Springvale Water Treatment Project

State Significant Development 7592
Environmental Impact Statement

Volume 2 Part 2 - Appendices C to D

September 2016

EnergyAustralia

Centennial Coal

Appendix C Biodiversity

Biodiversity Assessment Report

Springvale Water Treatment Project

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Document Status

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Approval for Issue

Name	Signature	Date
Arne Bishop		28 July 2016

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Summary

RPS Australia East Pty Ltd (RPS) has been engaged by Springvale Coal Pty Limited (Springvale Coal) to undertake a biodiversity impact assessment for the proposed Springvale Water Treatment Project (the Project), a State Significant Development (SSD). The Biodiversity Assessment Report (BAR) (this report) has the purpose of forming part of the Environmental Impact Statement (EIS) for the Project.

The Project and Project Application Area

The Project aims to improve water quality in the upper Coxs River catchment through the transfer of water from existing underground mine dewatering facilities for reuse at the Mount Piper Power Station (MPPS) cooling towers as a first priority, rather than discharge into the upper catchment of the Coxs River. Discharge of treated mine water will only occur when MPPS is not operating at full capacity.

The Project Application area comprises a number of infrastructure elements primarily including a 10 m wide linear pipeline corridor extending between the existing Gravity Tank on Newnes Plateau and the Water Treatment Plant location within the MPPS site. Other infrastructure includes the existing Gravity Tank site compound, the water treatment plant location at MPPS and a network of pipelines from the water treatment plant to the Springvale Coal Services Site and the cooling towers at MPPS.

A northern and southern pipeline alignment has been investigated on the Newnes Plateau. In this report the northern pipeline alignment is referred to as the Northern Study Area while the southern pipeline alignment is referred to as the Southern Study Area. Only one of these alignments will be selected when constructing the Project.

Impact Analysis

This BAR has been prepared with reference to the NSW BioBanking Assessment Methodology 2014 (BBAM 2014) as part of the *Framework for Biodiversity Assessment – NSW Biodiversity Offsets Policy for Major Projects* (FBA) (OEH 2014a). The FBA provides a dual assessment process for the development's impact and evaluation of suitable biodiversity offset options within a three stage investigation as listed below:

- **Stage 1** – Biodiversity Assessment;
- **Stage 2** – Impact Assessment (Biodiversity Values); and
- **Stage 3** – Biodiversity Offset Package.

This BAR includes the credit calculations that define the offset requirement for the Project site (Stages 1 & 2). The Stage 3 assessment represents the calculation for the offset package and has been compiled from offset lands described in Centennial Coal's Western Region Biodiversity Offset Package (Centennial Coal 2016).

Impact Minimisation

Impact avoidance opportunities are proposed to reduce the loss of biodiversity values within the Study Area (i.e. use of existing disturbed lands and pre-clearance surveys to avoid threatened plant and hollow-bearing trees). Impact minimisation and mitigation measures are also recommended to further minimise the potential flora and fauna impacts of the clearing, construction and operation of the proposal.

The Southern Study Area has an estimated 3.60 ha of additional clearing compared to the Northern Study Area. Consequently, the Ecosystem Credit requirements for the Southern Study Area are greater (i.e. additional 157 ecosystem credits). Conversely, the Northern Study Area requires a slightly higher number of

Species credits to be retired due to the larger area of potential habitat for the Large-eared Pied Bat. Overall, it is considered that the Northern Study Area would result in a lower biodiversity impact compared to the Southern Study Area. Consequently, the Northern Study Area has been selected as the preferred route and Southern Study Area is not discussed any further in the following Biodiversity Offset Package (BOP).

Biodiversity Offset Package

The Project fits within the Western Region Biodiversity Offset Package (WRBOP) (Centennial Coal 2016 *in prep.*) and has been relied on in the compilation of the BOP for this Project. The WRBOP comprises a number of Centennial owned/ controlled sites identified in the Strategic Lands Assessment (Centennial 2012) as suitable for biodiversity offsetting purposes. The WRBOP includes offset lands, land management initiatives and rehabilitation as part of a holistic approach to conservation and enhancement of biodiversity values within the greater Lithgow area (Centennial Coal 2016 *in prep.*). The following sections outline how the WRBOP (Centennial Coal 2016 *in prep.*) was used to address the offsetting requirements for this Project.

Ecosystem Credits

Section 10.5.4.1 of the FBA allows for a variation to ecosystem credit trading as specified in Section 10.5.3 (i.e. like for like plant community types (PCTs)). A comparison between the Projects' offsetting requirements and WRBOP ecosystem credit availability at a vegetation formation level is provided in **Table 1** to investigate the alternative trading arrangements available under the FBA. Negative balances are presented in (brackets).

Table 1 Net Balance: Formation 'Like for Like' Ecosystem Credit

Formation	WRBOP Credits[1]	Project Application Area (Northern Study Area)	
		Required Credits	WRBOP Net Balance
Grassy Woodlands[2]	3,518	22	3,496
Dry Sclerophyll Forests (Shrubby subformation)	2,267	984	1,283
Wet Sclerophyll Forests (Shrubby subformation)	(953)	58	(1,011)
Freshwater Wetlands	10	9	1
Total	**4,852**	**1,082**	**3,770**

Using FBA variation rule Section 10.5.4.2(a), the WRBOP would satisfy the ecosystem credit demand for all PCTs impacted by the Project with the exception of HN558 Narrow-leaved Peppermint - Mountain Gum - Brown Barrel moist open forest on high altitude ranges, northern South Eastern Highlands Bioregion (i.e. offsetting at a vegetation formation level). As HN558 is not listed as a threatened ecological community under the EPBC Act, it is possible to consider the application of FBA variation rule Section 10.5.4.2(b) to address this shortfall. Pending consideration of this offsetting approach by the OEH, it is considered that the Project can satisfy its biodiversity offsetting requirements in a manner compliant with the FBA.

[1] Current ecosystem credit ledger that has taken into account commitments for other projects included in the WRBOP
[2] Includes PCTs listed and Endangered or Critically Endangered Ecological Communities and are thus suitable for offset trading considerations under Section 10.5.4.2(b) of the FBA

Species Credits

The WRBOP is deficient in the provision of 'like for like' species credits for all three species credit species. However, section 10.5.7.1 of the FBA allows for a variation to species credit trading as specified in Section 10.5.6 (i.e. 'like for like' species credits). A comparison between the Projects offsetting requirements and WRBOP species credit availability at a life-form (flora) or 'order' (fauna) level, as permitted under Section 10.5.7.3(b) of the FBA, is provided in **Table 2** to investigate the alternative trading arrangements available under the FBA.

