heavy rainfall); and
- Due to the small size and nature of the proposed impacts, comprehensive fauna surveys (e.g. trapping, call playbacks, spotlighting, Anabat) were not conducted within the Project Areas and as such many fauna species potentially utilising site habitats would not have been recorded as part of this study. Instead, habitat assessments and opportunistic surveys were completed. The likely occurrence of species was assumed, based on habitat assessments, previous local records, seasonality, predicted faunal movements of locally occurring threatened species in combination with the local knowledge and experience of the authors.

3.0 Results

3.1 Desktop Assessment

3.1.1 Literature Review

A review of fauna monitoring reports conducted within and immediately surrounding the Project Areas has been undertaken. Monitoring reports undertaken for the Springvale, Angus Place and Clarence mines have also been reviewed. **Table 2** provides a list of any threatened species recorded, including the location and monitoring report from which it has been derived.

Table 2 Threatened Species Recorded by Previous Ecological Surveys

Species	TSC Act	EPBC Act	Location and Source		
			Angus Place	Springvale	Clarence
Amphibians					
Heleioporus australiacus Giant Burrowing Frog	V	V	BMS (2011b)	-	-
Mixophyes balbus Stuttering Frog	E	V	-	MKES (2004b)	-
Reptiles					
Eulamprus leuraensis Blue Mountains Water Skink	E	E	-	BMS (2011d)	BMS (2009d)
Birds					
Callocephalon fimbriatum Gang-gang Cockatoo	V	-	MKES (2004a, 2006a, 2007, 2008c) and BMS (2009c, 2010c, 2011b, 2012b, 2012c, 2012d, 2012e)	MKES (2004b, 2006b, 2006c, 2008a) and BMS (2009a, 2010a, 2011a, 2011c, 2011d, 2012a, 2012f, 2012g, 2012h)	MKES (2008b) and BMS (2009b, 2009d, 2010b)
Calyptorhynchus lathami Glossy Black-Cockatoo	V	-	MKES (2006a, 2007) and BMS (2009c)	MKES (2008a)	BMS (2009d)
Climacteris picumnus victoriae Brown Treecreeper (eastern subsp.)	V	-	MKES (2004a, 2006a, 2008c and BMS (2009c, 2010c, 2011b)	MKES (2004b, 2006c, 2008a) and BMS (2009a, 2010a, 2011a, 2012f, 2012g, 2012h)	MKES (2008b) and BMS (2009b, 2009d)
Daphoenositta chrysoptera Varied Sittella	V	-	MKES (2008c) and BMS (2009c, 2012d)	BMS (2009a, 2011a, 2011c, 2011d, 2012a, 2012g)	BMS (2009d)
Hieraaetus morphnoides Little Eagle	V	-	MKES (2006a, 2007) and BMS (2011b)	-	-
Melanodryas cucullata cucullata Hooded Robin (south-eastern form)	V	-	MKES (2004a, 2006a)	MKES (2006c, 2008a)	BMS (2010b)
Melithreptus gularis gularis	V	-	MKES (2004a)	MKES (2004b)	-

Species	TSC Act	EPBC Act	Location and Source		
Black-chinned Honeyeater (eastern subsp.)					
Ninox strenua Powerful Owl	V	-	MKES (2006a, 2007, 2008c) and BMS (2009c, 2010c, 2011b, 2012c)	MKES (2004b, 2006b, 2006c) and BMS (2011a, 2012a)	MKES (2008b) and BMS (2009d, 2010d)
Ninox connivens Barking Owl	V	-	MKES (2006a)	-	-
Petroica boodang Scarlet Robin	V	-	MKES (2006a, 2007, 2008c) and BMS (2009c, 2010c, 2011b, 2012b, 2012c, 2012d, 2012e) MKES (2004a, 2006a, 2007, 2008c0 and BMS (2010c, 2011b, 2012c, 2012d)	MKES (2004b, 2006c, 2008a) and BMS (2009a, 2010a, 2011a, 2011c, 2011d, 2012a, 2012f, 2012g, 2012h)	MKES (2008b0 and BMS (2009b, 2010b, 2010d)
Petroica phoenicea Flame Robin	V	-	-	MKES (2006b, 2006c, 2008a) and BMS (2010a, 2011a, 2011c, 2011d, 2012a, 2012f, 2012g, 2012h)	MKES (2008b) and BMS (2010d)
Pomatostomus temporalis temporalis Grey-crowned Babbler (eastern subsp.)	V	-	-	MKES (2006c)	-
Chthonicola sagittatus Speckled Warbler	V	-	MKES (2006a) and BMS (2009c)	-	-
Tyto novaehollandiae Masked Owl	V	-	-	-	BMS (2009d)
Tyto tenebricosa Sooty Owl	V	-	BMS (2010c)	BMS (2011a)	-
Mammals					
Cercartetus nanus Eastern Pygmy Possum	V	-	-	MKES (2004b, 2006c) and BMS (2010a, 2011c, 2011d, 2012g, 2012h)	-
Chalinolobus dwyeri Large-eared Pied Bat	V	V	MKES (2007) and BMS (2010c, 2011b, 2012d)	BMS (2010a, 2011a)	MKES (2008b)
Chalinolobus picatus Little Pied Bat	V	-	-	-	BMS (2009d)
Falsistrellus tasmaniensis Eastern False Pipistrelle	V	-	-	MKES (2006b, 2006c, 2008a) and BMS (2009a, 2010a, 2011a, 2012a, 2012h)	MKES (2008b) and BMS (2009b, 2010d)
Miniopterus schreibersii oceanensis Eastern Bentwing-bat	V	-	MKES (2004a, 2007) and BMS (2009c, 2010c, 2011b, 2012d)	MKES (2004b, 2006c, 2008a) and BMS (2009a, 2010a, 2011a, 2012a, 2012h)	MKES (2008b) and BMS (2009b, 2009d, 2010b)
Mormopterus norfolkensis	V	-	MKES (2007, 2008c)	-	-

Species	TSC Act	EPBC Act	Location and Source		
Eastern Freetail-bat					
Petaurus norfolcensis Squirrel Glider	V	-	MKES (2006a)	MKES (2004b, 2006c 2008a)	BMS (2010b)
Phascolarctos cinereus Koala	V	V	MKES (2008c)	BMS (2011c)	-
Scoteanax rueppellii Greater Broad-nosed Bat	V	-	BMS (2009c, 2010c)	BMS (2011a)	-

3.1.2 Database Searches

The results of database searches using OEH Atlas of NSW Wildlife (accessed October 2016) and EPBC Protected Matters Search (accessed October 2016) indicated that 21 threatened flora species and 47 threatened fauna species have been previously recorded within 10 km of the Project Areas. These species are listed in **Table 3** below.

Table 3 Occurring and potentially occurring Threatened Flora, Fauna and Ecological Communities within a 10 km radius of the Project Area

Scientific Name	Common Name	TSC Act	EPBC Act	No. of Records
Flora				
Caesia parviflora var. *minor*	Small Pale Grass-lily	E	-	1
Leucopogon fletcheri subsp. *fletcheri*		E	-	3
Dillwynia tenuifolia		V	-	1
Pultenaea glabra	Smooth Bush-pea	V	V	-
Acacia bynoeana	Bynoe's Wattle	V	V	-
Eucalyptus aggregata	Black Gum	V	-	-
Cryptostylis hunteriana	Leafless Tongue-orchid	E	V	-
Prasophyllum petilum	Tarengo Leek orchid	E	E	-
Prasophyllum sp. Wybong (C.Phelps ORG 5269)	a leek-orchid	-	CE	-
Grevillea evansiana	-	V	V	-
Persoonia hindii	-	E	-	728
Asterolasia elegans	-	E	E	-
Boronia deanei	Deane's Boronia	V	V	44
Pomaderris brunnea	Rufous Pomaderris	V	V	-
Thesium australe	Austral Toadflax	V	V	-
Veronica blakelyi	-	V	-	24
Euphrasia arguta	-	CE	CE	-
Haloragodendron lucasii	-	E	E	-
Homoranthus darwinioides		V	V	-
Pelargonium sp. Striatellum (G.W.Carr 10345)	Omeo Stork's-bill	E	E	-
Wollemia nobilis	Wollemi Pine	E	E	-
Insects				
Paralucia spinifera	Bathurst Copper Butterfly	E	V	-
Petalura gigantea	Giant Dragonfly	E	-	19

Scientific Name	Common Name	TSC Act	EPBC Act	No. of Records
Amphibians				
Heleioporus australiacus	Giant Burrowing Frog	V	V	-
Mixophyes balbus	Stuttering Frog	E	V	1
Pseudophryne australis	Red-crowned Toadlet	V	-	1
Litoria booroolongensis	Booroolong Frog	E	E	-
Litoria littlejohni	Littlejohn's Tree Frog	V	V	1
Reptiles				
Aprasia parapulchella	Pink-tailed Worm-lizard	V	V	-
Eulamprus leuraensis	Blue Mountains Water skink	E	E	29
Varanus rosenbergi	Rosenberg's Goanna	V	-	1
Hoplocephalus bungaroides	Broad-headed Snake	E	V	-
Avifauna				
Botaurus poiciloptilus	Australasian Bittern	E	E	-
Calidris ferruginea	Curlew Sandpiper	E	CE	-
Rostratula australis	Australian Painted Snipe	E	E	-
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-	73
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	1
Glossopsitta pusilla	Little Lorikeet	V	-	1
Lathamus discolor	Swift Parrot	E	E	-
Numenius madagascariensis	Eastern Curlew	-	CE	-
Ninox strenua	Powerful Owl	V	-	16
Tyto novaehollandiae	Masked Owl	V	-	1
Tyto tenebricosa	Sooty Owl	V	-	1
Climacteris picumnus victoriae	Brown Treecreeper (eastern subsp.)	V	-	29
Anthochaera phrygia	Regent Honeyeater	CE	E	-
Grantiella picta	Painted Honeyeater	V		-
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subsp.)	V	-	1
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subsp.)	V	-	1
Daphoenositta chrysoptera	Varied Sittella	V	-	9
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	-	6
Melanodryas cucullata cucullata	Hooded Robin (south-eastern subsp.)	V	-	2
Petroica boodang	Scarlet Robin	V	-	127
Petroica phoenicea	Flame Robin	V		189
Mammals				
Dasyurus maculatus maculatus	Spotted-tailed Quoll (SE mainland subsp.)	V	E	2
Isoodon obesulus obesulus	Southern Brown Bandicoot	E	E	-
Phascolarctos cinereus	Koala (Qld, NSW, Vic and ACT Populations)	V	V	3
Cercartetus nanus	Eastern Pygmy-possum	V	-	11
Petaurus norfolcensis	Squirrel Glider	V	-	4
Petauroides volans	Greater Glider	-	V	304
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	1

Scientific Name	Common Name	TSC Act	EPBC Act	No. of Records
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	-
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	9
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	7
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	3
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	3
Pseudomys novaehollandiae	New Holland Mouse	-	V	1
Fish				
Macquaria australasica	Macquarie Perch	-	E	-
Prototroctes maraena	Australian Grayling	-	V	-

Key:
V Vulnerable Species
E Endangered Species
CE Critically Endangered
M Migratory

Migratory species listed under the EPBC Act have also been considered under this assessment. A Protected Matters Search was undertaken (accessed October 2016) on the DoEE website which lists potential migratory species. **Table 4** lists 12 potentially occurring terrestrial migratory species within a 10 km radius of the Project Areas.

Table 4 Potentially Occurring Migratory Species within a 10 km radius of the Project Areas

Scientific Name	Common name	EPBC Act Status
Apus pacificus	Fork-tailed Swift	M
Ardea alba	Great Egret	M
Ardea ibis	Cattle Egret	M
Haliaeetus leucogaster	White-bellied Sea-Eagle	M
Hirundapus caudacutus	White-throated Needletail	M
Gallinago hardwickii	Latham's Snipe	M
Merops ornatus	Rainbow Bee-eater	M
Monarcha melanopsis	Black-faced Monarch	M
Motacilla flava	Yellow Wagtail	M
Myiagra cyanoleuca	Satin Flycatcher	M
Rhipidura rufifrons	Rufous Fantail	M
Rostratula australis	Australian Painted Snipe	M

3.1.3 Matters of National Environmental Significance (MNES)

Matters of National Environmental Significance (MNES) are identified in the Protected Matters Report generated by the Protected Matters Search Tool. Additional federally listed threatened or migratory species and ecological communities have been identified through interrogation of the NSW Wildlife Atlas Data (OEH 2016).

3.2 Field Survey Results

The prevailing weather conditions during the survey period are presented in **Table 5** below.

Table 5 Prevailing Weather Conditions

	Mon 26 Sept 2016	Wed 28 Sept 2016
Temperature	4.0-13.1 ^{O}C	-1.0-17.0 ^{O}C
Wind	Low	Low
Cloud (8th)	0	0
Rain (24 hrs) (mm)	0.4	0

3.2.2 Flora

3.2.2.1 Flora Species

Persoonia hindii (listed as endangered under the TSC Act) was detected at X Line and at GG Line. Four occurrences of the threatened species *Boronia deanei* (listed as vulnerable under the TSC and EPBC Acts) were detected at GGSW Line. Approximately 286 *Persoonia hindii* specimens were recorded within the X Line Project Area and approximately 57 individual specimens were recorded within the GG Line project area. **Figure 3** provides a visual representation of the recorded locations of *Persoonia hindii* and *Boronia deanei* along all subsidence lines.

Table 6 *Persoonia hindii* and *Boronia deanei* number and locations

Subsidence line	Point I.D	Number of individuals	Northings	Eastings
Persoonia hindii				
X	1	5	6303383.2	240966.0
X	2	16	6303387.5	240973.9
X	3	32	6303387.4	240976.8
X	4	54	6303389.0	240989.0
X	5	28	6303392.7	241001.7
X	6	4	6303391.5	241008.4
X	7	5	6303399.3	241082.7
X	8	4	6303396.4	241097.9
X	9	8	6303396.8	241112.8
X	10	18	6303397.2	241125.5
X	11	22	6303396.9	241134.0
X	12	2	6303396.1	241155.6
X	13	12	6303400.9	241178.6
X	14	19	6303400.4	241186.9
GG	1	38	6303318.4	240327.6
GG	2	4	6303314.7	240349.8
GG	3	15	6303312.6	240356.2
Boronia deanei				
GGSW	1	1	6303042.8	240071.2
GGSW	2	1	6303035.6	240070.6
GGSW	3	1	6303013.6	240079.3
GGSW	4	1	6303004.2	240079.1

Legend

- Site Location
- Subsidence Lines
- Drainage
- Swamps
- 10m Contours

Vegetation

- 7 Newnes Plateau Narrow-leaved Peppermint - Mountain Gum - Brown Stringybark Layered Forest
- 8 Newnes Sheltered Peppermint - Brown Barrel Shrubby Forest
- 14 Tableland Mountain Gum - Snow Gum - Daviesia Montane Open Forest
- 26 Newnes Plateau Narrow-leaved Peppermint - Silver-top Ash Layered Open Forest
- 26a Newnes Plateau Gum Hollows varient: Brittle Gum - Mountain Gum, Scribbly Gum - Snow Gum Shrubby Open Forest
- 28 Sandstone Plateau And Ridge Scribbly Gum - Silver-top Ash Shrubby Woodland
- 29 Sandstone Slopes Sydney Peppermint Shrubby Forest
- 30 Exposed Blue Mountains Sydney Peppermint - Silver-top Ash Shrubby Woodland
- 43 Pagoda Rock Sparse Shrubland
- 44 Sandstone Plateaux Tea Tree - Dwarf Sheoak - Banksia Rocky Heath
- 45 Newnes Plateau Tea Tree - Banksia - Mallee Heath
- 50 Newnes Plateau Shrub Swamp
- 51 Newnes Plateau Hanging Swamp
- 59 Non-native Vegetation - Pine plantation / woodlot / shelter
- 62 Cleared and Severely Disturbed Lands

N

Carne Creek

GG Line

X Line 600m Extension

GGSW Line

GGE Line

BB Line

200 100 0 200 400 600 800 m

SCALE:1:12,500 AT A3 SIZE

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TITLE : **FIGURE 2: VEGETATION AND SUBSIDENCE LINES**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **21/11/2016**

PURPOSE: **ECOLOGY**

VERSION (PLAN BY): A A3 (james.hugo)

PATH: S:\Centennial\All Jobs\133312 Springvale Subsidence Lines REF\10 - Drafting\Arcgis Map Documents\Eco\133312 Figure 3 - Vegetation and subsidence D 20161121.mxd

CLIENT: **CENTENNIAL**

JOB REF: **133312**

RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762)
241 DENISON STREET BROADMEADOW PO BOX 428 HAMILTON NSW 2303
T: 02 4940 4200 F: 02 4961 6794 www.rpsgroup.com.au

3.2.2.2 Vegetation Community Mapping

Previous local vegetation mapping produced by RPS (2014) in conjunction with ground-truthing of the proposed subsidence lines identified six vegetation communities within the Project Areas. Listed below are the vegetation communities that intersect each subsidence line along with a brief outline of the dominant floral characteristics of each vegetation community identified within the Project Areas.

1. MU 7 – Newnes Plateau Narrow-leaved Peppermint – Mountain Gum – Brown Stringybark Layered Forest;

Plate 1 Newnes Plateau Narrow-leaved Peppermint – Mountain Gum – Brown Stringybark Layered Forest

Description: This forest community is found on high-altitude parts of the Newnes Plateau with relatively fertile soils (DEC 2006b). The area of this community was found along parts of Subsidence Line BB (refer to **Figure 3**). It is characterised by an open forest with a relatively diverse shrubby mid-layer and a ground layer consisting of graminoids and grasses.

Canopy Layer: 22 – 36m tall with 30 - 60% Percentage Foliage Cover (PFC). Dominant species included *Eucalyptus radiata* (Narrow-leaved Peppermint), *Eucalyptus blaxlandii* (Blaxland's Stringybark) *Eucalyptus dives* (Broad-leaved Peppermint) and *Eucalyptus sclerophylla* (Hard-leaved Scribbly Gum).

Shrub Layer: 1 – 2m tall with approximately 20 - 40% PFC. Dominant shrub species included *Monotoca scoparia* (Prickly Broom Heath), *Isopogon anemonifolius* (Broad-leaf Drumsticks), *Acacia dorothea* (Dorothy's Wattle), *Acacia buxifolia* (Box-leaf Wattle), and *Lomatia silaifolia* (Crinkle Bush).

Ground Layer: 0 - 1 m tall with 25 - 55% PFC. Dominant species included *Joycea pallida* (Silvertop Wallaby Grass), *Poa sieberiana, Dianella revoluta* var. *revoluta* (Blue Flax-lily),

Lomandra longifolia (Spiny-headed Mat-rush) and *Patersonia longifolia* (Dwarf Purple Flag)

Classification: It was considered that this vegetation community is not commensurate with any EEC listed under the TSC Act or EPBC Act.

2. MU14 Tableland Mountain Gum - Snow Gum - Daviesia Montane Open Forest;

Plate 2 Tableland Mountain Gum – Snow Gum – Daviesia Montane Open Forest

Description: This vegetation community occurs in Subsidence Line BB. It forms open woodlands with moderately dense understorey vegetation on the more sheltered lower slopes of hills, typically in association with gullies and the slopes above drainage lines.

Canopy Layer: 22 to 40 m – 31% PFC. The overall dominant species was *Eucalyptus fastigata* (Brown Barrel). Other canopy species included *Eucalyptus dalrympleana* subsp. *dalrympleana* (Mountain Gum), *Eucalyptus blaxlandii* (Blaxlands Stringybark) and *Eucalyptus oreades* (Blue Mountains Ash).

Shrub Layer: 1 to 2 m – 75% PFC. Dominant shrub species included: *Maytenus silvestris* (Orange Bush), *Leptospermum*. *polygalifolium* subsp. *polygalifolium* (Tantoon), *Cassinia aculeata* (Dolly Bush), *Acacia longifolia* (Sydney Golden Wattle), *Acacia obtusifolia* (Blunt-leaf Wattle) and *Acacia falcata.*

Ground Layer: 0 to 1 m – 60% PFC. Dominant species included: *Pteridium esculentum* (Bracken), *Blechnum nudum* (Fishbone Water Fern), *Blechnum cartilagineum* (Gristle Fern), *Centella asiatica* (Indian Pennywort), *Australopyrum pectinatum* and *Calochlaena dubia* (Rainbow Fern).

Classification: This vegetation community is not commensurate with any Endangered Ecological Community listed under the TSC Act or EPBC Act.

3. MU 26 – Newnes Plateau Narrow-leaved Peppermint – Silvertop Ash Layered Open Forest;

Plate 3 Newnes Plateau Narrow-leaved Peppermint – Silvertop Ash Layered Open Forest

Description: This community was found across Subsidence Lines X, X extension, GG, GGSW, GGE and BB (refer to **Figure 3**). In general this community occurs in depressions and low-gradient slopes at high-altitude sites (DEC 2006b). It is characterised by an open forest with a relatively dense and diverse shrubby mid-layer and a ground layer consisting of graminoids and grasses.

Canopy Layer: 15 – 30m with 10 – 60% PFC. Dominant species included *Eucalyptus sieberi* (Silver-top Ash), *Eucalyptus oreades* (Mountain Ash) and *Eucalyptus blaxlandii* (Blaxland's Stringybark).

Shrub Layer: 1.5 – 4.0m tall with 3 – 70% PFC. Dominant shrub species included *Daviesia latifolia* (Hop Bitter-pea), *Podolobium ilicifolium* (Native Holly), *Acacia buxifolia* (Box-leaf Wattle), *Lomatia silaifolia* (Crinkle Bush) and *Monotoca scoparia* (Prickly Broom-heath).

Ground Layer: 0 – 1m tall with 10 – 70% PFC. Dominant species included *Pteridium esculentum* (Bracken), *Caustis flexuosa* (Curly Wig), *Lomandra glauca* (Pale Mat-rush) and *Patersonia sericea* (Silky Purple-flag).

Classification: This vegetation community is not commensurate with any EEC listed under the TSC Act or EPBC Act.

4. MU 26a – (Variant of MU26) Newnes Plateau Narrow-leaved Peppermint - Silvertop Ash Layered Open Forest in Gentle Depressions;

Plate 4 Newnes Plateau Narrow-leaved Peppermint - Silvertop Ash Layered Open Forest

Description: This community occurs in slight depression and hollows. It is a variation of MU26 (described above) that differs in being shorter and characterised by an abundance of eucalypts with twisted, white stems. This community was found on Subsidence Lines X, GGSW, GG and GGE (refer to **Figure 3**). It is characterised by an open forest with a relatively diverse canopy layer with a sparse shrubby mid-layer and a ground layer consisting of graminoids and grasses.

Canopy Layer: 15 – 30m with 10 – 60% PFC. Dominant species included *Eucalyptus dives* (Broad-leaved Peppermint), *Eucalyptus blaxlandii* (Blaxland's Stringybark), *Eucalyptus sieberi* (Silver-top Ash), *Eucalyptus mannifera* (Brittle Gum), *Eucalyptus sclerophylla* (Hard-leaved Scribbly Gum), *Eucalyptus oreades* (Mountain Ash) and *Eucalyptus radiata* (narrow-leaved Peppermint).

Shrub Layer: 1.5 – 4.0m tall with 3 – 70% PFC. Dominant shrub species included *Daviesia latifolia* (Hop Bitter-pea), *Acacia dorothea* (Dorothy's Wattle), *Acacia buxifolia* (Box-leaf Wattle) and *Monotoca scoparia* (Prickly Broom-heath).

Ground Layer: 0 – 1m tall with 10 – 70% PFC. Dominant species included *Joycea pallida* (Silvertop Wallaby Grass), *Pteridium esculentum* (Bracken), *Dianella revoluta* var. *revoluta* (Blueberry Lily), *Lomandra glauca* (Pale Mat-rush), *Lomandra longifolia* (Spiky-headed Mat-rush), *Poa sieberiana* (Snowgrass) and *Patersonia sericea* (Silky Purple-flag).

Classification: This vegetation community is not commensurate with any EEC listed under the TSC Act or EPBC Act.

5. MU 28 – Sandstone Plateau and Ridge Scribbly Gum – Silvertop Ash Shrubby Woodland

Plate 5 Sandstone Plateau and Ridge Scribbly Gum – Silvertop Ash Shrubby Woodland

Description: This community of shrubby woodland was identified on Subsidence Line X (refer to **Figure 3**). It was typically an open woodland, characterised by a diverse and quite dense shrub layer. This community occurred on shallow sandy soils, usually at altitudes greater than 1000 m.

Canopy Layer: 7 – 20 m with 25 – 30% PFC. *Eucalyptus sclerophylla* (Hard-leaved Scribbly Gum) was the most abundant species within this community. Other species included *Eucalyptus sieberi* (Silver-top Ash), *Eucalyptus dives* (Broad-leaved Peppermint) and *Eucalyptus sparsifolia* (Narrow-leaved Stringybark).

Shrub Layer: 0.5 – 5.0 m with around 70% PFC. This layer included diverse species such as: *Leptospermum polyanthum, Hakea dactyloides* (Broad-leaved Hakea), *Acacia terminalis* (Sunshine Wattle), *Leptospermum trinervium* (Slender Tea-tree), *Acacia dorothea* (Dorothy's Wattle), *Lomatia silaifolia* (Crinkle Bush) and *Isopogon anemonifolius* (Flat-leaved Drumsticks).

Ground Layer: To 1 m tall with 30 – 65% PFC. *Lomandra glauca* (Pale Mat-rush), *Dianella revoluta* var. *revoluta* (Blueberry Lily), *Austrostipa pubescens* (Tall Speargrass), *Caustis flexuosa* (Curly Wig), *Patersonia sericea* (Wild Iris), *Boronia microphylla*, *Lepidosperma laterale* (Variable Sword-sedge), *Platysace linearifolia* (Narrow-leaved Platysace) and *Hibbertia serpyllifolia*.

Classification: This vegetation community is not commensurate with any EEC listed under the TSC Act or EPBC Act.

6. MU 50 – Newnes Plateau Shrub Swamp

Plate 6 Newnes Plateau Shrub Swamp

Description: This vegetation community occurs along long gentle open drainage lines and was identified at Subsidence Lines GGSW and GGE (refer to **Figure 3**). It forms a dense wet heath with an unevenly textured tussock / hummock grassy sedge understorey. The substrate is typically a deep layer of damp to very wet organic matter and peat moss upon a layer of alluvial sand. Trees are typically absent, although sparsely scattered Eucalypts can occur in the margins.

Canopy Layer: 5 – 8 m tall with 0 to 10% PFC. Generally absent in the core of the community, only sparsely present within the margins. Typical species are dependent upon adjoining vegetation communities.

Shrub Layer: 0.5 – 2.5 m tall with 45 to 70% PFC. Dominant shrub species included: *Leptospermum continentale* (Prickly Tea-tree). *Leptospermum grandifolium* (Woolly Tea-tree), *Grevillea acanthifolia* subsp. *acanthifolia* (Bog Grevillea), *Banksia marginata* (Silver Banksia), *Pultenaea divaricata* and *Baeckea linifolia* (Weeping Baeckea).

Ground Layer: To 0.8 m tall with 10 – 60% PFC. Dominant species included: *Gleichenia dicarpa* (Pouched Coral Fern), *Empodisma minus*, *Gahnia sieberiana* (Red-fruited Saw Sedge), *Blechnum cartilagineum* (Gristle Fern), *Epacris paludosa* (Swamp Epacris), *Baloskion australe* and *Carex inversa* (Knob Sedge).

Classification: This community corresponds to *Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion* as listed in the TSC Act. This vegetation community is also a component of the federally listed (EPBC Act) EEC known as *Temperate Highland Peat Swamps on Sandstone*.

3.2.3 Fauna

3.2.3.1 Fauna Species

No threatened fauna were detected during diurnal surveys within the Project Areas.

3.2.3.2 Fauna Habitat

The terrestrial habitats of the open forests consist of sparse understorey shrubs and ground cover vegetation with additional habitat features such as woody debris, rocks, termite mounds and leaf litter.

Forest habitats throughout the subsidence lines and monitoring stations provide important foraging resources such as foliage, seeds, pollen, nectar and invertebrates for a range of bird and mammal species. These resources were primarily available at the canopy layer, as most subsidence lines presented a sparse shrub layer. Resources in the canopy layer are largely utilized by arboreal species that take advantage of the available flowers and nectar at this stratum.

Arboreal mammals are nocturnal, emerging at night to feed on the leaves and flowers of trees and shrubs, whilst some may opportunistically feed on insects. Microchiropteran bats feed on insects aerially and utilise decorticating bark and small hollows and/or logs for roosting purposes.

Diverse guilds of woodland bird species feed on seeds, pollen, and nectar of canopy and understorey vegetation and glean insects from the bark and foliage.

One wombat burrow was observed to occur within the project area around GGE Line. No additional significant ecological attributes such as hollow bearing trees were identified within the Project Areas of the subsidence lines and/or monitoring stations, however termite mounds were observed in close proximity to some subsidence lines. Termite mounds play an important role in the breeding behaviours of monitor lizards, particularly the Rosenberg's Goanna (*Varanus rosenbergi*) which is vulnerable under the TSC Act.

4.0 Potential Impacts

The majority of direct potential impacts are associated with vegetation modification. There is potential for weed incursion and trampling due to the entry of humans and machines into the sites. The following sections discuss the 'avoid, minimise, offset' hierarchy that has been adopted to negate significant impacts for the Project.