Table 2 Potential Offset Site Suitability: 'Like for Like' Threatened Species

Impact Species	WRBOP Alternative species[3]	WRBOP	Project Application Area (Northern Study Area)	
			Required Credits	WRBOP Net Balance
Eucalyptus cannonii (Capertee Stringybark)	*Eucalyptus aggregata* (Black Gum)	2,436	39	2,397
Caesia parviflora var. *minor* (Pale Grass-lily)	No Schedule 1 or 1A species available as alternative	0	42[4]	(42)
Large-eared Pied Bat (*Chalinolobus dwyeri*)	Large-eared Pied Bat (*Chalinolobus dwyeri*)	(1,015)	9	(1,024)
Total		**4,322**	**90**	**1,331**

The WRBOP would satisfy, at a life-form or 'order' level, the Projects' species credit demand for one of the three species impacted (i.e. use of variation rule specified under Section 10.5.7.3(b) of the FBA). Variation rules cannot be applied to the Large-eared Pied Bat (*Chalinolobus dwyeri*), as this species is listed on the EPBC Act (exclusion identified under Section 10.5.7.2(b)). The WRBOP would be in deficit for this species.

However, alternative offsetting arrangements exist for *Caesia parviflora* var. *minor* (Pale Grass-lily) despite the unavailability of a 'like for like' or suitable variation option under Section 10.5.7.3(b) of the FBA). Additional species credit trading options would need to be incorporated into the WRBOP to satisfy a variation under Section 10.5.7.3(b) (i.e. find an offset site containing an endangered or critically endangered flora species listed under the TSC Act) or consider options for supplementary measures for species credits under Section 10.5.7.5. The most suitable offsetting approach would be determined following the consideration of impact avoidance options available at the detailed design and/ or construction stage (i.e. use of pre-clearance surveys to achieve impact avoidance outcomes).

[3] Plant species identified as being potentially suitable for offsetting under FBA variation rule Section 10.5.7.3(b)
[4] Assumed impact. Liability may be reduced following implementation of impact avoidance during detailed design/ construction stages (i.e. pre-clearance surveys).

Stage 1 – Biodiversity Assessment

1.0 Introduction

RPS Australia East Pty Ltd (RPS) has been engaged by Springvale Coal Pty Limited (Springvale Coal) to undertake a biodiversity impact assessment for the Springvale Water Treatment Project (hereafter referred to as the 'Project'). The Project has the aim of improving environmental outcomes and water quality in the upper Coxs River catchment through the transfer of water from existing underground mine dewatering facilities for reuse at the Mount Piper Power Station (MPPS) rather than discharging into the catchment. Discharges of treated water will only occur when MPPS is not operating at full capacity.

This Biodiversity Assessment Report (BAR) has been prepared with reference to the NSW BioBanking Assessment Methodology (BBAM) as part of the *Framework for Biodiversity Assessment – NSW Biodiversity Offsets Policy for Major Projects* (FBA) (OEH 2014a). The FBA provides a dual assessment process for the developments impact and evaluation of suitable biodiversity offset options within a three stage investigation as listed below:

- Stage 1 – Biodiversity Assessment;
- Stage 2 – Impact Assessment (Biodiversity Values); and
- Stage 3 – Biodiversity Offset Package.

The FBA requires offset sites to be selected, surveyed, calculated and reported on (Stage 3). However, the Stage 3 assessment is dependent on the results of the Stage 1 & 2 results. At this point in time, this BAR only includes the calculations for the credits required for the development site (Stages 1 & 2). Given this, the Stage 3 assessment will be conducted following consultation with Springvale Coal with regard to results herewith and the identification of the proposed offset package.

A Biodiversity Inventory and EPBC Act Assessment Report is appended (Appendix 1) to supplement the BAR. This report contains a detailed description of the biodiversity values within the Study Area and methods used to define the values. An assessment of Matters of National Environmental Significance (MNES) is also included together with assessments for other matters not assessed under the FBA (e.g. State Environmental Planning Policies (SEPPs)).

The linear based BioBanking Major Project development module, which was launched on 15 July 2015, was used to assess the development impacts presented herewith.

1.1 Project Description

Springvale and Angus Place Collieries operate a water management scheme, referred to as the Springvale Delta Water Transfer Scheme (SDWTS), for the management of safe water levels in the underground workings at both mines. The SDWTS incorporates a network of pipelines connecting the dewatering bore facilities on the Newnes Plateau to Springvale Mine's licensed discharge points (LDP) (i.e. LDP009 and LDP010), where the mine water is currently discharged into Coxs River via the Swayers Swamp Creek.

EnergyAustralia owns and operates the MPPS, about eight kilometres west of the Springvale Mine pit top. MPPS has a high demand for make-up water for use in the cooling tower system. Water is currently drawn from the Coxs River and Fish River water supply schemes. MPPS operates as a zero discharge site with no release of water or by-products (eg. brine) from the cooling tower system to receiving waters. MPPS has an existing brine management system for the treatment and disposal of brine on site.

The Project involves establishing a pipeline and ancillary facilities to transfer water from existing dewatering facilities on the Newnes Plateau for treatment and reuse at MPPS. An overview of the Project is shown on **Figure 1** and includes the following major elements:

- A system to transfer up to 36 ML/day of dewatered mine water from the existing gravity tank forming part of Springvale Mine's approved dewatering facilities on the Newnes Plateau, to a new water treatment plant at the MPPS site;
- A new water treatment plant incorporating desalination processes to reduce the salinity of mine water to a standard suitable for either industrial reuse or environmental release;
- Transfer of treated water from the water treatment plant to the MPPS cooling tower to contribute to the demand for make-up water;
- Transfer of any excess treated water to the Springvale Coal Services site (Western Coal Services Project, SSD 5579) for direct environmental release to Wangcol Creek;
- Transfer of the saline brine stream from the water treatment plant to the MPPS cooling tower blowdown system for integration with existing treatment and brine disposal practices;
- Installation of a crystalliser to provide further treatment of the additional salt load generated within the MPPS cooling tower blowdown system; and
- A truck turning bay and pipeline storage area along the southern alignment only.

Two Project alignments are assessed separately in this report; a northern alignment (Northern Study Area) and a southern alignment (Southern Study Area). Collectively the Northern Study Area and the Southern Study Area are hereafter termed the Study Area. One alignment will ultimately be selected for final placement of the pipeline. Biodiversity investigations have been performed within the Study Area to determine the alignment with the least impact.

1.2 The Study Area

The location and extent of the Study Area is shown in **Figure 1**. The Study Area has an area of approximately 98 ha comprising two pipeline corridors of 20 m width, which are separately referred to as the:

- Northern Study Area; and
- Southern Study Area.

Survey effort, desktop analysis and results have been considered for the entire Study Area, whilst the disturbance or impact footprint is referred to when considering the Project's direct impacts. The preferred route, termed the Project Application Area, is described in Stage 3 of this report following a detailed consideration of the impacts within the Northern Study Area and Southern Study Area

1.3 Potential Disturbance Footprint

For the purposes of this assessment the impact area or disturbance footprint is defined by the extent of native vegetation removal within the preferred route. Native vegetation removal will be restricted to a 10 m wide corridor along the preferred route within which all construction works associated with pipeline installation are to be contained. Two potential disturbance footprints, these being the Northern and Southern Study Areas, have been mapped and are calculated below:

- Northern Study Area (~27.84 ha of native vegetation cover); and
- Southern Study Area (~31.44 ha of native vegetation cover).

1.4 Site Particulars

Locality The pipeline extends from the Gravity Tank on the Newnes Plateau westwards to the Mount Piper Power Station in the Lithgow Local Government Area. The water treatment plant will be located at the MPPS site.