4.1 Avoid and Minimise

Notable ecological features such as threatened flora, including *P. hindii* and *B. deanei*, will be avoided to accommodate the subsidence lines. Additionally, no mature trees (having a trunk diameter of over 300 mm) will be removed, nor will the project remove any hollow-bearing trees.

The following sections discuss the level of impacts specific to each subsidence line with regard to avoidance and minimising impacts.

4.1.1 Subsidence Line X

The installation of this line will require vegetation disturbance of up to 0.97 ha of MU26 – Newnes Plateau Narrow-Leaved Peppermint – Silver-top Ash Layered Open Forest (refer to **Plate 7**).

A large population of *Persoonia hindii* (229 individuals) was recorded along the proposed Subsidence Line X (see **Figure 3** and **Table 6**). Attempts were made at the time to identify an alternate route for the line, though it was determined that this was not possible due to the prevalence of *P. hindii* throughout the site location buffer (see **Figure 3**), 10m either side of the proposed subsidence monitoring line.

Persoonia hindii is a low lying plant that would not obstruct the line of site within a subsidence line. Although individuals were detected within Subsidence Line X, it is not considered necessary to remove or harm any individuals to accommodate the line. No trampling, brush hooking, whipper snipping or chain sawing of any *P. hindii* individuals is expected to occur.

Section 8.1 details recommendations for completing works in such a manner as to avoid significant impacts on locally occurring *P. hindii*.

Plate 7 Subsidence Line X Extension.

4.1.2 Subsidence Line BB

The installation of this line will require vegetation disturbance to small areas of MU07 - Newnes Plateau Narrow-leaved Peppermint - Brown Barrel Shrubby Forest, MU 14 Tableland Mountain Gum – Snow Gum – Daviesia Montane Open Forest and MU26 Newnes Plateau Narrow-leaved Peppermint – Silver-top Ash layered Open Forest (refer to **Plate 8**). Up to 2.26 ha of vegetation has potential to be modified to accommodate Subsidence Line BB.

No EECs or threatened species were recorded along this line.

Plate 8 Subsidence Line BB

4.1.3 Subsidence Line GG

The installation of this line will require vegetation disturbance to small areas of MU26 Newnes Plateau Narrow-leaved Peppermint - Silvertop Ash Layered Open Forest (refer to **Plate 9**) and MU 26a – (Variant of MU26) Newnes Plateau Narrow-leaved Peppermint - Silvertop Ash Layered Open Forest in Gentle Depressions. Up to 0.98 ha of vegetation has potential to be modified to accommodate Subsidence Line GG.

A population of *P. hindii* (57 individuals) was recorded along proposed Subsidence Line GG (See **Figure 3** and **Table 6**). *Persoonia hindii* is a low lying plant that would not obstruct the line of site within a subsidence line. Although individuals were detected within Subsidence Line GG, it is not considered necessary to remove or harm any individuals to accommodate the line. No trampling, brush hooking, whipper snipping or chain sawing of any *P. hindii* individuals is expected to occur.

Section 8.1 details recommendations for completing works in such a manner as to avoid significant impacts on locally occurring *P. hindii*.

Plate 9 Woodland at Subsidence Line GG

4.1.4 Subsidence Line GGE

The installation of this line will require vegetation disturbance to small areas of MU26 Newnes Plateau Narrow-leaved Peppermint - Silvertop Ash Layered Open Forest, MU 26a – (Variant of MU26) Newnes Plateau Narrow-leaved Peppermint - Silvertop Ash Layered Open Forest in Gentle Depressions, MU 7 Newnes Plateau Narrow-leaved Peppermint - Mountain Gum - Brown Stringybark Layered Forest and MU50 - Newnes Plateau Shrub Swamp (EEC) (refer to **Plate 10**). Of the disturbance area (approximately 1.04 ha), approximately 0.11 ha of MU 50 has the potential to be modified as a result of the monitoring frequency of approximately twice annually. Monitoring involves two persons accessing the swamp by foot, subsequently having the potential to cause minor alterations to the shrub layer. However, existing animal tracks will be utilised where possible. No trimming of vegetation within the EEC is expected to occur. Stakes will be placed in surrounding vegetation, not within the EEC. No significant changes to species assemblage or EEC structure are expected to occur.

Plate 10 Woodland at Subsidence Line GGE

4.1.5 Subsidence Line GGSW

The installation of this line will require vegetation disturbance to small areas of MU26 Newnes Plateau Narrow-leaved Peppermint - Silvertop Ash Layered Open Forest, MU26a Newnes Plateau Gum Hollows variant: Brittle Gum - Mountain Gum, Scribbly Gum - Snow Gum Shrubby Open Forest and MU50 - Newnes Plateau Shrub Swamp (EEC) (refer to **Plate 11**). Up to 0.62 ha of vegetation has potential to be modified to accommodate Subsidence Line GGSW. Of the disturbance area, approximately 0.11 ha of MU 50 has the potential to be modified as a result of the monitoring frequency of approximately twice annually. Monitoring involves two persons accessing the swamp by foot, subsequently having the potential to cause minor alterations to the shrub layer. However, existing animal tracks will be utilised where possible. No trimming of vegetation is expected to occur. Stakes will be placed in surrounding vegetation, not within the EEC. No significant changes to species assemblage or EEC structure are expected to occur.

A number of *Boronia deanei* (four individuals) were also recorded at Subsidence Line GGSW (See **Figure 3** and **Table 6**). All *B. deanei* individuals will be avoided during works.

Section 8.1 outlines recommendations for completing works in such a manner as to avoid significant impacts on locally occurring EEC and *B. deanei.*

Plate 11 Subsidence Line GGSW.

4.2 Offset

Centennial has prepared the Maximum Offset Liability Report that outlines the biodiversity offset requirements for impacts upon Temperate Highland Peat Swamps on Sandstone (THPSS). This includes calculating the maximum offset liability for any environmental consequences on THPSS which may result from the approved mining operations. Centennial is also required to demonstrate suitable arrangements have been made to provide offsets quickly in the event that they are required. If an impact is found to occur after avoidance and minimisation, these impacts would be offset as required under the SSD Approval. Impacts requiring offsetting may also include those associated with this project if it is found that there is a greater than negligible impact.

5.0 Threatened Species and Communities Assessment

As per the assessment carried out within **Table A1 (Appendix 1)**, the following species / communities have been deemed to require further detailed assessment via the application of 7-part tests as described in DECC (2007) due to potential levels of impacts likely to result from the Project. The 7-part tests conducted for threatened flora species and EECs considered likely to occur within the Project Area are contained in **Appendix 2**.

Threatened Flora

- *Boronia deanei*
- *Caesia parviflora* var. *minor*
- *Persoonia hindii*
- *Veronica blakelyi*

Threatened Fauna

- Giant Dragonfly (*Petalura gigantea*)
- Giant Burrowing Frog (*Heleioporus australiacus*)
- Red-crowned Toadlet (*Pseudophryne australis*)
- Blue Mountains Water Skink (*Eulamprus leuraensis*)
- Rosenberg's Goanna (*Varanus rosenbergi*)
- Little Eagle (*Hieraaetus morphnoides*)
- Gang-Gang Cockatoo (*Callocephalon fimbriatum*)
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*)
- Little Lorikeet (*Glossopsitta pusilla*)
- Powerful Owl (*Ninox strenua*)
- Barking Owl (*Ninox connivens*)
- Masked Owl (*Tyto novaehollandiae*)
- Sooty Owl (*Tyto tenebricosa*)
- Brown Treecreeper (eastern subsp.) (*Climacteris picumnus picumnus*)
- Varied Sittella (*Daphoenositta chrysoptera*)
- Dusky Woodswallow (*Artamus cyanopterus cyanopterus*)
- Scarlet Robin (*Petroica boodang*)
- Flame Robin (*Petroica phoenicea*)
- Squirrel Glider (*Petaurus norfolcensis*)
- Eastern Pygmy Possum (*Cercartetus nanus*)
- Large-eared Pied Bat (*Chalinolobus dwyeri*)
- Little Pied Bat (*Chalinolobus picatus*)
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)
- Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)

- Eastern Freetail-bat (*Mormopterus norfolkensis*)
- Greater Broad-nosed Bat (*Scoteanax rueppellii*)

Endangered Ecological Communities

- Newnes Plateau Shrub Swamp

The 7-part tests concluded that the Project is unlikely to have a significant impact on threatened species, ecological communities or their habitats.

6.0 Key Threatening Processes

A Key Threatening Process (KTP) is defined in the TSC Act as a process that threatens, or could threaten, the survival or evolutionary development of species, populations or ecological communities. Something can be a threat if it:

- adversely affects two or more threatened species, populations or ecological communities; or
- could cause species, populations or ecological communities that are not currently threatened to become threatened.

KTP's are listed in Schedule 3 of the TSC Act. Three KTP's have the potential to affect the Project Areas as a consequence of the proposed monitoring sites, being:

- Clearing of native vegetation;
- Infection of native plants by *Phytophthora cinnamomi*; and
- Invasion of native plant communities by exotic perennial grasses.

No other KTP's are believed to be likely as a consequence of the proposed subsidence monitoring lines.

"Clearing of native vegetation"

This project will contribute to this KTP through the removal of a very small and negligible amount of native vegetation, in relation to the surrounding large habitats available for those threatened species that may be affected by this KTP. This has the potential to impact upon a range of threatened fauna species (DEC 2001) including the Scarlet Robin, Flame Robin and various microbat species. However, hand tools will be used to navigate through the vegetation within the monitoring sites without requiring the removal of large areas of vegetation.

"Infection of native plants by *Phytophthora cinnamomi*"

The activity has the potential to result in the importation of this pathogen, which has the potential to impact upon existing threatened plant species (DEC 2002). It is considered that the proposed works will not significantly contribute to this KTP provided that the correct hygiene protocols are established and implemented.

"Invasion of native plant communities by exotic perennial grasses"

Due to the creation of soil disturbance at some sites, there is the potential for these areas to be colonised by exotic perennial grasses at the conclusion of subsidence monitoring activities. If introduced, exotic perennial grasses typically dominate such areas (DEC 2003), incrementally contributing to this KTP. Effective tool and vehicle cleaning procedures prior to commencing work will reduce the potential for this KTP to occur.

6.1 Considerations Under SEPP 44 – 'Koala Habitat Protection'

All sites are within the Newnes State Forest. SEPP 44 does not apply to State Forest lands. Therefore, SEPP 44 is not applicable. In addition, no Koala feed trees occur within the sites. Therefore, the sites are not considered to constitute 'Potential Koala Habitat' as defined by SEPP 44.

7.0 Matters of National Environmental Significance

An EPBC Act Protected Matters Search was undertaken within the DoEE online database (accessed October 2016) to generate a list of those MNES from within 10 km of the Project Area, which may have the potential to occur within the sites.

An assessment of those MNES relevant to biodiversity has been undertaken in accordance within *EPBC Act Policy Statement 1.1 Significant Impact Guidelines Matters of National Environmental Significance* (DoEE, 2016). The matters of national environmental significance protected under national environment law include:

- listed threatened species and communities;
- listed migratory species;
- Ramsar wetlands of international importance;
- Commonwealth marine environment;
- world heritage properties;
- national heritage places;
- the Great Barrier Reef Marine Park;
- nuclear actions; and
- a water resource, in relation to coal seam gas development and large coal mining development.

7.1 Nationally Listed Threatened, Migratory Species and Ecological Communities

Assessment of potential impacts to those nationally listed threatened species and ecological communities that have potential to occur (refer to **Appendix 1**) has been undertaken and is provided in **Appendix 3**. **Table 7** lists those species with potential for significant impact as a result of the Project.

Table 7 Assessment of Impact to Threatened Species and Ecological Communities Potentially Occurring within a 10 km radius of the Project Areas

Scientific Name	Common name	EPBC Act Status
Flora		
Boronia deanei	Deane's Boronia	V
Fauna		
Chalinolobus dwyeri	Large-eared Pied Bat	V
Eulamprus leuraensis	Blue Mountains Water Skink	E
Heleioporus australiacus	Giant Burrowing Frog	V
Petauroides volans	Greater Glider	V
Pseudomys novaehollandiae	New Holland Mouse	V
EECs		
Temperate Highland Peat Swamps on Sandstone		E

7.1.2 Endangered Ecological Communities

The EEC Temperate Highland Peat Swamps on Sandstone occurs within proposed subsidence monitoring lines GGE and GGSW. To avoid unnecessary damage to Carne West Swamp, Gang Gang Swamp South West, Gang Gang Swamp East or Sunnyside East Swamp, subsidence monitoring will not occur within these ecosystems. The subsidence lines have been established to the edge of each shrub swamp and then resume on the opposite side of the respective shrub swamp. Some trampling may occur, however existing

animal tracks will be used where possible, or the EEC will be walked around. No stakes will be established within the EEC. The Assessment of significance (**Appendix 3**) concluded that the proposed activities are not likely to significantly impact upon this EEC.

7.1.3 Threatened Flora

Deane's Boronia (*Boronia deanei*) was recorded within the proposed disturbance area of Subsidence Line GGSW. Four individuals are located within the central area of the proposed line. The incremental amount of clearing required, in addition to the measures proposed to avoid all recorded individuals, is a negligible impact towards the habitat of this species. The Assessment of significance for *Boronia deanei* concluded that the proposed activities are not likely to significantly impact upon this species.

No other EPBC Act listed flora species were recorded within Project Areas. **Appendix 3** details the assessments of significance for listed flora species considered to have to potential to occur within the Project Areas.

7.1.4 Threatened Fauna

No EPBC Act listed fauna species were recorded during surveys. **Appendix 3** details the assessments of significance for listed fauna species considered to have the potential to occur within the Project Areas.

Table 8 lists migratory species considered to have the potential to occur within the Project Areas (refer to **Appendix 1**). Assessments of Significance were conducted for these species and are included in **Appendix 3**.

Table 8 Threatened and Migratory Species and Ecological Communities Potentially Occurring within a 10 km radius of the Project Areas

Scientific Name	Common name	EPBC Act Status	Potential for Significant Impact
Merops ornatus	Rainbow Bee-eater	M	No
Monarcha melanopsis	Black-faced Monarch	M	No

7.2 Ramsar Wetlands of International Importance

There are no wetlands protected by international treaty (the Ramsar convention) arising from the EPBC Act Protected Matters Report generated for an area of 10km within the Project Areas.

7.3 Commonwealth Marine Environment

The Proposal will have no adverse effect on any Commonwealth marine area, as there are no such marine areas within the region.