Boundaries

The western portion of the Study Area is surrounded by industrial and agricultural lands accommodating infrastructure, cleared lands and road networks. The Newnes State Forest occurs to the eastern end of the Study Area and bounds the north, east and the southeast of the Study Area (see **Figure 1**).

Current Land Use

Part of the Study Area (the eastern portion) is contained within Newnes State Forest which is managed by Forestry Corporation of NSW. Other areas of the Study Area are situated within Centennial owned lands, private lands and EnergyAustralia lands with uses such as mining, forestry, pastoral farming and energy resources.

Topography

The landscape in this region ranges from flat to gently inclined rises on broad (>300 m) valley floors away from drainage lines. The local relief is <25 m with a slope gradient typically <10% (King 1993). The main drainage line intersecting the Study Area is the Coxs River; a sixth order stream. The Wangcol Creek tributary extends to the north of the western portion of the Study Area, orientated on an approximate east-west axis. Several small tributaries of the Wangcol Creek extend into the Study Area.

Geology and Soils

The Study Area extends from Mount Piper Power Station near Wallerawang in the west to the Newnes Plateau in the east in the Blue Mountains. The Newnes Plateau surface is gently to moderately inclined covered by friable Narrabeen Group sandstones and pagoda rock formations on the plateau margins. Vertical sandstone cliffs descend from the edge of the plateau in the eastern part of the Study Area. The western part of the Study Area is characterised by gently undulating to rolling hills on the Permian and Devonian sedimentary sequences and minor Carboniferous granites (King 1993: 2-3). Much of the Study Area are in disturbed terrain.

The geology for the Study Area is primarily an undifferentiated mix of sandstone, shale and tuff, formed on the Narrabeen Group, laid down in the Triassic period. This is bounded by nearby deposits of the Illawarra Coal Measures (Pi) laid down in the Permian period, comprising shale, sandstone, conglomerate and chert, with coal and seams of torbanite and a quaternary alluvium of gravel, sand, silt and clay, found mainly along watercourses (Bryan, 1966).

Vegetation

Vegetation within the Study Area is dominated by three distinct vegetation types; dense low swamp shrubby vegetation along the drainage lines; eucalypt forest and woodland vegetation on the slopes and flats; and ridges and dry rocky heath along cliffs and ridgetops.

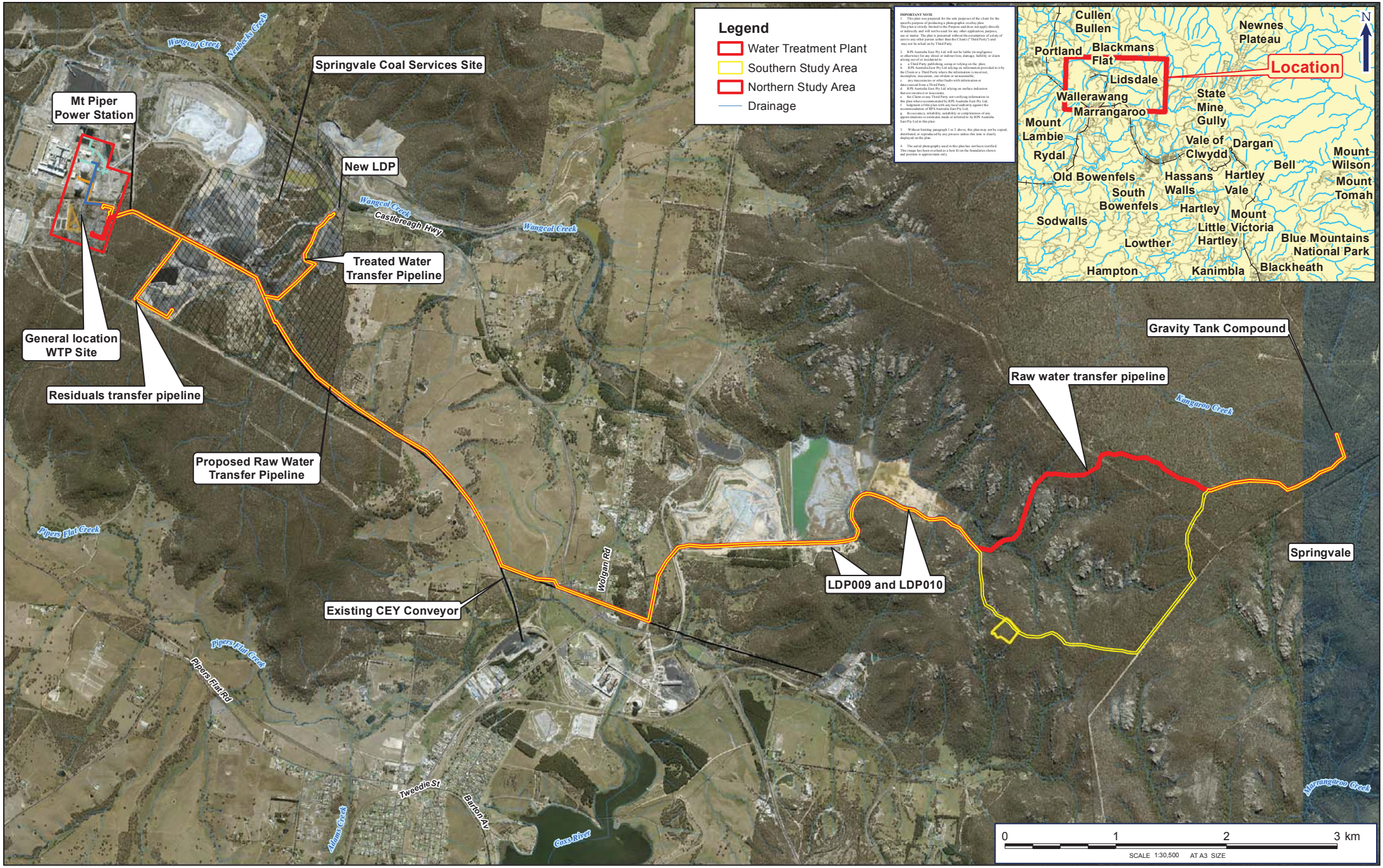
1.5 Background Information

A review of relevant information was performed to identify the biodiversity values occurring or potentially occurring within the Study Area (**Appendix 1**). This included previous ecological reports, vegetation maps, topographic maps, aerial photography and general scientific literature reviews. Of particular relevance were a number of previous RPS assessments, some of which contain unpublished data (RPS 2011, RPS 2012, RPS 2014a and RPS 2014b).

RPS has utilised the information from previous RPS assessments noted above as a baseline, and undertaken a suite of ecological survey work across the Study Area in order to update the dataset, and to

assess significant habitat features of the Study Area and their potential to support threatened species, populations, endangered ecological communities (EECs) and their habitats.

Additional targeted fieldwork has also been undertaken in accordance with the FBA methodology to assess impacts and to inform biodiversity offsets considerations for the Project.



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TITLE : **FIGURE 1: STUDY AREA**	LOCATION : **SPRINGVALE**	DATUM:GDA 1994 PROJECTION: GDA 1994 MGA Zone 56	DATE : **17/08/2016** PURPOSE: **BAR**	VERSION (PLAN BY): C A3 (Natalie.Wood) PATH: J:\JOBS\Centennial\All Jobs\131758 JV Energy Australia Springvale\10 - Drafting\Arcgis Map Documents\Eco\BioBanking Figures\131758 Figure 1 Location BAR C A3 20160812.mxd

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2.0 Biodiversity Assessment

The biodiversity values of the Study Area have been quantified in accordance with the BioBanking Assessment Methodology 2014 (BBAM 2014) using the linear assessment module. Supplementary information used to perform this assessment is provided in Appendix 1 (Biodiversity Inventory Report).

2.1 Identified Landscape Features

The Study Area is situated within the:

- Sydney Basin Interim Biogeographic Regionalisation for Australia (IBRA) Bioregion, the Capertee and Wollemi IBRA Subregions;
- Newnes Plateau and the Capertee Plateau Mitchell Landscape; and
- Hawkesbury/Nepean Catchment Management Area (CMA).

Landscape features identified within the Study Area and surrounding assessment buffers are shown in **Figure 2** and **Figure 3**.

2.2 Determining Landscape Value

The Landscape Value of the Study Area is scored based on several variables including:

- Percentage Native Vegetation Cover;
- Connectivity Values; and
- Patch Size.

2.2.1 Percentage Native Vegetation Cover

Geographic Information System (GIS) was used to calculate the current and future percentage of native vegetation cover. A buffer of 550 m width compliant with the linear assessment module of the BBAM 2014 was created either side of the Study Area centreline for this purpose (see **Figure 2** and **Figure 3**). Percentage native vegetation cover within the 550 m buffer was estimated in increments of 5% using GIS for 'Before' and 'After' the development scenario as shown in **Table 3**.

Table 3 Percent Native Vegetation Cover Assessment

Study Area	Before Development	After Development
Northern Study Area	51-56%	51-56%
Southern Study Area	56-60%	56-60%

2.2.2 Connectivity Value

Step 1:

A desktop Connectivity Condition assessment was undertaken by assessing the average condition of native vegetation across the Study Areas 'Primary' linkages to adjoining vegetation. Primary linkages are defined as native vegetation that:

- Is in moderate to good condition;
- Has a patch size > 1 hectare in area;
- Is separated by a distance of <100 metres; and

- Is not separated by a dual carriageway or wider highway or similar hostile link.

Parts of the Study Area are part of a connecting link of native vegetation.

Step 2:

The Study Area intersects a 'State Significant Biodiversity Link' which is a riparian buffer of a 6th order stream (i.e. Coxs River).

2.2.3 Patch Size

To assess the Patch Size, the assessment must:

- Determine the percent native vegetation cleared in the Mitchell Landscape in which most of the development occurs. In this case the majority of the Southern and the Northern Study Areas occur in the Capertee Plateau Mitchell Landscape. The Capertee Plateau Mitchell Landscape is currently 59% cleared; and
- Determine the Patch size class, which in this instance is 'extra large'.

Based on the above, the 'Patch Size Score' for both the Southern and Northern Study Areas were calculated to be 12.5.

2.2.4 Area to Perimeter Ratio

GIS was used to calculate the area (m^2) and perimeter (m) of each separate patch >1 ha within the 550 m buffer zone that will be impacted by development. The total area to perimeter ratios before and after development were calculated and shown in **Table 4**.

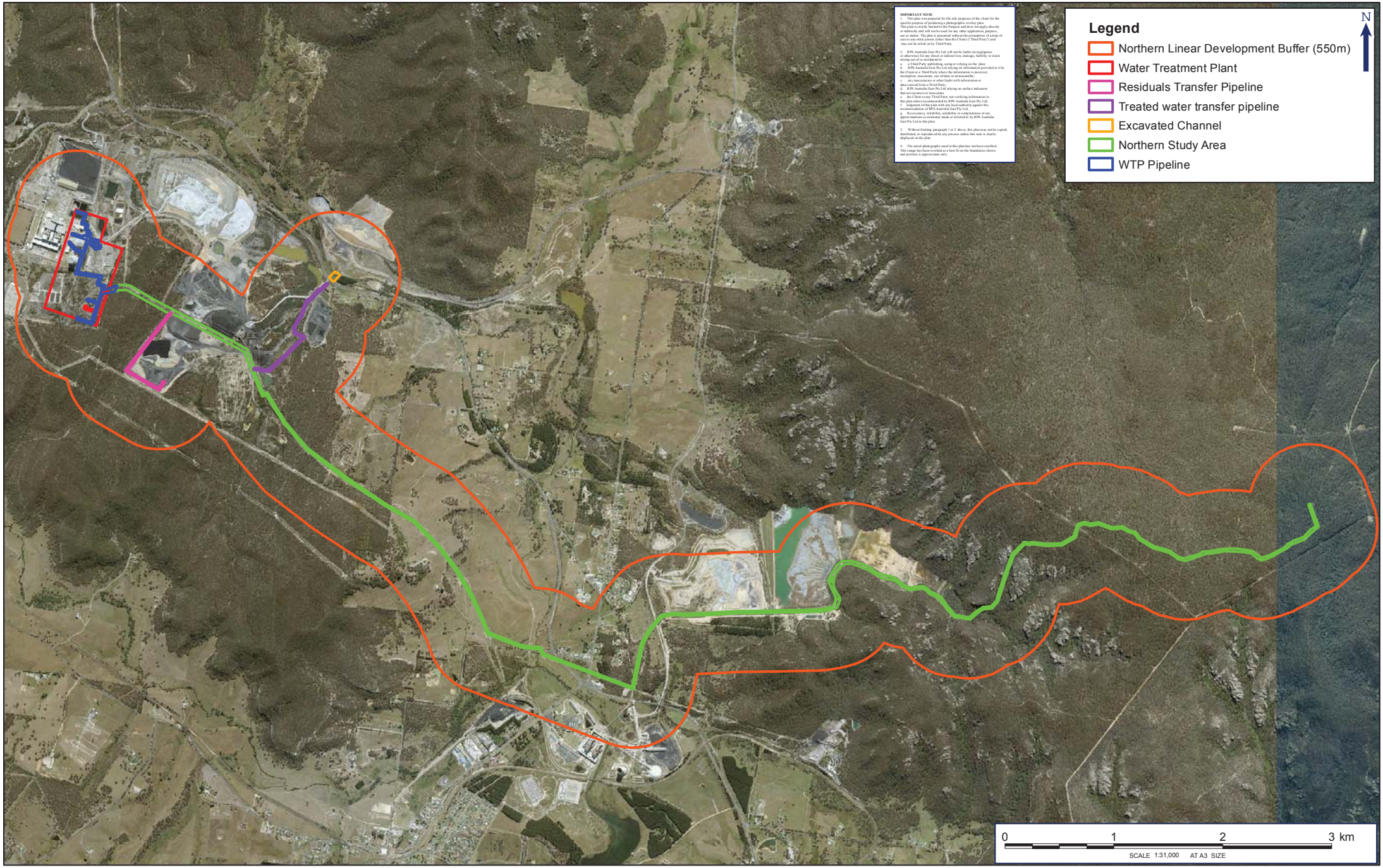
Table 4 Area to Perimeter Assessment

Study Area	Before Development	After Development
Northern Study Area	96	88
Southern Study Area	104	104

Proportional change in 'area to perimeter ratio' for the Northern and Southern Study Areas did not cross any specified BBAM 2014 thresholds. As such, both the Northern and Southern Study Area scored a 0 for the "Area to Perimeter" measure.