7.4 World Heritage Properties and National Heritage Places

The Gardens of Stone National Park is part of the Greater Blue Mountains Area (GBMA). It occurs to the immediate north of the Project Area and also occurs approximately 5 km to the east. The GBMA is a World Heritage Property and National Heritage Place. DoE (2013) provides Significant Impact Assessment criteria for World Heritage Properties and National Heritage Places. Those assessment criteria, which are relevant to biodiversity, are considered below.

As per DoE (2013), an action is likely to have a significant impact on natural heritage values of a World Heritage property if there is a real chance or possibility that the action will:

- reduce the diversity or modify the composition of plant and animal species in all or part of a World

Heritage property;

- fragment, isolate or substantially damage habitat important for the conservation of biological diversity in a World Heritage property;
- cause a long-term reduction in rare, endemic or unique plant or animal populations or species in a World Heritage property; and
- fragment, isolate or substantially damage habitat for rare, endemic or unique animal populations or species in a World Heritage property.

An action is likely to have a significant impact on natural heritage values of a National Heritage place if there is a real chance or possibility that the action will:

- modify or inhibit ecological processes in a National Heritage place;
- reduce the diversity or modify the composition of plant and animal species in a National Heritage place;
- fragment or damage habitat important for the conservation of biological diversity in a National Heritage place;
- cause a long-term reduction in rare, endemic or unique plant or animal populations or species in a National Heritage place; and
- fragment, isolate or substantially damage habitat for rare, endemic or unique animal populations or species in a National Heritage place.

Due to the low level of impact and large distance from the GBMA, no impact is expected to occur to this area.

7.5 Great Barrier Reef Marine Park

The Proposal will not have an adverse effect on Great Barrier Reef Marine Park, as this area is not within the region.

7.6 All Nuclear Actions

No type of nuclear activity is proposed for the Project Area.

7.7 Water Resource, in relation to Coal Seam Gas Development and Large Coal Mining Development

This MNES has been developed to determine whether a large coal mining development or CSG development is likely to have a significant impact on a water resource. The Proposal does not require the use of a water resource in relation to coal seam gas or large coal mining development to undertake the proposed activities.

8.0 Conclusion and Recommendations

RPS Australia East Pty Ltd (RPS) was engaged by Centennial Springvale Pty Ltd to undertake a Flora and Fauna Assessment of five proposed subsidence lines (X extension, BB, GG, GGE and GGSW).

Two threatened flora species, namely *Persoonia hindii* (listed as vulnerable under the TSC Act) and *Boronia deanei* (listen as vulnerable under the TSC and EPBC Acts) were detected during surveys. A total of 229 *Persoonia hindii* were identified along subsidence line X, 57 *Persoonia hindii* along subsidence line GG and four *Boronia deanei* along subsidence line GGSW.

Previous local vegetation mapping in the region (DEC 2006b, RPS 2014) in conjunction with ground-truthing of the proposed subsidence lines identified six vegetation communities within the Project Areas. One vegetation community, namely MU 50 Newnes plateau Shrub Swamp was found to be commensurate with *Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion* as listed under the TSC Act. This vegetation community was also commensurate with the federally listed (EPBC Act) EEC known as *Temperate Highland Peat Swamps on Sandstone*.

No threatened fauna were identified during field surveys.

Potential impacts are expected to modify areas of native vegetation including the above-listed EEC. No individual threatened flora are being removed and are not expected to be impacted upon as a result of the project. The 7-part Test of Significance (TSC Act) and Assessment of Significance (EPBC Act) concluded that the activities involved in the installation of the subsidence lines, in unison with monitoring twice annually, are minor. Therefore, the project is not expected to have a significant impact on threatened species or EECs listed under the TSC Act or EPBC Act, or any other MNES.

8.1 Recommendations

The following recommendations have been outlined to provide ecological guidelines and site management strategies that may prevent any ongoing detrimental impacts upon habitat surrounding the proposed subsidence monitoring line sites.

- It is recommended that an ecologist be onsite to monitor subsidence monitoring line installation at lines X, GG and GGSW when it occurs, to avoid potential impacts on *P. hindii* and *B. Deanei*;
- It is our recommendation that the EECs be avoided. However, were not possible, measures to minimise impacts are recommended;
- All individual *P. hindii* and *B. deanei* plants should be flagged to ensure trampling does not occur during ongoing monitoring; and
- It is recommended that appropriate measures such as vehicle cleaning protocols be employed to ensure that working within the site does not result in bringing materials (soils, weeds or pathogens etc.) onto the sites that may cause the distribution of weed species or introduce pathogens such as *Phytophthora.* This will ameliorate the Key Threatening Processes '*Weed Invasion by Exotic Perennial Grasses'* and '*Infection of Native Plants by Phytophthora cinnamomi*'.

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Appendix 1

Likelihood of Occurrence

Identification of Subject Species and Communities

Threatened flora and fauna species (listed under the TSC Act and/or EPBC Act) that have been gazetted and recorded within 10 km of the Project Area have been considered within this assessment. EECs known from the broader area have also been addressed. Additional species that were known from the region that did not arise in searches were also considered.

This assessment deals with the following heads of consideration in tabulated form (refer to **Table A1** below):

'Species / Community'/ Population' – Lists each threatened species / population / EEC known from the vicinity. The status of each threatened species under the TSC Act and EPBC Act are also provided.

'Habitat Description' – Provides a brief account of the species / community / population and the preferred habitat attributes required for the existence / survival of each species / community.

'Likelihood of Occurrence within the Project Area – Assesses the likelihood of each species / community to occur along or within the immediate vicinity of the study area in terms of the aforementioned habitat description and taking into account local habitat preferences, results of current field investigations, data gained from various sources (such as OEH Atlas of NSW Wildlife) and previously gained knowledge via fieldwork undertaken within other ecological assessments in the locality.

Potential for impact – Assesses the potential of each species/community/population to be impacted within the Project Area.

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
Flora					
Caesia parviflora var. *minor* (Small Pale Grass-lily)	E	-	Found in damp places in open forest on sandstone.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. Species likely to occur.	Known habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.
Leucopogon fletcheri subsp. *fletcheri*	E	-	Occurs in dry eucalypt woodland or in shrubland on clayey lateritic soils, generally on flat to gently sloping terrain along ridges and spurs.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted.
Dillwynia tenuifolia	V	-	The core distribution is the Cumberland Plain from Windsor to Penrith east to Deans Park. Other populations in western Sydney are recorded from Voyager Point and Kemps Creek in the Liverpool LGA, Luddenham in the Penrith LGA and South Maroota in the Baulkham Hills Shire. Disjunct localities include: the Bulga Mountains at Yengo in the north, Kurrajong Heights and Woodford in the Lower Blue Mountains. In western Sydney, may be locally abundant particularly within scrubby-dry heath areas within Castlereagh Ironbark forest and Shale Gravel Transition forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum woodland. At Yengo, is reported to occur in disturbed escarpment woodland on Narrabeen sandstone.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
Pultenaea glabra	V	V	Grows in swamp margins, hillslopes, gullies and creekbanks and occurs within dry sclerophyll forest and tall damp heath on sandstone. Restricted to the higher Blue Mountains.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted.
Acacia bynoeana (Bynoe's Wattle)	E	V	Grows mainly in heath and dry sclerophyll forest in sandy soils. Mainly south of Dora Creek-Morisset area to Berrima and the Illawarra region, west to the Blue Mountains, also recorded from near Kurri Kurri in the Hunter Valley and from Morton National Park.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted.
Eucalyptus aggregata (Black Gum)	V	-	Found in the NSW Central and Southern Tablelands, with small isolated populations in Victoria and the ACT. Has a moderately narrow distribution, occurring mainly in the wetter, cooler and higher parts of the tablelands in the lowest parts of the landscape, on alluvial soils, on cold, poorly-drained flats and hollows adjacent to creeks and small rivers. Also occurs as isolated paddock trees in modified native or exotic pastures.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted.
Cryptostylis hunteriana (Leafless Tongue-orchid)	V	V	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (Eucalyptus sclerophylla), Silvertop Ash (E. sieberi), Red Bloodwood (Corymbia gummifera) and Black Sheoak (Allocasuarina	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted.

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
			littoralis); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (C. subulata) and the Tartan Tongue Orchid (C. erecta).		
Prasophyllum petilum	E	E	0	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted.
Grevillea evansiana (Evans Grevillea)	V	V	Grows in dry sclerophyll forest or woodland, occasionally in swampy heath, in sandy soils, usually over Hawkesbury sandstone.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted
Persoonia hindii	E	-	Occurs in dry sclerophyll forests and woodlands on sandy soils. Stoloniferous (has underground horizontal stems) and is thought to be clonal. Hence, each location may comprise only one to a few individuals.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. Species known to occur.	Known habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.
Asterolasia elegans	E	E	Occurs north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby local government areas. Also likely to occur in the western part of Gosford local government area. Known from only seven populations, only one of which is wholly within a conservation reserve. Occurs on Hawkesbury sandstone in sheltered forests on mid- to lower slopes and	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
			valleys, e.g. in or adjacent to gullies which support sheltered forest.		
Boronia deanei	V	V	Scattered populations occur between the far south-east of NSW and the Blue Mountains (including the upper Kangaroo River near Carrington Falls, the Endrick River near Nerriga and Nalbaugh Plateau), mainly in conservation reserves. Grows in wet heath, often at the margins of open forest adjoining swamps or along streams.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. Species known to occur.	Known habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2** and an AoS (EPBC Act) has been prepared in **Appendix 3**.
Pomaderris brunnea (Brown Pomaderris)	V	V	The species is expected to live for 10 - 20 years, while the minimum time to produce seed is estimated to be 4 - 6 years. Found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area. It also occurs at Walcha on the New England Tableland and in far eastern Gippsland in Victoria.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted
Thesium australe (Austral Toadflax)	V	V	Grows in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Occurs in grassland or grassy woodland. Grows on kangaroo grass tussocks but has also been recorded within the exotic coolatai grass.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted
Veronica blakelyi	V	-	Restricted to the western Blue Mountains, near Clarence, near Mt Horrible, on Nullo Mountain and in the Coricudgy Range. Occurs at fewer than 20 locations, none of which is in a conservation reserve. Occurs in eucalypt forest, often in moist areas.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
Euphrasia arguta	CE	CE	Occur in eucalypt forest with a mixed grass and shrub understorey within Nundle State forest. Sites have either been logged in the last few decades, or appear to have regrown from past clearing.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted
Haloragodendron lucasii	E	E	Occurs on Hawkesbury Sandstone in moist sandy loam soil. The species prefers sheltered aspects and inhabits gentle slopes below cliff lines near creeks in low open woodland or open forest. Its distribution is correlated with high soil moisture and phosphorus levels.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted
Homoranthus darwinioides	V	V	Grows in various woodland habitats with shrubby understoreys, usually in gravely sandy soils. Landforms the species has been recorded growing on include flat sunny ridge tops with scrubby woodland, sloping ridges, gentle south-facing slopes, and a slight depression on a roadside with loamy sand.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
Wollemia nobilis (Wollemi Pine)	E	E	The Wollemi Pine occurs in the warm temperate rainforest and rainforest margins in a eucalypt forest-woodland complex within the Sydney Sandstone Biome of the eastern coast of NSW. Topography controls vegetation associations where Wollemi Pine occurs. Within the canyons rainforest occurs and the surrounding ridges have dry sclerophyll woodland. Associated species of these communities include Ceratopetalum apetalum, Doryphora sassafras, Acmena smithii, Backhousea myrtifolia, Quintinia sieberi, Angophora floribunda, Dicksonia antarctica, Cyathea australis, Eupomatia laurina, Lepidosperma urophorum, Sticherus flabellatus, Todea barbara, Cissus hypoglauca, Clematis aristata, Pandorea pandorana and Parsonsia straminea.	The habitat of this species does not exist within the site. Not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted
Fauna					
Paralucia spinifera (Bathurst Copper Butterfly)	E	V	The Copper Butterfly is only found in the Central Tablelands of NSW. Its habitat is restricted to elevations above 900 m where it feeds exclusively on a form of blackthorn. The butterfly's life cycle relies on a 'mutualistic' relationship with the ant *Anonychomyrma itinerans*, and on the presence of blackthorn (Bursaria spinosa subsp. lasiophylla).	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
Petalura gigantea (Giant Dragonfly)	E	-	The Giant Dragonfly is found along the east coast of NSW from the Victorian border to northern NSW. It is not found west of the Great Dividing Range. There are known occurrences in the Blue Mountains and Southern Highlands, in the Clarence River catchment, and on a few coastal swamps from north of Coffs Harbour to Nadgee in the south. Live in permanent swamps and bogs with some free water and open vegetation. Adults emerge from late October and are short-lived, surviving for one summer after emergence.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. Species known to occur.	Known habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.
Heleioporus australiacus (Giant Burrowing Frog)	V	V	The Giant Burrowing Frog has been recorded breeding in a range of water bodies associated with more sandy environments of the coast and adjacent ranges from the Sydney Basin south the eastern Victoria. It breeds in hanging swamps, perennial non-flooding creeks and occasionally permanent pools, but permanent water must be present to allow its large tadpoles time to reach metamorphosis.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. Species likely to occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2** and an AoS (EPBC Act) has been prepared in **Appendix 3**.
Mixophyes balbus (Stuttering Frog)	E	V	Associated with streams in dry sclerophyll and wet sclerophyll forests and rainforests of more upland areas of the Great Dividing Range of NSW and down into Victoria. Breeding occurs along forest streams with permanent water where eggs are deposited within nests excavated in riffle zones by the females and the tadpoles swim free into the stream when large enough to do so. Outside of breeding, individuals range widely across the forest floor and can be found hundreds of metres from water	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
Pseudophryne australis (Red-crowned Toadlet)	V	-	Occurs on wetter ridge tops and upper slopes of sandstone formations on which the predominant vegetation is dry open forests and heaths. This species typically breeds within small ephemeral creeks that feed into larger semi-perennial streams. After rain these creeks are characterised by a series of shallow pools lined by dense grasses, ferns and low shrubs and usually contain leaf litter for shelter. Eggs are terrestrial and laid under litter, vegetation or rocks where the tadpoles inside will reach a relatively late stage of development before waiting for flooding waters before hatching will occur.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. Species known to occur.	Known habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.
Litoria booroolongensis (Booroolong Frog)	E	E	The Booroolong Frog is found along permanent western flowing streams of the Great Dividing Range through most of NSW and down into northern Victorua. Streams range from small slow-flowing creeks to large rivers and the adults are found on or near cobble banks and other rock structures within stream margins and shelter under rocks or amongst vegetation near the ground on the stream edge. The species occurs along streams in both forested areas and open pasture, but has been affected by the presence of the introduced willow tree. Booroolong Frogs sometimes basks in the sun on exposed rocks near flowing water during summer.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
Litoria littlejohni (Littlejohn's Tree Frog)	V	V	Occurs in wet and dry sclerophyll forests and heathland associated with sandstone outcrops between 280 and 1000 m on the eastern slopes of the Great Dividing Range from the Central Coast down into Victoria. Individuals have been collected from a wide range of water bodies that includes semi-permanent dams, permanent ponds, temporary pools and permanent streams, with calling occurring from fringing vegeation or on the banks. Individuals have been observed sheltering under rocks on high exposed ridges during summer and within deep leaf litter adjacent to the breeding site. Calling occurs in all months of the year, often in association with heavy rains. The tadpoles are distinctive, being large and very dark in colouration.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted
Aprasia parapulchella (Pink-tailed Legless Lizard)	V	V	Inhabits sloping, open woodland areas with predominantly native grassy groundlayers, particularly those dominated by kangaroo grass. Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted
Eulamprus leuraensis (Blue Mountains Water skink)	E	E	The species is restricted to isolated and naturally fragmented habitats of permanent sedge and hanging swamps (these develop at moderate to high altitudes on sloping rock faces composed of Narrabeen sandstone which are subject to a constant supply of water), in open forest and open scrub or heath.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. Species known to occur.	Known habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2** and an AoS (EPBC Act) has been prepared in **Appendix 3**.

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
Varanus rosenbergi (Rosenberg's Goanna)	V	-	This species is a Hawkesbury-Narrabeen sandstone outcrop specialist. Occurs in coastal heaths, humid woodlands and both wet and dry sclerophyll forests.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	Known habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.
Hoplocephalus bungaroides (Broad-headed Snake)	E	V	Occurs almost exclusively in association with communities occurring on Triassic sandstone within the Sydney Basin. Typically found among exposed sandstone outcrops with vegetation types ranging from woodland to heath. Within these habitats they spend most of the year sheltering in and under rock crevices and exfoliating rock. However, some individuals will migrate to tree hollows to find shelter during hotter parts of summer.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted
Botaurus poiciloptilus (Australasian Bittern)	E	E	The Australasian Bitterns is widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes and spikerushes.	The habitat of this species does not exist within the site. Not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted
Hieraaetus morphnoides (Little Eagle)	V	-	Most abundant in lightly timbered areas with open areas nearby. Often recorded foraging in grasslands, crops, treeless dune fields, and recently logged areas. May nest in farmland, woodland and forest in tall trees.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	Known habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
Calidris ferruginea (Curlew Sandpiper)	E	-	The Curlew Sandpiper is distributed around most of the coastline of Australia. It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes the inland	The habitat of this species does not exist within the site. Not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted
Rostratula australis (Australian Painted Snipe)	E	E, M	In NSW, this species has been recorded at the Paroo wetlands, Lake Cowell, Macquarie Marshes and Hexham Swamp. Most common in the Murray-Darling Basin. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds.	The habitat of this species does not exist within the site. Not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore unlikely to be impacted.
Callocephalon fimbriatum (Gang-gang Cockatoo)	V	-	In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Also occur in subalpine snow gum woodland and occasionally in temperate or regenerating forest. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. It requires tree hollows in which to breed.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	Known habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
Calyptorhynchus lathami (Glossy Black-Cockatoo)	V	-	Inhabits forest with low nutrients, characteristically with key Allocasuarina spp. Tends to prefer drier forest types with a middle stratum of Allocasuarina below Eucalyptus or Angophora. Often confined to remnant patches in hills and gullies. Breed in hollows stumps or limbs, either living or dead. Endangered population in the Riverina.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	Known habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**
Glossopsitta pusilla (Little Lorikeet)	V	-	Distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range in NSW, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. Mostly occur in dry, open eucalypt forests and woodlands. They feed primarily on nectar and pollen in the tree canopy. Nest hollows are located at heights of between 2 m and 15 m, mostly in living, smooth-barked eucalypts. Most breeding records come from the western slopes.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	Known habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**
Lathamus discolor (Swift Parrot)	E	CE	The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW. This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted.

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
Numenius madagascariensis (Eastern Curlew)	-	CE	The Eastern curlew spends its breeding season in northeastern Asia, including Siberia to Kamchatka, and Mongolia. Its breeding habitat is composed of marshy and swampy wetlands and lakeshores. Most individuals winter in coastal Australia, with a few heading to South Korea, Thailand, Philippines and New Zealand, where they stay at estuaries, beaches, and salt marshes. It uses its long, decurved bill to probe for invertebrates in the mud. It may feed in solitary but it generally congregates in large flocks to migrate or roost. Its call is a sharp, clear whistle, cuuue-reee, often repeated.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. Species likely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted
Ninox strenua (Powerful Owl)	V	-	Occupies wet and dry eucalypt forests and rainforests. Can occupy both un-logged and lightly logged forests as well as undisturbed forests where it usually roosts on the limbs of dense trees in gully areas. It is most commonly recorded within red turpentine in tall open forests and black she-oak within open forests. Large mature trees with hollows at least 0.5 m deep are required for nesting. Tree hollows are particularly important for the Powerful Owl because a large proportion of the diet is made up of hollow-dependent arboreal marsupials. Nest trees for this species are usually emergent with a diameter at breast height of at least 100 cm.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	Potential habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
Ninox connivens (Barking Owl)	V	-	Generally found in open forests, woodlands, swamp woodlands and dense scrub. Can also be found in the foothills and timber along watercourses in otherwise open country.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	Potential habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.
Tyto novaehollandiae (Masked Owl)	V	-	Inhabits a diverse range of wooded habitat that provide tall or dense mature trees with hollows suitable for nesting and roosting. Mostly recorded in open forest and woodlands adjacent to cleared lands. Nest in hollows, in trunks and in near vertical spouts or large trees, usually living but sometimes dead. Nest hollows are usually located within dense forests or woodlands. Masked owls prey upon hollow-dependent arboreal marsupials, but terrestrial mammals make up the largest proportion of the diet.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	Potential habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.
Tyto tenebricosa (Sooty Owl)	V	-	Often found in tall old-growth forests, including temperate and subtropical rainforests. In NSW mostly found on escarpments with a mean altitude less than 500 metres. Nests and roosts in hollows of tall emergent trees, mainly eucalypts often located in gullies. Nests have been located in trees 125 to 161 centimetres in diameter.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	Potential habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
Climacteris picumnus victoriae (Brown Treecreeper (eastern subspecies))	V	-	Found in eucalypt woodlands (including box-gum woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and river red gum forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	Potential habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.
Anthochaera phrygia (Regent Honeyeater)	CE	E,M	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. The distribution of the species has contracted dramatically in the last 30 years to between north-eastern Victoria and south-eastern Queensland. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. In some years flocks converge on flowering coastal woodlands and forests.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
Grantiella picta (Painted Honeyeater)	V	-	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. Inhabits boree, brigalow and box-gum woodlands and box-ironbark forests.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted
Melithreptus gularis (Black-chinned Honeyeater (eastern subspecies))	V	-	Eucalypt woodlands within an approximate annual rainfall range of 400-700mm	The habitat of this species does not exist within the site. Not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted
Pomatostomus temporalis temporalis (Grey-crowned Babbler (eastern subspecies))	V	-	In NSW, the eastern sub-species occurs on the western slopes of the Great Dividing Range, and on the western plains reaching as far as Louth and Balranald. It also occurs in woodlands in the Hunter Valley and in several locations on the north coast of NSW. It may be extinct in the southern, central and New England tablelands. Inhabits open box-gum woodlands on the slopes, and box-cypress-pine and open box woodlands on alluvial plains.	The habitat of this species does not exist within the site. Not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted
(*Pyrrholaemus sagittatus*) Speckled Warbler	V	-	The Speckled Warbler lives in a wide range of eucalypt dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy.	The habitat of this species does not exist within the site. Not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
Daphoenositta chrysoptera (Varied Sittella)	V	-	Inhabits wide variety of dry eucalypt forests and woodlands, usually with either shrubby under storey or grassy ground cover or both, in all climatic zones of Australia. Usually in areas with rough-barked trees, such as stringybarks or ironbarks, but also in paperbarks or mature Eucalypts with hollows.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. Species likely to occur.	Potential habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.
Artamus cyanopterus cyanopterus (Dusky Woodswallow)	V	-	The Dusky Woodswallow is widespread in eastern, southern and southwestern Australia. In New South Wales it is widespread from coast to inland, including the western slopes of the Great Dividing Range and farther west. It is sparsely scattered in, or largely absent from, much of the Upper Western region. The Dusky Woodswallow is often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests. At sites where Dusky Woodswallows are recorded the understorey is typically open with sparse eucalypt saplings, acacias and other shrubs, including heath. The ground cover may consist of grasses, sedges or open ground, often with coarse woody debris (Higgins and Peter 2002). Birds are also often observed in farm land, usually at the edges of forest or woodland or in roadside remnants or wind breaks with dead timber.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	Potential habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
Melanodryas cucullata cucullata (Hooded Robin (south-eastern form))	V	-	Occupy a wide range of eucalypt woodlands, Acacia shrublands and open forests.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted
Petroica boodang (Scarlet Robin)	V	-	The Scarlet Robin is found from SE Queensland to SE South Australia and also in Tasmania and SW Western Australia. In NSW, it occurs from the coast to the inland slopes. The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. Species known to occur.	Known habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.
Petroica phoenicea (Flame Robin)	V	-	Flame Robins are found in a broad coastal band from southern Queensland to just west of the South Australian border. The species is also found in Tasmania. The preferred habitat in summer includes eucalyptus forests and woodland, whilst in winter prefers open woodlands and farmlands. It is considered migratory. The Flame Robin breeds from about August to January.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. Species known to occur.	Known habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.
Dasyurus maculatus maculatus (Spotted-tailed Quoll)	V	E	Spotted-tailed Quoll are found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Queensland. Only in Tasmania is it still considered common. Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
Isoodon obesulus obesulus (Southern Brown Bandicoot (eastern))	E	-	Prefers sandy soils with scrubby vegetation and-or areas with low ground cover that are burn from time to time. A mosaic of post fire vegetation is important for this species.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted
Phascolarctos cinereus (Koala)	V	V	Inhabits eucalypt forests and woodlands. The suitability of these forests for habitation depends on the size and species of trees present, soil nutrients, climate and rainfall.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted
Cercartetus nanus (Eastern Pygmy-possum)	V	-	Inhabits rainforest through to sclerophyll forest and tree heath. Banksias and myrtaceous shrubs and trees are a favoured food source. Will often nest in tree hollows, but can also construct its own nest. Because of its small size it is able to utilise a range of hollow sizes including very small hollows. Individuals will use a number of different hollows and an individual has been recorded using up to 9 nest sites within a 0.5ha area over a 5 month period.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. Species likely to occur.	Known habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.
Petaurus norfolcensis (Squirrel Glider)	V	-	Generally occurs in dry sclerophyll forests and woodlands but is absent from dense coastal ranges in the southern part of its range. Requires abundant hollow bearing trees and a mix of eucalypts, banksias and acacias. There is only limited information available on den tree use by Squirrel gliders, but it has been observed using both living and dead trees as well	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. Species likely to occur.	Known habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
			as hollow stumps. Within a suitable vegetation community at least one species should flower heavily in winter and one species of eucalypt should be smooth barked. Endangered population in the Wagga Wagga LGA.		
Petauroides volans (Greater Glider)	-	V	This species is primarily folivorous, largely restricted to eucalypt forests and woodlands. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. Species likely to occur.	Known habitat for this species occurs within Study Area. Therefore, it has the **potential** to be impacted. An AoS (EPBC Act) has been prepared in **Appendix 3**.
Petrogale penicillata (Brush-tailed Rock-wallaby)	E	V	Found in rocky areas in a wide variety of habitats including rainforest gullies, wet and dry sclerophyll forest, open woodland and rocky outcrops in semi-arid country. Commonly sites have a northerly aspect with numerous ledges, caves and crevices.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted
Pteropus poliocephalus (Grey-headed Flying-fox)	V	V	This species is a canopy-feeding frugivore and nectarivore of rainforests, open forests, woodlands, melaleuca swamps and banksia woodlands. Bats commute daily to foraging areas, usually within 15 km of the day roost although some individuals may travel up to 70 km.	Habitat of some value exists within the site (e.g. native vegetation cover). However, micro-habitat conditions necessary for incidence are absent from the site. Species not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted
Chalinolobus dwyeri (Large-eared Pied Bat)	V	V	Located in a variety of drier habitats, including the dry sclerophyll forests and woodlands to the east and west of the Great Dividing Range. Can also be found on the edges of rainforests and in wet sclerophyll forests. This species roosts in caves and mines in groups of between 3 and 37 individuals.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**. An AoS (EPBC Act) has been prepared in **Appendix 3**

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
Chalinolobus picatus (Little Pied Bat)	V	-	The Little-Pied Bat is found in inland Queensland and NSW (including Western Plains and slopes) extending slightly into South Australia and Victoria. Occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress-pine forest, mallee, Bimbil box. Roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.
Falsistrellus tasmaniensis (Eastern False Pipistrelle)	V	-	Inhabit sclerophyll forests, preferring wet habitats where trees are more than 20 m high. Two observations have been made of roosts in stem holes of living eucalypts. There is debate about whether or not this species moves to lower altitudes during winter, or whether they remain sedentary but enter torpor. This species also appears to be highly mobile and records showing movements of up to 12 km between roosting and foraging sites.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	Known habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.
Miniopterus schreibersii oceanensis (Eastern Bentwing-bat)	V	-	Eastern Bent-wing Bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	Known habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.
Mormopterus norfolkensis (Eastern Freetail-bat)	V	-	Most records are from dry eucalypt forests and woodlands to the east of the Great Dividing Range. Appears to roost in trees, but little is known of this species' habits.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	Known habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
Scoteanax rueppellii (Greater Broad-nosed Bat)	V	-	Prefer moist gullies in mature coastal forests and rainforests, between the Great Dividing Range and the coast. They are only found at low altitudes below 500 m. In dense environments they utilise natural and human-made opening in the forest for flight paths. Creeks and small rivers are favoured foraging habitat. This species roosts in hollow tree trunks and branches.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	Known habitat for this species occurs within the areas of predicted subsidence and ESAs. Therefore, it has the **potential** to be impacted. A 7-Part Test of significance (TSC Act) has been applied to this species in **Appendix 2**.
Pseudomys novaehollandiae (New Holland Mouse)	-	V	The New Holland Mouse currently has a disjunct, fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Across the species' range the New Holland Mouse is known to inhabit open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes.	Habitat at a PCT level exists. Micro-habitat conditions necessary for incidence are present within the site. While not observed the species may occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted. An AoS (EPBC Act) has been prepared in **Appendix 3**.
Macquaria australasica (Macquarie Perch)	E (FM Act)	E	Macquarie perch are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their tributaries	The habitat of this species does not exist within the site. Not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted.