2.2.5 Landscape Score

Data for 'Percentage Native Vegetation Cover', 'Connectivity' and 'Patch Size' was combined to calculate a Landscape Score of 25 for the Northern Study Area. The same calculation procedure for the Southern Study Area resulted in a Landscape Score of 26. Marginal differences in the calculated Landscape Score exist between the Northern and Southern Study Areas.



TITLE : **FIGURE 2: NORTHERN LINEAR DEVELOPMENT BUFFER (550M)**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **17/08/2016**

PURPOSE: **BAR**

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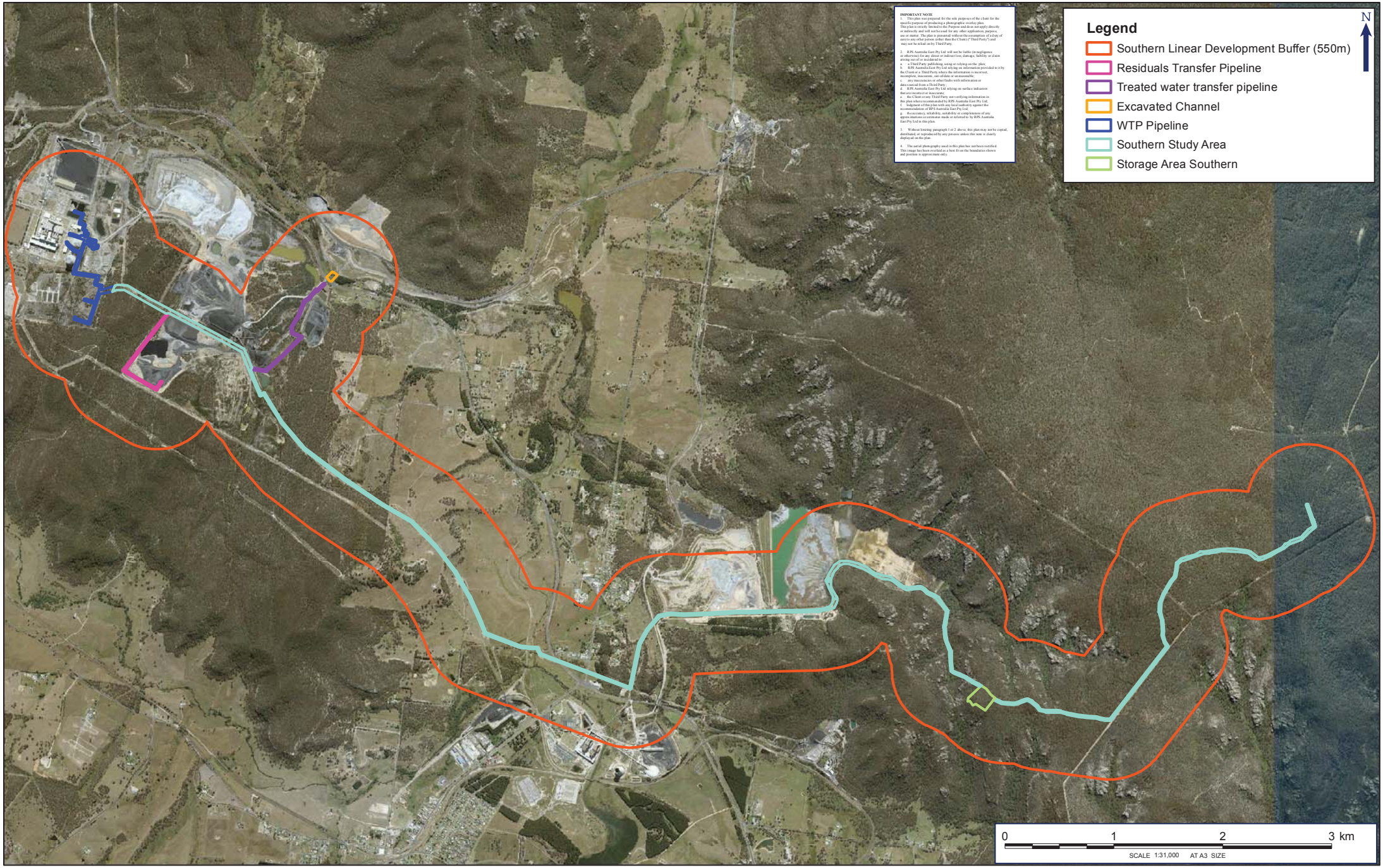

TITLE : **FIGURE 3: SOUTHERN LINEAR DEVELOPMENT BUFFER (550M)**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

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2.3 Assessing Native Vegetation

2.3.1 Native Vegetation Cover

Vegetation communities as mapped by DEC (2006) were reclassified using 'best fit' Plant Community Type (PCT) listed in the PCT Database (OEH 2016a) to describe vegetation zones. Parameters used to select the 'best fit' PCT included overstorey and understorey floristics, soil landscape, location and topographic position. **Table 5** lists the RPS mapped vegetation communities) within the Study Area, as adapted from DEC (2006), and corresponding best fit PCTs. Threatened Ecological Community (TEC) equivalents are also provided.

Table 5 Regional Vegetation Types and PCT Equivalent

Vegetation Community (DEC 2006)	PCT	TEC
MU 7 Newnes Plateau Narrow-leaved Peppermint - Mountain Gum - Brown Stringybark Layered Forest	HN558 Narrow-leaved Peppermint - Mountain Gum - Brown Barrel moist open forest on high altitude ranges, northern South Eastern Highlands	-
MU 8 Newnes Sheltered Peppermint – Brown Barrel Shrubby Forest	HN599 Sydney Peppermint - Narrow-leaved Peppermint shrubby open forest on sheltered slopes of the Newnes Plateau, Sydney Basin	-
MU 11 Tableland Gully Snow Gum - Ribbon Gum Montane Grassy Forest	HN572 Ribbon Gum - Snow Gum grassy forest on damp flats, eastern South Eastern Highlands	*Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions*
MU 26 Newnes Plateau Narrow-leaved Peppermint - Silver-top Ash Layered Open Forest	HN600 Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin	-
MU 28 Sandstone Plateau and Ridge Scribbly Gum – Silvertop Ash Shrubby Woodland	HN600 Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin	-
MU 29 Sandstone Slopes Sydney Peppermint Shrubby Forest	HN600 Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin	-
MU 33 Tableland Broad-leaved Peppermint - Brittle Gum - Red Stringybark Grassy Open Forest	HN514 Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands	-
MU 35 Tableland Gully Mountain Gum – Broad-leaved Peppermint Grassy Forest	HN590 Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands	-
MU 37 Coxs Permian Red Stringybark - Brittle Gum Woodland	HN570 Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highland	-
MU 43 Pagoda Rock Sparse Shrubland	HN508 Blue Mountains Mallee Ash - Dwarf Casuarina heath of the upper Blue Mountains, Sydney Basin	-
MU 44 Sandstone Plateaux Tea Tree - Dwarf Sheoak - Banksia Rocky Heath	HN508 Blue Mountains Mallee Ash - Dwarf Casuarina heath of the upper Blue Mountains, Sydney Basin	-