Scientific Name (Common Name)	TSC Act	EPBC Act	Habitat	LoO	Potential Impact
Prototroctes maraena (Australian Grayling)	-	V	Historically, this species occurred in coastal streams from the Grose River Valley, southwards through NSW, Vic. and Tas. It also occasionally occurred high upstream in the Snowy R. A single juvenile specimen was collected from Lake Macquarie in 1974. This species spends only part of its lifecycle in freshwater. The Tambo River population inhabits a clear, gravel-bottomed stream with alternating pools and riffles, and granite outcrops. It has also been associated with clear, gravel-bottomed habitats in the Mitchell & Wonnangatta Rivers but was present in a muddy-bottomed, heavily silted habitat in the Tarwin R.	The habitat of this species does not exist within the site. Not observed and unlikely to occur.	This species is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted.

Appendix 2

7-part Test

Consideration under Section 5A of the Environmental Planning and Assessment Act 1979

Considerations of the effects of the proposed subsidence monitoring sites under the guidelines of Section 5A of the EP&A Act 1979 for the concerned threatened species / populations/ecological communities are given below.

The majority of information used for the assessment has been sourced from OEH Threatened Species Information and Environmental Impact Assessment Guidelines, OEH Atlas of NSW Wildlife and other published or widely available literature sources such as scientific journals and reports. For the purposes of the Seven-Part Test, threatened species have been grouped into 'guilds', that is, species sharing similar habitat or ecological requirements have been grouped and assessed together.

Flora

- *Boronia deanei*
- *Caesia parviflora* var. *minor*
- *Persoonia hindii*
- *Veronica blakelyi*

Fauna

- Giant Dragonfly (*Petalura gigantea*)
- Giant Burrowing Frog (*Heleioporus australiacus*)
- Red-crowned Toadlet (*Pseudophryne australis*)
- Blue Mountains Water Skink (*Eulamprus leuraensis*)
- Rosenberg's Goanna (*Varanus rosenbergi*)
- Little Eagle (*Hieraaetus morphnoides*)
- Gang-Gang Cockatoo (*Callocephalon fimbriatum*)
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*)
- Little Lorikeet (*Glossopsitta pusilla*)
- Powerful Owl (*Ninox strenua*)
- Barking Owl (*Ninox connivens*)
- Masked Owl (*Tyto novaehollandiae*)
- Sooty Owl (*Tyto tenebricosa*)
- Brown Treecreeper (eastern subsp.) (*Climacteris picumnus picumnus*)
- Varied Sittella (*Daphoenositta chrysoptera*)
- Dusky Woodswallow (*Artamus cyanopterus cyanopterus*)
- Scarlet Robin (*Petroica boodang*)
- Flame Robin (*Petroica phoenicea*)
- Squirrel Glider (*Petaurus norfolcensis*)
- Eastern Pygmy Possum (*Cercartetus nanus*)
- Large-eared Pied Bat (*Chalinolobus dwyeri*)

- Little Pied Bat (*Chalinolobus picatus*)
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)
- Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)
- Eastern Freetail-bat (*Mormopterus norfolkensis*)
- Greater Broad-nosed Bat (*Scoteanax rueppellii*)

Endangered Ecological Communities

- Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion

Threatened Flora

Boronia deanei (Deane's Boronia)

B. deanei grows on the margins of high altitude swamps, in wet heath and in drier open forest on low nutrient, poorly drained peaty soils on sandstone or granite. The species is known to occur throughout the Newnes Plateau in swamp habitats, and has been recorded at Line GGSW Project Area.

(a) **In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Four *B. deanei* individuals were recorded within the GGSW Project Area. Subsidence line installation will not remove any individuals of the species and shall consist of small scale, localised disturbance including the moving of small amounts of debris, trimming low vegetation and removal of some immature trees. An ecologist will be present during installation works to identify *B. deanei* within the proposed disturbance area; to avoid damage to, or removal of, individuals. It is therefore unlikely that the proposed action will adversely affect *B. deanei* such that a local population of the species is placed at risk of extinction.

(b) **in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,**

The species does not constitute an endangered population and therefore the proposed action is not likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

(c) **in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

This is not applicable for this species.

(d) **In relation to the habitat of a threatened species, population or ecological community:**

(i) **the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

Up to 0.05 ha of habitat suitable for *B. deanei* will be modified as part of the proposed activities.

(ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

The area of habitat is not expected to become fragmented due to works as connectivity throughout the area will not be altered.

(iii) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality**

Limited habitat will be modified as part of works. Suitable habitat exists immediately adjacent to the Project Area. Habitat to be modified is not considered important for the long term survival of the species in the locality.

(e) **Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Critical habitat for this threatened species does not occur within the Project Area.

(f) **Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has not been developed for *Boronia deanei*.

(g) **Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

Key threatening processes relevant to the proposal have been discussed in the body of the report.

Caesia parviflora var. *minor* (Small Pale Grass-lily)

C. parviflora var. *minor* grows in damp places in heath, woodland and dry sclerophyll forest on sandstone-derived soils. The species is known to occur in the Wollemi CMA sub-region. One record for the species exists within 10 kilometres of the Project Areas, and the species was not recorded during surveys of Subsidence lines X, BB, GG, GGE and GGSW.

(a) **In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Caesia parviflora var. *minor* has not been recorded within the Project Areas, however is considered to potentially occur. Subsidence line installation will present a small scale of disturbance to Project Areas; and future monitoring works represent minimal impact on the sites. It is therefore unlikely that the proposed action will adversely affect *Caesia parviflora* var. *minor* such that a local population of the species is placed at risk of extinction.

(b) **in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,**

The species does not constitute an endangered population and therefore the proposed action is not likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

(c) **in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

This is not applicable for this species.

(d) **In relation to the habitat of a threatened species, population or ecological community:**

(i) **the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

Up to 4.22 ha of habitat suitable for *Caesia parviflora* var. *minor* will be modified as part of the proposed works.

(ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

The area of habitat is not expected to become fragmented due to works as connectivity throughout the area will not be altered.

(iii) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality**

Limited habitat will be modified as part of works. Suitable habitat exists immediately adjacent to the Project Areas. Habitat to be modified is not considered important for the long term survival of the species in the locality.

(e) **Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Critical habitat for this threatened species does not occur within the Project Areas.

(f) **Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has not been developed for *Caesia parviflora* var. *minor*.

(g) **Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

Key threatening processes relevant to the proposal have been discussed in the body of the report.

Persoonia hindii

P. hindii occurs in dry sclerophyll forests and woodlands on sandy soils. The species is known only from the Newnes Plateau, in the Newnes State Forest. The species is known to occur within the Project Areas and was recorded within the proposed disturbance footprints of Subsidence Monitoring Lines X, BB and GG.

(a) **In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

P. hindii was recorded in large numbers at Subsidence Line X (229 individuals), and Subsidence Line GG (57 individuals). Works will not remove any individuals of the species and shall consist of small scale, localised disturbance including the moving of small amounts of debris, trimming low vegetation and removal

of some immature trees. An ecologist will be present during installation works to identify *P. hindii* within the proposed disturbance areas at lines X and GG in order to avoid damage to, or removal of, individuals. It is therefore unlikely that the proposed action will adversely affect *P. hindii* such that a local population of the species is placed at risk of extinction.

(b) **in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,**

The species does not constitute an endangered population and therefore the proposed action is not likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

(c) **in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

This is not applicable for this species.

(d) **In relation to the habitat of a threatened species, population or ecological community:**

(i) **the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

Up to 4.34 ha of habitat suitable for *P. hindii* will be modified as part of the proposed works.

(ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

The area of habitat is not expected to become fragmented due to works as connectivity throughout the area will not be altered.

(iii) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality**

Limited habitat will be modified as part of works. Suitable habitat exists immediately adjacent to the Project Areas. Habitat to be modified is not considered important for the long term survival of the species in the locality.

(e) **Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Critical habitat for this threatened species does not occur within the Project Areas.

(f) **Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has not been developed for *P. hindii.*

(g) **Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

Key threatening processes relevant to the proposal have been discussed in the body of the report.

Veronica blakelyi

V. blakelyi occurs in moist and sheltered areas of eucalypt forest, associated with canopy species including *Eucalyptus dives*, *E. dalrympleana*, *E. rossii* and *E. pauciflora*. It is restricted to the western Blue Mountains. A total of 24 records of the species occur within 10 kilometres of the Project Areas. The species was not recorded during surveys.

(a) **In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

V. blakelyi has not been recorded within the Project Areas, however is considered to potentially occur. Subsidence line installation will present a small scale of disturbance to Project Areas; and future monitoring works represent minimal impact on the sites. It is therefore unlikely that the proposed action will adversely affect *V. blakelyi* such that a local population of the species is placed at risk of extinction.

(b) **in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,**

The species does not constitute an endangered population and therefore the proposed action is not likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

(c) **in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

This is not applicable for this species.

(d) **In relation to the habitat of a threatened species, population or ecological community:**

(i) **the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

Up to 4.34 of habitat suitable for *V. blakelyi* will be modified as part of the proposed works.

(ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

The area of habitat is not expected to become fragmented due to works as connectivity throughout the area will not be altered.

(iii) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality**

Limited habitat will be modified as part of works. Suitable habitat exists immediately adjacent to the Project Areas. Habitat to be modified is not considered important for the long term survival of the species in the locality.

(e) **Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Critical habitat for this threatened species does not occur within the Project Areas.

(f) **Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has not been developed for *V. blakelyi.*

(g) **Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

Key threatening processes relevant to the proposal have been discussed in the body of the report.

Threatened Fauna

Giant Dragonfly (*Petalura gigantea*)

This species is found in permanent swamps and bogs with some water and open vegetation. This species is known to occur in Central Carne and in Gang Gang Swamp, which would be intersected by the proposed subsidence monitoring lines.

The Giant Dragonfly is known to construct burrows into the ground where it lays its eggs (oviposition) in the waterlogged substrate or under moist litter (Benson and Baird 2012). Burrow depth was recorded to range from 18 to 75 cm (Benson and Baird 2012), with some burrows showing evidence of adaptive burrow deepening by larvae of the species as a response to a lowering groundwater table.

(a) **In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Subsidence lines X, GGSW and GGE are proposed to traverse swamps known to provide potential habitat for this species. Installation and monitoring will involve trimming of low-lying shrub vegetation and trampling from monitoring that will occur twice annually. Impacts are considered minor and are not expected affect the overall integrity of the swamp. Subsidence monitoring is not expected to substantially contribute to disturbance. It is therefore considered unlikely that the Project will affect the lifecycle of this species such that a local population is likely to be placed at risk of extinction.

(b) **in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,**

The species does not constitute an endangered population and therefore the proposed action is not likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

(c) **in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

This is not applicable for this species.

(d) **In relation to the habitat of a threatened species, population or ecological community:**

(i) **the extent to which habitat is likely to be removed or modified as a result of the action**

proposed,

Approximately 0.05 ha of habitat suitable for *P. gigantea* will be modified as part of the proposed works.

(ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

The area of habitat is not expected to become fragmented due to works as connectivity throughout the area will not be altered.

(iii) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality**

Limited habitat will be modified as part of works. Suitable habitat exists immediately adjacent to the Project Areas. Habitat to be modified is not considered important for the long term survival of the species in the locality.

(e) **Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Critical habitat for this threatened species does not occur within the Project Areas.

(f) **Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has not been developed for *P. gigantea.*

(g) **Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

Key threatening processes relevant to the proposal have been discussed in the body of the report.

Giant Burrowing Frog (*Heleioporus australiacus*)

The Giant Burrowing Frog has been recorded by call recognition in previous surveys within the surrounding area (BMS 2011b). The location description provided was the 'Kangaroo Creek road crossing'. Additional scattered records occur throughout the Blue Mountains National Park. Preferred breeding habitat exists in the Project Area within the upland shrub swamps. Suitable habitats occur widely through the Newnes Plateau and more preferred habitat, in the form of small headwater creek lines and slow flowing to intermittent creek-lines, occurs throughout the wider Blue Mountains area. The habitats within the Project Area are therefore a small proportion of the available habitat within the locality, much of which is conserved within the nearby national parks.

(a) **In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Subsidence lines X, GGSW and GGE are proposed to traverse swamps known to provide potential habitat for this species, as well as open forests in which this species may forage. Installation and monitoring will involve trimming of low-lying shrub vegetation and trampling from monitoring that will occur twice annually. Impacts are considered minor and are not expected affect the overall integrity of the swamp. Subsidence monitoring is not expected to substantially contribute to disturbance. It is therefore considered unlikely that the Project will affect the lifecycle of this species such that a local population is likely to be placed at risk of extinction.

(b) **in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such**

that a viable local population of the species is likely to be placed at risk of extinction,

The species does not constitute an endangered population and therefore the proposed action is not likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

(c) **in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

This is not applicable for this species.

(d) **In relation to the habitat of a threatened species, population or ecological community:**

(i) **the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

Up to 5.65 ha of habitat suitable for *H. australiacus* will be modified as part of the proposed works.

(ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

The area of habitat is not expected to become fragmented due to works as connectivity throughout the area will not be altered.

(iii) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality**

Limited habitat will be modified as part of works. Suitable habitat exists immediately adjacent to the Project Areas. Habitat to be modified is not considered important for the long term survival of the species in the locality.

(e) **Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Critical habitat for this threatened species does not occur within the Project Areas.

(f) **Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has not been developed for *H. australiacus.*

(g) **Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

Key threatening processes relevant to the proposal have been discussed in the body of the report.

Red-crowned Toadlet (*Pseudophryne australis*)

This species is found in open forest on Hawkesbury and Narrabeen sandstones, and is restricted to the Sydney Basin. It inhabits periodically wet drainage lines below sandstone ridges, sheltering in dense

vegetation and thick leaf litter. *P. australis* appears to occur as localised populations restricted to the immediate vicinity of breeding habitats.

(a) **In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

P. australis was not recorded during surveys of the Project Area. One record for the species exists within a 10 kilometre search of the Project Areas. Potential breeding habitat exists in the Project Areas within the shrub swamps. Suitable habitats occur widely through the Newnes Plateau and throughout the wider Blue Mountains area. Due to the tendency of *P. australis* to form discrete populations, disturbance to breeding or refuge habitat has the potential to adversely affect a local population of the species. Subsidence line installation and monitoring will comprise limited habitat disturbance and modification. Subsidence monitoring is not expected to substantially contribute to disturbance. It is therefore considered unlikely that the Project will affect the lifecycle of this species such that a local population is likely to be placed at risk of extinction.

(a) **in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,**

The species does not constitute an endangered population and therefore the proposed action is not likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

(b) **in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

This is not applicable for this species.

(c) **In relation to the habitat of a threatened species, population or ecological community:**

(i) **the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

Up to 0.05 ha of habitat suitable for *P. australis* will be modified as part of the proposed works.

(ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

The area of habitat is not expected to become fragmented due to works as connectivity throughout the area will not be altered.