Vegetation Community (DEC 2006)	PCT	TEC
MU 53 Mountain Hollow Grassy Fen	HN602 Tableland swamp meadow on impeded drainage sites of the western Sydney Basin and South Eastern Highlands	*Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions*
MU 58 Acacia Thickets	HN 570 Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highland (Poor Condition)	-
MU 59 Non-native Vegetation – Pine Plantation / Woodlot / Shelter	Non- native vegetation	-
MU 62 Cleared/disturbed lands	Cleared/disturbed lands	-

Full descriptions of these PCTs are presented within the Biodiversity Inventory Report prepared for the Study Area (**Appendix 1**). Two of these PCTs are commensurate with EECs listed under the TSC Act.

2.3.2 Vegetation Zones

Vegetation Zones mapped in the Northern and Southern Study Areas are listed in **Table 6** and **Table 7** respectively and shown in **Figure 4**.

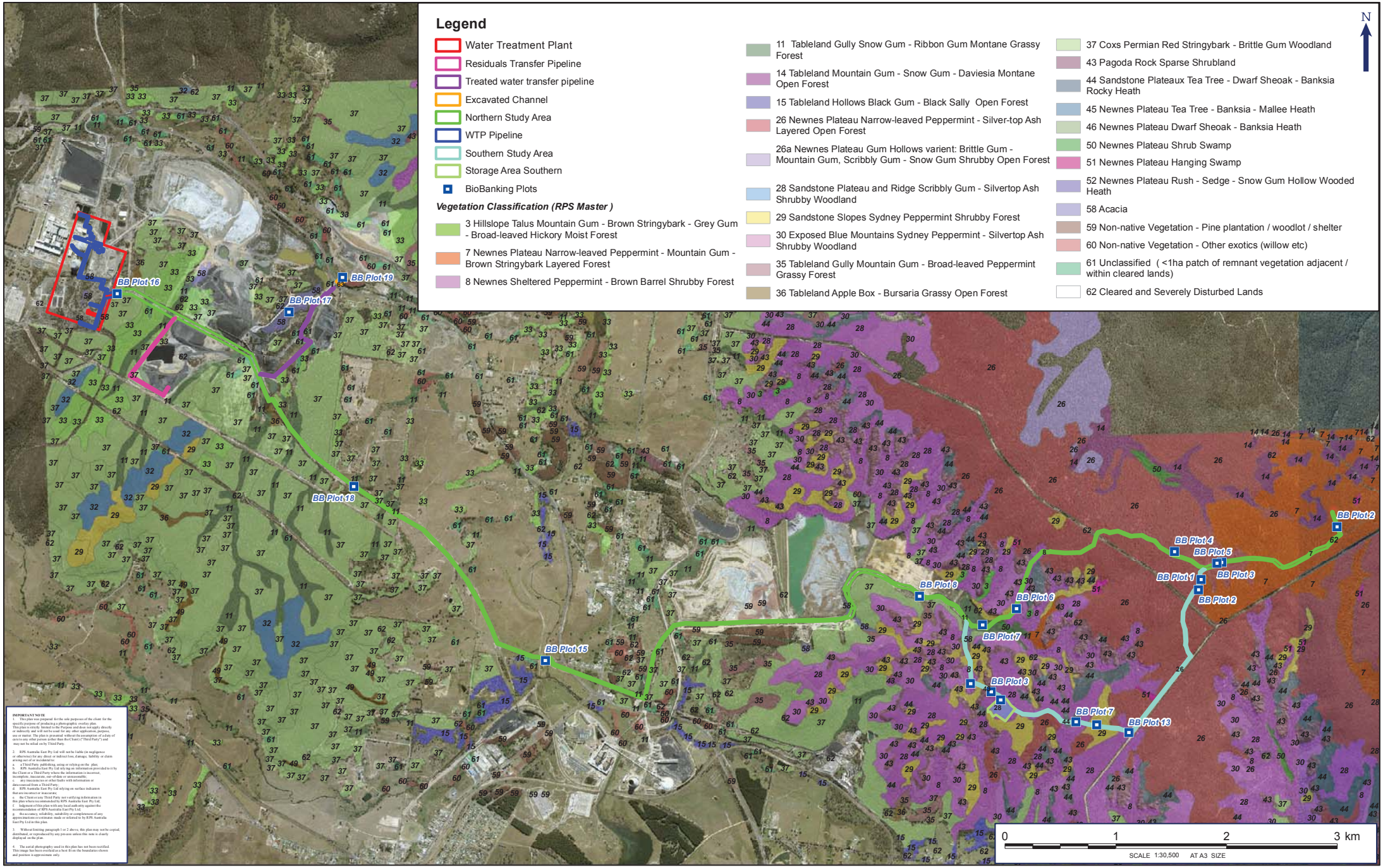
Table 6 Vegetation Zones – Northern Study Area

Veg Zone #	Vegetation Formation	PCT	Condition Class	Area (ha)	TEC	Cleared in Major Catchment Area (%)	Site Value Score
1	Dry Sclerophyll Forests (Shrubby subformation)	HN599	Moderate / Good	0.73	Not an EEC	30	64.58
2	Grassy Woodlands	HN572	Moderate / Good	0.63	Commensurate with an EEC	80	42.71
3	Grassy Woodlands	HN514	Moderate / Good	0.47	Not an EEC	80	53.62
4	Dry Sclerophyll Forests (Shrubby subformation)	HN600	Moderate / Good	1.71	Not an EEC	20	62.33
5	Freshwater Wetlands	HN602	Moderate / Good	0.02	Commensurate with an EEC	85	36.23
6	Dry Sclerophyll Forests (Shrubby subformation)	HN570	Moderate / Good_Poor	21.22	Not an EEC	55	40.62
7	Dry Sclerophyll Forests (Shrubby subformation)	HN570	Moderate / Good	1.49	Not an EEC	55	62.50
8	Wet Sclerophyll Forests (Shrubby subformation)	HN558	Moderate / Good	1.11	Not an EEC	30	61.63
10	Freshwater Wetlands	HN630	Moderate / Good	0.46	Not an EEC	70	31.88

Table 7 Vegetation Zones – Southern Study Area

Veg Zone #	Vegetation Formation	PCT	Condition Class	Area (ha)	TEC	Cleared in Major Catchment Area (%)	Site Value Score
1	Dry Sclerophyll Forests (Shrubby subformation)	HN599	Moderate / Good	0.19	Not an EEC	30	63.02
2	Grassy Woodlands	HN572	Moderate / Good	0.61	Commensurate with an EEC	80	36.98
3	Grassy Woodlands	HN514	Moderate / Good	0.47	Not an EEC	80	53.62
4	Dry Sclerophyll Forests (Shrubby subformation)	HN600	Moderate / Good	5.57	Not an EEC	20	50.69
5	Freshwater Wetlands	HN602	Moderate / Good	0.02	Commensurate with an EEC	85	36.23
6	Dry Sclerophyll Forests (Shrubby subformation)	HN570	Moderate / Good_Poor	21.45	Not an EEC	55	40.62
7	Dry Sclerophyll Forests (Shrubby subformation)	HN570	Moderate / Good	1.26	Not an EEC	55	62.50
8	Wet Sclerophyll Forests (Shrubby subformation)	HN558	Moderate / Good	1.24	Not an EEC	30	66.32
9	Heathlands	HN508	Moderate / Good	0.17	Not an EEC	5	48.07
10	Freshwater Wetlands	HN630	Moderate / Good	0.46	Not an EEC	70	31.88

Plot data for the Northern and Southern Study Areas is provided in **Table 8** and **Table 9** respectively.