(iii) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality**

Limited habitat will be modified as part of works. *P. australis* has not been recorded in the vicinity of Project Areas and has been uncommonly recorded in the wider area. It is therefore unlikely that the Project Areas represent significant habitat for the species, and is not considered important for the long term survival of the species in the locality.

(d) **Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Critical habitat for this threatened species does not occur within the Project Areas.

(e) **Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

(f) A recovery plan has not been developed for *P. australis.*

(g) **Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

Key threatening processes relevant to the proposal have been discussed in the body of the report.

Blue Mountains Water Skink (*Eulamprus leuraensis*)

This species has been previously recorded by RPS in Shrub Swamps that are proposed to be intersected by X line, GGSW and GGE. The Blue Mountains Water Skink is considered to be reliant on the presence of permanent groundwater seepage and/or waterlogging within parts of the inhabited swamp, even during times of drought and is typically associated with the more waterlogged areas of the swamp (Benson and Baird 2012). Genetic studies have also determined that the species experiences little dispersal between swamps (Dubey and Shine 2009), and therefore the shrub swamps present within the Project Area may constitute several 'local populations' of the species.

(a) **In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Subsidence lines X, GGSW and GGE are proposed to traverse swamps known to provide potential habitat for this species. Installation and monitoring will involve trimming of low-lying shrub vegetation and trampling from monitoring that will occur twice annually. Impacts are considered minor and are not expected affect the overall integrity of the swamp. Subsidence monitoring is not expected to substantially contribute to disturbance. It is therefore considered unlikely that the Project will affect the lifecycle of this species such that a local population is likely to be placed at risk of extinction.

(b) **in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,**

The species does not constitute an endangered population and therefore the proposed action is not likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

(c) **in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

This is not applicable for this species.

(d) **In relation to the habitat of a threatened species, population or ecological community:**

(i) **the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

Up to 0.05 ha of habitat suitable for *E. leuraensis* will be modified as part of the proposed works.

(ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

The area of habitat is not expected to become fragmented due to works as connectivity throughout the area will not be altered.

(iii) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality**

Limited habitat will be modified as part of works. Suitable habitat exists immediately adjacent to the Project Areas at subsidence lines GGSW and GGE. Habitat to be modified is not considered important for the long term survival of the species in the locality.

(e) **Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Critical habitat for this threatened species does not occur within the Project Areas.

(f) **Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

The *Blue Mountains Water Skink (Eulamprus leuraensis) Recovery Plan* (NPWS 2001) applies to this species. The proposed action is not consistent with the objective of the recovery plan due to potential degradation of the species' habitat; however the limited modification and small extent of disturbance is not expected to impact the survival of the species.

(g) **Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

Key threatening processes relevant to the proposal have been discussed in the body of the report.

Rosenberg's Goanna (*Varanus rosenbergi*)

This species is found in heath, open forest and woodland. It uses termite mounds for breeding. It shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens.

(a) **In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

The proposed sites occur within a large area containing contiguous forest, woodland, heath, swamp and rocky habitats. These habitats continue throughout the Newnes State Forest and into the Blue Mountains National Park. Local populations of the Rosenberg's Goanna would extend into these adjacent protected habitats. Therefore, the losses of potential habitat for the Rosenberg's Goanna are small, relative to the available occupied habitats. In addition the most valuable habitat resource that was recorded (termite mounds) will be avoided. Therefore, the Project is unlikely to impact local populations of the Rosenberg's Goanna, such that it is likely to be placed at risk of extinction.

(b) **in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,**

The species does not constitute an endangered population and therefore the proposed action is not likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

(c) **in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

This is not applicable for this species.

(d) **In relation to the habitat of a threatened species, population or ecological community:**

(i) **the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

Approximately 5.65 ha of habitat suitable for *V. rosenbergi* will be modified as part of the proposed works.

(ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

The area of habitat is not expected to become fragmented due to works as connectivity throughout the area will not be altered.

(iii) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality**

Limited habitat will be modified as part of works. Suitable habitat exists immediately adjacent to the Project Areas. Habitat to be modified is not considered important for the long term survival of the species in the locality.

(e) **Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Critical habitat for this threatened species does not occur within the Project Areas.

(f) **Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has not been developed for *V. rosenbergi*.

(g) **Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

Key threatening processes relevant to the proposal have been discussed in the body of the report.

Woodland Birds

Little Eagle (*Hieraaetus morphnoides*)

This species is most abundant in lightly timbered areas with open areas nearby. Often recorded foraging in grasslands, crops, treeless dune fields, and recently logged areas. Nest in tall trees in farmland, woodland and forest.

Gang-Gang Cockatoo (*Callocephalon fimbriatum*)

This species is found in the summer months in tall mountain forests and woodlands, and mature wet sclerophyll forests. In winter it may occur at lower altitudes in drier more open Eucalypt forests and woodlands and is often found in urban areas in some districts. This species forages in trees for nectar and possibly lerps.

Glossy Black-Cockatoo (*Calyptorhynchus lathami*)

This species occurs in forests and woodlands where it forages predominantly on *Allocasuarina* cones. Favoured species include *Allocasuarina littoralis* (Black She-oak), *A. torulosa* (Forest She-oak) and *A. verticillata* (Drooping She-oak).

Little Lorikeet (*Glossopsitta pusilla*)

Distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range in NSW, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. Mostly occur in dry, open eucalypt forests and woodlands. They feed primarily on nectar and pollen in the tree canopy. Nest hollows are located at heights of between 2 m and 15 m, mostly in living, smooth-Barked eucalypts. Most breeding records come from the western slopes.

Brown Treecreeper (*Climacteris picumnus victoriae*)

This species is found in eucalypt woodland and dry open forest; mainly in habitats dominated by stringybarks and other rough-barked eucalypts. The brown treecreeper forages in trees and on the ground; and utilises tree hollows for nesting.

Varied Sittella (*Daphoenositta chrysoptera*)

Inhabits wide variety of dry eucalypt forests and woodlands, usually with either shrubby under storey or grassy ground cover or both, in all climatic zones of Australia. Usually in areas with rough-Barked trees, such as stringybarks or ironbarks, but also in paperbarks or mature Eucalypts with hollows.

Scarlet Robin (*Petroica boodang*)

This species is distributed from the coast to inland slopes in NSW, Inhabiting dry eucalypt forests and woodlands, particularly those with abundant logs and fallen timber; and an open, grassy understorey with scattered shrubs.

Flame Robin (*Petroica phoenicea*)

This species breeds in upland habitats including tall moist eucalypt forests and woodlands, in clearings and areas of open understorey. During winter, birds migrate to lower altitudes, occupying drier, more open habitats.

Dusky Woodswallow (*Artamus cyanopterus cyanopterus*)

This species occupies woodlands and dry open sclerophyll forests.

(a) **In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

No threatened woodland birds were recorded during surveys of the Project Areas. All species listed above are known to occur in the wider area and may at times utilise habitats within the Project Areas. Works will remove low-lying vegetation and cause small localised disturbance to ground habitat. These impacts will be

short-lived and natural regeneration will return habitat to a condition similar to that present prior to works commencing. Project Areas are located within large areas of suitable habitat for woodland birds. Therefore, the proposed works are not expected to impact on the life cycle of these species such that a viable population could be placed at risk of extinction.

(b) **in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,**

There are no endangered populations considered to have a potential of occurring within the Project Areas. Therefore, the action proposed is not likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

(c) **in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

(i) **is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**

(ii) **is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction**

This is not applicable for these species.

(d) **In relation to the habitat of a threatened species, population or ecological community:**

(i) **the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

Up to 5.65 ha of habitat suitable for woodland birds will be modified as part of the proposed works.

(ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

The area of habitat is not expected to become fragmented due to works as connectivity throughout the area will not be altered.

(iii) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality**

Limited habitat will be modified as part of works. Suitable habitat exists immediately adjacent to the Project Areas. Habitat to be modified is not considered important for the long term survival of the species in the locality.

(e) **Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Critical habitat for these threatened species does not occur within the Project Areas.

(f) **Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

No recovery plans are applicable to these species.

(g) **Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

Key threatening processes relevant to the proposal have been discussed in the body of the report.

Forest Owls

Powerful Owl (*Ninox strenua*)

Occupies wet and dry eucalypt forests and rainforests. It is most commonly recorded within red turpentine in tall open forests and black she-oak within open forests. Large mature trees with hollows at least 0.5 m deep are required for nesting. Tree hollows are particularly important for the Powerful Owl because a large proportion of the diet is made up of hollow-dependent arboreal marsupials. Nest trees for this species are usually emergent with a diameter at breast height of at least 100 cm.

Barking Owl (*Ninox connivens*)

This species is generally found in open forests, woodlands, swamp woodlands and dense scrub. Can also be found in the foothills and timber along watercourses in otherwise open country. Strongholds for the species include the Pilliga State Forest and Macquarie Marshes in NSW; though it is uncommonly encountered in a variety of habitats throughout the state.

Masked Owl (*Tyto novaehollandiae*)

Inhabits a diverse range of wooded habitat that provides tall or dense mature trees with hollows suitable for nesting and roosting. Mostly recorded in open forest and woodlands adjacent to cleared lands. Nests in hollows, in trunks and in near vertical spouts of large trees, usually living but sometimes dead. Nest hollows are usually located within dense forests or woodlands. Masked owls prey upon hollow-dependent arboreal marsupials, but terrestrial mammals make up the largest proportion of the diet.

Sooty Owl (*Tyto tenebricosa*)

Occurs in a variety of rainforest types as well as moist eucalypt forests. Roosts in heavy vegetation, hollows in large forest trees, and in caves and rock overhangs. Nests in very large tree hollows. Sooty owls prey predominantly on arboreal and hollow-dependent fauna including Common Ringtail Possums (*Pseudocheirus peregrinus*) and Sugar Gliders (*Petaurus breviceps*) but will also prey on terrestrial mammals including rats and bandicoots.

(a) **In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Owls were not encountered during surveys; however targeted surveys were not completed. These species rely on tree hollows for nesting. No mature or hollow-bearing trees will be removed as part of works; therefore, the proposed works are not expected to impact on the life cycle of these species such that a viable population could be placed at risk of extinction.

(b) **in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,**

There are no endangered populations considered to have a potential of occurring within the Project Areas. Therefore, the action proposed is not likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

(c) **in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

(i) is likely to have an adverse effect on the extent of the ecological community such that

its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

This is not applicable for these species.

(d) **In relation to the habitat of a threatened species, population or ecological community:**

(i) **the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

Up to 5.65 ha of habitat suitable for forest owls will be modified as part of the proposed works.

(ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

The area of habitat is not expected to become fragmented due to works as connectivity throughout the area will not be altered.

(iii) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality**

Small areas of habitat suitable for prey species will be modified as part of works. Habitat to be modified is not considered important for the long term survival of the species in the locality.

(e) **Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Critical habitat for these threatened species does not occur within the Project Areas.

(f) **Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

The approved *Recovery Plan for Large Forest Owls* (DEC 2006a), and draft recovery plan for the Barking Owl, is applicable for these species. The action will not be consistent with the objectives of this plans due to the removal of foraging habitat, however, the removal of a small amount of potential foraging habitat is not expected to impact the survival of these birds.

(g) **Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

Key threatening processes relevant to the proposal have been discussed in the body of the report.

Arboreal Mammals

Squirrel Glider (*Petaurus norfolcensis*)

The squirrel glider is found in mature and old growth box and box-ironbark woodlands; river red gum forest; and blackbutt-bloodwood forests. Mixed species stands with an *Acacia* midstorey are preferred. The squirrel glider requires areas with abundant tree hollows for refuge and nest sites.

Eastern Pygmy Possum (*Cercartetus nanus*)

Eastern Pygmy Possums have been recorded within the surrounding area. Open forests, shrub swamps, and dry heathlands throughout the Newnes Plateau offer suitable habitat for this species. Areas with a dense understorey of shrubs, particularly patches of dense *Banksia*, offer the best potential foraging resources

within the open forest habitats. The species shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird nests and Ringtail Possum dreys, and vegetation thickets.

(a) **In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Arboreal mammals were not encountered during surveys; however targeted surveys were not completed. The Squirrel Glider relies on tree hollows for refuge, and the Eastern Pygmy Possum utilises tree hollows as well as other refuge types. No mature or hollow-bearing trees will be removed as part of works; and vegetation clearing will be limited to low-lying vegetation and several immature trees. The small extent of disturbance is therefore unlikely to impact on the life cycle of these species such that a viable population could be placed at risk of extinction.

(b) **in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,**

There are no endangered populations considered to have a potential of occurring within the Project Areas. Therefore, the action proposed is not likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

(c) **in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

(i) **is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**

(ii) **is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction**

This is not applicable for these species.

(d) **In relation to the habitat of a threatened species, population or ecological community:**

(i) **the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

Up to 5.65 ha of habitat suitable for arboreal mammals will be modified as part of the proposed works.

(ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

The area of habitat is not expected to become fragmented due to works as connectivity throughout the area will not be altered.

(iii) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality**

Small areas of habitat suitable for foraging will be modified as part of works. Habitat to be modified is not considered important for the long term survival of the species in the locality.

(e) **Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Critical habitat for these threatened species does not occur within the Project Areas.

(f) **Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

No recovery plans are applicable for these species.

(g) **Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

Key threatening processes relevant to the proposal have been discussed in the body of the report.

Microbats

Large-eared Pied Bat (*Chalinolobus dwyeri*)

This species roosts in caves and crevices in cliffs, as well as old mine workings and disused nests of the Fairy Martin (*Petrocheildon ariel*). Forages beneath the canopy in well timbered areas containing gullies.

Little Pied Bat (*Chalinolobus picatus*)

This species is found in inland Queensland and NSW (including Western Plains and slopes) extending slightly into South Australia and Victoria. Occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress-pine forest, mallee, Bimbil box. Roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings.

Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)

This species roosts predominantly in tree hollows but also under loose tree bark; and prefers moist habitats with trees over 20 metres in height.

Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)

This species predominantly roosts in caves, but will also use derelict mines. Discrete populations are formed around maternity caves, with wide-ranging dispersal at other times of the year. The species forages in forested areas.

Eastern Freetail-bat (Mormopterus norfolkensis)

Most records are from dry eucalypt forests and woodlands to the east of the Great Dividing Range. Appears to roost in trees, but little is known of this species' habits.

Greater Broad-nosed Bat (*Scoteanax rueppellii*)

This species usually roosts in tree hollows, and utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Hunts along creek and river corridors.

(a) **In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

No microbat species were recorded during surveys; however targeted surveys were not completed. Several species with the potential to occur within the Project Areas utilise tree hollows for roosting. No mature or hollow-bearing trees will be removed as part of works; and vegetation clearing will be limited to low-lying

vegetation and several immature trees. The small extent of disturbance is therefore unlikely to impact on the life cycle of these species such that a viable population could be placed at risk of extinction.