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TITLE : **FIGURE 4: VEGETATION ZONE AND PLOT LOCATIONS**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **17/08/2016**

PURPOSE: **BAR**

VERSION (PLAN BY): A A3 (Natalie.Wood)

PATH: J:\JOBS\Centennial\All Jobs\131758 JV Energy Australia Springvale\10 - Drafting\Arcgis Map Documents\Eco\BioBanking Figures\131758 Figure 4 Veg BB BAR B A3 20160721.mxd

CLIENT: **CENTENNIAL COAL**

JOB REF: **PR131758**

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Table 8 Survey Plot/Transect Data – Northern Study Area

Plot ID #	Plant Species Richness	Native Over-storey Cover	Native Mid Storey Cover	Native Ground Cover - grasses	Native Ground Cover - shrubs	Native Ground Cover - other	Exotic Plant Cover	# Tree Hollows	Overstorey Regeneration	Length Fallen Logs (m)	Easting (GDA 94-MGA 56)	Northing (GDA 94-MGA 56)
Veg Zone: – HN558 Narrow-leaved Peppermint - Mountain Gum - Brown Barrel moist open forest on high altitude ranges, northern South Eastern Highlands (1 plots completed; minimum 1 plots required)												
BB02	34	54	2.5	68	10	44	0	3	0	45	235,372	6,302,312
Veg Zone: – HN599 Sydney Peppermint - Narrow-leaved Peppermint shrubby open forest on sheltered slopes of the Newnes Plateau, Sydney Basin (1 plots completed; minimum 1 plots required)												
BB06	34	44	26.5	80	8	80	0	4	0	18	232,455	6,301,617
Veg Zone: – HN572 Ribbon Gum - Snow Gum grassy forest on damp flats, eastern South Eastern Highlands (1 plots completed; minimum 1 plots required)												
BB07	32	50.5	31.5	46	54	14	0	0	0	8	23,216	6,301,470
Veg Zone: – HN600 Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin (3 plots completed; minimum 1 plots required)												
BB05	29	39	17.5	68	16	8	0	1	0	73	234,310	6,302,033
BB03	35	21.5	18	90	4	40	0	4	0	56	234,219	6,302,012
BB04	33	39	14	72	46	6	0	6	0	37	233,929	6,302,103
Veg Zone: – HN514 Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands (1 plots completed; minimum 1 plots required)												
BB08	34	20	15	90	16	64	0	3	0	18	225,771	6,303,469
Veg Zone: – HN602 Tableland swamp meadow on impeded drainage sites of the western Sydney Basin and South Eastern Highlands (1 plots completed; minimum 1 plots required)												
BB04b	27	35	11	70	2	8	0	4	0	32	230,970	6,301,700
BB09	31	47	0	54	10	36	0	6	0	17	226,110	6,303,025
Veg Zone: – HN 570 Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highland (Poor Condition) (5 plot completed; minimum 4 plot required)												
BB16	17	17.5	0	66	2	18	4	0	0	0	224,335	6,304,465
BB17	19	11.5	0	48	6	10	2	0	0	0	225,887	6,304,298

Plot ID #	Plant Species Richness	Native Over-storey Cover	Native Mid Storey Cover	Native Ground Cover - grasses	Native Ground Cover - shrubs	Native Ground Cover - other	Exotic Plant Cover	# Tree Hollows	Overstorey Regeneration	Length Fallen Logs (m)	Easting (GDA 94-MGA 56)	Northing (GDA 94-MGA 56)
BB11	21	30	18	76	0	6	60	0	0	7	230,925	6,301,566
BB08b	19	0	13	30	2	26	58	0	0	1	231,582	6,301,728
BB20	11	0	26	34	18	2	24	0	0	0	224,200	6,304,511
Veg Zone: – HN630 Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion (1 plot completed; minimum 1 plot required)												
BB19	1	0	92	0	0	0	50	0	1	0	226,324	6,304,562

Table 9 Survey Plot/Transect Data – Southern Study Area

Plot ID #	Plant Species Richness	Native Over-storey Cover	Native Mid Storey Cover	Native Ground Cover - grasses	Native Ground Cover - shrubs	Native Ground Cover - other	Exotic Plant Cover	# Tree Hollows	Overstorey Regeneration	Length Fallen Logs (m)	Easting (GDA 94-MGA 56)	Northing (GDA 94-MGA 56)
Veg Zone: – HN558 Narrow-leaved Peppermint - Mountain Gum - Brown Barrel moist open forest on high altitude ranges, northern South Eastern Highlands (1 plots completed; minimum 1 plots required)												
BB002	34	54	2.5	68	10	44	0	3	0	45	235,372	6,302,312
BB001	26	27	21	70	20	36	0	2	0	16	234,126	6,301,881
Veg Zone: – HN599 Sydney Peppermint - Narrow-leaved Peppermint shrubby open forest on sheltered slopes of the Newnes Plateau, Sydney Basin (1 plots completed; minimum 1 plots required)												
BB12	35	55	46	22	54	44	0	2	0	43	232042	6,300,937
Veg Zone: – HN572 Ribbon Gum - Snow Gum grassy forest on damp flats, eastern South Eastern Highlands (1 plots completed; minimum 1 plots required)												
BB18	20	28.5	13	74	10	8	38	0	0	0	226,473	6,302,720
Veg Zone: – HN600 Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin (3 plots completed; minimum 1 plots required)												
BB006	33	39.5	16	4	56	42	0	5	0	51	233,182	6,300,568
BB05	29	39	17.5	68	16	8	0	1	0	73	234,310	6,302,033
BB03	35	21.5	18	90	4	40	0	4	0	56	234,219	6,302,012
BB002	33	33	16	26	28	22	0	3	0	66	234103	6301787
BB13	27	31.5	5.5	54	34	48	0	3	0	27	233469	6300497
BB14	18	28	25	80	8	54	0	5	0	11	232312	6300792
Veg Zone: – HN514 Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands (1 plots completed; minimum 1 plots required)												
BB08	34	20	15	90	16	64	0	3	0	18	225,771	6,303,469
Veg Zone: – HN570 Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highland (2 plots completed; minimum 1 plots required)												
BB04b	27	35	11	70	2	8	0	4	0	32	230,970	6,301,700
BB09	31	47	0	54	10	36	0	6	0	17	226,110	6,303,025