(b) **in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,**

There are no endangered populations considered to have a potential of occurring within the Project Areas. Therefore, the action proposed is not likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

(c) **in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

This is not applicable for these species.

(d) **In relation to the habitat of a threatened species, population or ecological community:**

(i) **the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

Up to 5.65 ha of habitat suitable for threatened microbat species will be modified as part of the proposed works.

(ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

The area of habitat is not expected to become fragmented due to works as connectivity throughout the area will not be altered.

(iii) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality**

Small areas of habitat suitable for foraging will be modified as part of works. Habitat to be modified is not considered important for the long term survival of the species in the locality.

(e) **Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Critical habitat for these threatened species does not occur within the Project Areas.

(f) **Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

No recovery plans are applicable for these species.

(g) **Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

Key threatening processes relevant to the proposal have been discussed in the body of the report.

Endangered Ecological Communities

Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion

Newnes Plateau Shrub Swamps occur in narrow, elongated swamps formed in low-slope headwaters of the Newnes Plateau. This community is present within the Project Areas at Subsidence Monitoring Lines GGE and GGSW.

(a) **In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Not applicable for this EEC.

(b) **in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,**

Not applicable for this EEC.

(c) **in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

To avoid unnecessary damage to Carne West Swamp, Gang Gang Swamp South West, Gang Gang Swamp East or Sunnyside East Swamp, subsidence monitoring will not occur within these ecosystems that contain this EEC. The subsidence lines have been established to the edge of each shrub swamp and then resume on the opposite side of the respective shrub swamp. No stakes are to be installed within the EEC. Subsidence monitoring will occur twice a year involving two persons traversing through or around the swamp. Existing animal tracks will be used where possible, otherwise the swamp will be walked around. This frequency is not considered substantial enough to alter structural integrity of the swamp if they are being avoided.

The Project is therefore unlikely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

(d) **In relation to the habitat of a threatened species, population or ecological community:**

(i) **the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

Up to 0.05 ha of this EEC may be modified as part of the proposed works.

(ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

Works occurring within the Project Areas will not cause fragmentation or isolation as the EEC extends over large areas of the swamp at sites GGE and GGSW.

(iii) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality**

Areas of the Newnes Plateau Shrub Swamp EEC are considered very important to the ongoing survival of the EEC in the locality. As areas of this EEC are largely being avoided by the proposed works, they are not considered to cause impacts to the long-term survival of this EEC in the locality.

(e) **Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Critical habitat for this ecological community does not occur within the Project Areas.

(f) **Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

No recovery plans are applicable for this EEC.

(g) **Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

Key threatening processes relevant to the proposal have been discussed in the body of the report.

Appendix 3

EPBC Act Assessment of Significance

It has been determined that, based on habitats present, five nationally threatened flora species, seven nationally threatened fauna species and one EEC occur or have potential to occur within the Project Areas. These species/EEC are:

Threatened Flora

- *Boronia deanei* (Deane's Boronia), listed as Vulnerable.

Threatened Fauna

- *Chalinolobus dwyeri* (Large-eared Pied Bat), listed as Vulnerable;
- *Eulamprus leuraensis* (Blue Mountains Water Skink), listed as Endangered;
- *Heleioporus australiacus* (Giant Burrowing Frog), listed as Vulnerable;
- *Petauroides volans* (Greater Glider), listed as Vulnerable; and
- *Pseudomys novaehollandiae* (New Holland Mouse), listed as Vulnerable.

Endangered Ecological Communities

- Temperate Highland Peat Swamps on Sandstone

Assessments of Significance are provided in the following tables.

Significance Assessments for Vulnerable Flora Species

Significant Impacts	*Boronia deanei*
Lead to a long-term decrease in the size of an important population.	**Unlikely.** This species was observed within GGSW Project Area, however no individuals will be removed as part of works. Suitable habitat for the species exists in the surrounding area. Any impacts from the removal of habitat are not expected to lead to a long term decrease in the size of an important population.
Reduce the area of occupancy of the species.	**Unlikely.** This species was observed within GGSW Project Area, however no individuals will be removed. It is therefore unlikely that its area of occupancy within the Project Area will be reduced as a result of subsidence monitoring line installation and monitoring.
Fragment an existing important population into two or more populations.	**Unlikely.** No individuals will be removed as part of works. Habitat connectivity will be maintained. It is considered that the proposed works will not fragment any populations as a result of subsidence monitoring line installation and monitoring.
Adversely affect habitat critical to the survival of a species.	**No.** Critical habitat has not been declared for this species. The expected clearing impacts involved a part of works will not affect critical habitat for this species.
Disrupt the breeding cycle of a population.	**Unlikely.** No individuals will be removed from Project Area GGSW, therefore this species will retain the ability to breed. Proposed works will not result in the disruption of the breeding cycle of a population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	**Unlikely.** Small areas of vegetation are to be trimmed/removed during works. The majority of suitable habitat will remain intact and connectivity to surrounding habitat will be maintained. Therefore, habitat disturbance is not expected to cause the species to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely.** Adequate measures to prohibit the transport of invasive species, and minimal habitat disturbance of the Project Areas make it unlikely that works will lead to an increase in invasive species.
Introduce disease that may cause the species to decline.	**Unlikely.** Suitable control measures prohibiting the transport of diseases into the Project Areas make it unlikely that works will lead to and introduced disease to the area.
Interfere substantially with the recovery of the species.	**Unlikely.** This species was recorded within the GGSW Project Area. Small-scale disturbance as part of works is not expected to interfere with the recovery of the species.

Significance Assessments for Vulnerable Fauna Species

Significant Impacts	*Chalinolobus dwyeri*	*Heleioporus australiacus*	*Petauroides volans*	*Pseudomys novaehollandiae*
Lead to a long-term decrease in the size of an important population.	**Unlikely.** This species was not recorded within the Project Areas. Potential habitat will not be removed as part of works. It is not expected that works will lead to a long-term decrease in the size of an important population.	**Unlikely.** This species was not recorded within the Project Areas. Small areas of potential habitat will be modified as part of works, however it is not expected that works will lead to a long-term decrease in the size of an important population.	**Unlikely.** This species was not recorded within the Project Areas. Potential habitat will not be removed as part of works. It is not expected that works will lead to a long-term decrease in the size of an important population.	**Unlikely.** This species was not recorded within the Project Areas. Small areas of potential habitat will be modified as part of works, however it is not expected that works will lead to a long-term decrease in the size of an important population.
Reduce the area of occupancy of the species.	**Unlikely.** Suitable roosting habitat does not exist within the Project Areas. Potential foraging habitat will not be impacted as part of works. Therefore, the project will not reduce the area of occupancy of the species.	**Unlikely.** Small areas of potential habitat will be disturbed/ modified as part of works. This is not considered likely to reduce the area of occupancy of the species.	**Unlikely.** Potential habitat will not be impacted as part of works. Therefore, the project will not reduce the area of occupancy of the species.	**Unlikely.** Small areas of potential habitat will be disturbed/ modified as part of works. This is not considered likely to reduce the area of occupancy of the species.
Fragment an existing important population into two or more populations.	**Unlikely.** The scale of works will not fragment an existing population into two or more populations.	**Unlikely.** The scale of works will not fragment an existing population into two or more populations.	**Unlikely.** The scale of works will not fragment an existing population into two or more populations.	**Unlikely.** The scale of works will not fragment an existing population into two or more populations.
Adversely affect habitat critical to the survival of a species.	**No.** Critical habitat has not been declared for this species. Works will not affect critical habitat for this species.	**No.** Critical habitat has not been declared for this species. Works will not affect critical habitat for this species.	**No.** Critical habitat has not been declared for this species. Works will not affect critical habitat for this species.	**No.** Critical habitat has not been declared for this species. Works will not affect critical habitat for this species.
Disrupt the breeding cycle of a population.	**Unlikely.** Maternity roost sites for this species do not occur within Project Areas. Foraging habitat will not be impacted by works. It is unlikely that works will disrupt the breeding cycle of a population.	**Unlikely.** Proposed works will cause limited habitat disturbance. Suitable breeding habitat exists throughout the locality. It is therefore unlikely that works will disrupt the breeding cycle of a population.	**Unlikely.** Hollow-bearing trees as well as foraging habitat will not be impacted as part of works. Suitable breeding habitat exists throughout the locality. It is therefore unlikely that works will disrupt the breeding cycle of a population.	**Unlikely.** Proposed works will cause limited habitat disturbance. Suitable breeding habitat exists throughout the locality. It is therefore unlikely that works will disrupt the breeding cycle of a population.

Significant Impacts	*Chalinolobus dwyeri*	*Heleioporus australiacus*	*Petauroides volans*	*Pseudomys novaehollandiae*
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	**Unlikely.** Proposed works will cause limited disturbance to ground and understorey habitats. It is unlikely that these works will cause the species to decline.	**Unlikely.** Proposed works will cause limited disturbance to ground and understorey habitats. It is unlikely that these works will cause the species to decline.	**Unlikely.** Proposed works will cause limited disturbance to ground and understorey habitats. It is unlikely that these works will cause the species to decline.	**Unlikely.** Proposed works will cause limited disturbance to ground and understorey habitats. It is unlikely that these works will cause the species to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely.** Adequate measures to prohibit the transport of invasive species, and minimal habitat disturbance of the Project Areas make it unlikely that works will lead to an increase in invasive species.	**Unlikely.** Adequate measures to prohibit the transport of invasive species, and minimal habitat disturbance of the Project Areas make it unlikely that works will lead to an increase in invasive species.	**Unlikely.** Adequate measures to prohibit the transport of invasive species, and minimal habitat disturbance of the Project Areas make it unlikely that works will lead to an increase in invasive species.	**Unlikely.** Adequate measures to prohibit the transport of invasive species, and minimal habitat disturbance of the Project Areas make it unlikely that works will lead to an increase in invasive species.
Introduce disease that may cause the species to decline.	**Unlikely.** Suitable control measures prohibiting the transport of diseases into the Project Areas make it unlikely that works will lead to and introduced disease to the area.	**Unlikely.** Suitable control measures prohibiting the transport of diseases into the Project Areas make it unlikely that works will lead to and introduced disease to the area.	**Unlikely.** Suitable control measures prohibiting the transport of diseases into the Project Areas make it unlikely that works will lead to and introduced disease to the area.	**Unlikely.** Suitable control measures prohibiting the transport of diseases into the Project Areas make it unlikely that works will lead to and introduced disease to the area.
Interfere substantially with the recovery of the species.	**Unlikely.** The species was not recorded within the Project Areas. The small scale of vegetation removal and disturbance is not expected to interfere with the recovery of the species.	**Unlikely.** The species was not recorded within the Project Areas. The small scale of vegetation removal and disturbance is not expected to interfere with the recovery of the species.	**Unlikely.** The species was not recorded within the Project Areas. The small scale of vegetation removal and disturbance is not expected to interfere with the recovery of the species.	**Unlikely.** The species was not recorded within the Project Areas. The small scale of vegetation removal and disturbance is not expected to interfere with the recovery of the species.

Assessment of Significance for Endangered Fauna Species

Significant Impacts	*Blue Mountains Water Skink (Eulamprus leuraensis)*
Lead to a long-term decrease in the size of a population.	**Unlikely.** This species has been previously recorded in swamps proposed to be intersected by Subsidence Monitoring lines GGE and GGSW. Due to the small scale of disturbance, and likely habitat regeneration following installation works, it is unlikely that the species will lose habitat as part of proposed works. Therefore, no long-term decrease in population size will occur.
Reduce the area of occupancy of the species.	**Unlikely**. Installation of subsidence monitoring lines at sites GGE and GGSW will require minor disturbance to the species' habitat. It is unlikely that these works will reduce the area of occupancy of the species.
Fragment an existing important population into two or more populations.	**Unlikely**. Minor habitat disturbance as part of works at sites GGE and GGSW will not lead to the creation of barriers to movement of the species. It is therefore unlikely that any populations will be fragmented as a result of proposed works.
Adversely affect habitat critical to the survival of a species.	**Unlikely**. Critical habitat has not been identified for this species. It is unlikely that proposed works will affect habitat critical to the species.
Disrupt the breeding cycle of a population.	**Unlikely**. Breeding is likely to occur in swamps to be intersected by subsidence monitoring lines GGE and GGSW; however, the level of disturbance to these swamps during proposed works is unlikely to disrupt the breeding cycle of local populations.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	**Unlikely**. Suitable habitat is present throughout swamps to be intersected by subsidence monitoring lines GGE and GGSW; however the level of disturbance to these habitats during proposed works is unlikely to remove or modify habitat to an extent as to cause the species to decline.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat.	**Unlikely**. It is unlikely that the affected area will experience an increase in invasive species due to proposed works.
Introduce disease that may cause the species to decline.	**Unlikely**. There are no diseases which have been associated with the decline of this species. As a consequence the proposed works are not expected to introduce any diseases that may cause this species to decline.
Interfere with the recovery of the species.	**Unlikely.** Large areas of equal quality habitat are available for this species within the surrounding area. It is therefore considered unlikely that the proposed works will substantially interfere with the recovery of the species.

Assessment of Significance for Endangered Ecological Communities

Significant Impacts	Temperate Highland Peat Swamps on Sandstone (THPSS)
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines.	**Unlikely.** To avoid unnecessary damage to Carne West Swamp, Gang Gang Swamp South West, Gang Gang Swamp East or Sunnyside East Swamp, subsidence monitoring will not occur within these ecosystems that contain this EEC. The subsidence lines have been established to the edge of each shrub swamp and then resume on the opposite side of the respective shrub swamp. No stakes are to be installed within the EEC. Subsidence monitoring will occur twice a year involving two persons traversing through or around the swamp. Existing animal tracks will be used where possible, otherwise the swamp will be walked around. It is therefore unlikely that proposed works will fragment, or increase fragmentation of, the community.
Adversely affect habitat critical to the survival of an ecological community.	**Unlikely**. Areas of this EEC are largely being avoided. It is unlikely that the proposed works will adversely affect habitat critical to the survival of the ecological community.
Modify or destroy abiotic (non-living) factors (such as water, nutrients or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.	**Unlikely**. Areas of this EEC are largely being avoided. The proposed works are unlikely to modify or destroy abiotic factors necessary to the community's survival.
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting.	**Unlikely**. Areas of this EEC are largely being avoided. Therefore, it is unlikely to cause a substantial change in the species composition of the ecological community; or cause the decline or loss of functionally important species.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: 1. Assisting invasive species, that are harmful to the listed ecological community, to become established, or 2. Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or 3. Interfere with the recovery of the ecological community.	**Unlikely**. Proposed works will follow guidelines to avoid the spread of invasive species into the ecological community. Fertilisers, herbicides and other chemicals are not associated with the proposed works; and works are not expected to interfere with the recovery of the ecological community.