Plot ID #	Plant Species Richness	Native Over-storey Cover	Native Mid Storey Cover	Native Ground Cover - grasses	Native Ground Cover - shrubs	Native Ground Cover - other	Exotic Plant Cover	# Tree Hollows	Overstorey Regeneration	Length Fallen Logs (m)	Easting (GDA 94-MGA 56)	Northing (GDA 94-MGA 56)
Veg Zone: – HN508 Blue Mountains Mallee Ash - Dwarf Casuarina heath of the upper Blue Mountains, Sydney Basin (2 plots completed; minimum 1 plots required)												
BB03	20	3.5	25	2	32	32	0	0	0	29	232,227	6,300,864
BB07	30	14	24.5	6	44	32	0	2	0	15	232,992	6,300,595
Veg Zone: – HN602 Tableland swamp meadow on impeded drainage sites of the western Sydney Basin and South Eastern Highlands (1 plots completed; minimum 1 plots required)												
BB15	10	0	0	84	0	2	44	0	0	0	228,202	6,301,147
Veg Zone: – HN 570 Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highland (Poor Condition) (5 plot completed; minimum 4 plot required)												
BB16	17	17.5	0	66	2	18	4	0	0	0	224,335	6,304,465
BB17	19	11.5	0	48	6	10	2	0	0	0	225,887	6,304,298
BB11	21	30	18	76	0	6	60	0	0	7	230,925	6,301,566
BB08b	19	0	13	30	2	26	58	0	0	1	231,582	6,301,728
BB20	11	0	26	34	18	2	24	0	0	0	224,200	6,304,511
Veg Zone: – HN630 Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion (1 plot completed; minimum 1 plot required)												
BB19	1	0	92	0	0	0	50	0	1	0	226,324	6,304,562

2.4 Geographic and Habitat Features

Geographic and Habitat Features (GHFs) listed in **Table 10** and **Table 11** were selected in the BioBanking Credit Calculator as occurring within the Northern and Southern Study Areas respectively (i.e. incidence of broad non-PCT habitat features predicted by the BioBanking Credit Calculator). GHFs not occurring in the Study Area were not selected and were filtered out of the assessment.

Table 10 Geographic and Habitat Features – Northern Study Area (filtered)

Geographic and Habitat Feature	Species	
	Common name	Scientific name
land within 250 m of termite mounds or rock outcrops	Rosenbergs Goanna	*Varanus rosenbergi*
land containing escarpments, cliffs, caves, deep crevices, old mine shafts or tunnels	Large-eared Pied Bat	*Chalinolobus dwyeri*
land within 500 m of sandstone escarpments with hollow-bearing trees, rock crevices or flat sandstone rocks on exposed cliff edges and sandstone outcropping	Broad-headed Snake	*Hoplocephalus bungaroides*
land within 40 m of heath, woodland or forest	Giant Burrowing Frog	*Heleioporus australiacus*
land above 800 m altitude in Wollemi CMA subregion	Bathurst Copper Butterfly	*Paralucia spinifera*
land within 100 m of stream or creek banks	Booroolong Frog	*Litoria booroolongensis*
heath or eucalypt forest on sandstone with a build-up of litter or other debris and containing, or within 40 m of, ephemeral or intermittent drainage lines	Red-crowned Toadlet	*Pseudophryne australis*
land within 100 m of emergent aquatic or riparian vegetation	Green and Golden Bell Frog	*Litoria aurea*

Table 11 Geographic and Habitat Features – Southern Study Area (filtered)

Feature	Species	
	Common Name	Scientific Name
land within 250 m of termite mounds or rock outcrops	Rosenbergs Goanna	*Varanus rosenbergi*
land containing escarpments, cliffs, caves, deep crevices, old mine shafts or tunnels	Large-eared Pied Bat	*Chalinolobus dwyeri*
land within 500 m of sandstone escarpments with hollow-bearing trees, rock crevices or flat sandstone rocks on exposed cliff edges and sandstone outcropping	Broad-headed Snake	*Hoplocephalus bungaroides*
land within 40 m of heath, woodland or forest	Giant Burrowing Frog	*Heleioporus australiacus*
land above 800 m altitude in Wollemi CMA subregion	Bathurst Copper Butterfly	*Paralucia spinifera*
land within 100 m of stream or creek banks	Booroolong Frog	*Litoria booroolongensis*
heath or eucalypt forest on sandstone with a build-up of litter or other debris and containing, or within 40 m of, ephemeral or intermittent drainage lines	Red-crowned Toadlet	*Pseudophryne australis*
land within 100 m of emergent aquatic or riparian vegetation	Green and Golden Bell Frog	*Litoria aurea*
rainforest or tall open wet forest with understorey and/or leaf litter and within 100 m of streams	Stuttering Frog	*Mixophyes balbus*

3.0 Threatened Species

The Threatened Species Profile Database (TSPD) (OEH 2016b) classifies threatened species into two credit types; 'Ecosystem Credit' and 'Species Credit' type species. Threatened species aggregated into the Ecosystem Credit class represent those with habitat requirements that can be predicted using PCTs as habitat surrogates. Impacts on these threatened species are treated at a vegetation zone level and do not attract individual species credit requirements.

Conversely, Species Credit species are those with habitat needs that are not reliably predicted by PCT and/ or location (e.g. predicted using GHF). Only Species Credit species require targeted surveys and attract individual species specific offset requirements. However, it should be noted that some species have a dual classification (i.e. have both ecosystem and species credit class). For example, Species Credits for specific areas of 'breeding habitat' (e.g. roost sites for cave microbats) as opposed to ecosystem credits that apply to the foraging habitat for the same species.

The 'Tg' value for a threatened species is a representation of a species' life history characteristics, rarity, and the amount of information available on the species. The 'Tg' value of both ecosystem and species type species weights the significance of habitat and in the case of ecosystem credit type species the species with the highest 'Tg' value is applied to the site. In certain circumstances, the 'Tg' value can be modified by the assessor to better characterise the value or importance of a site for an individual species.

The following sections discuss these aspects of the assessment including any use of judgement.

3.1 Ecosystem Credit Species

The 'Site Survey details' section of the Credit Calculator lists a total of 13 Ecosystem Credit type species with potential to occur within the Study Area. These are listed in **Table 12** along with recorded incidence.

Table 12 Predicted Ecosystem Type Species

Common Name	Scientific Name	Recorded Within 10km (NSW Wildlife Atlas 2015)	Recorded in Northern Study	Recorded in Southern Study Area
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus subsp. victoriae*	Y	Y	Y
Diamond Firetail	*Stagonopleura guttata*	Y	N	N
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	Y	N	N
Flame Robin	*Petroica phoenicea*	Y	N	N
Gang-gang Cockatoo	*Callocephalon fimbriatum*	Y	Y	Y
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	Y	Y	Y
Little Eagle	*Hieraaetus morphnoides*	Y	Y	Y
Little Lorikeet	*Glossopsitta pusilla*	Y	N	Y
Powerful Owl	*Ninox strenua*	Y	Y	N
Scarlet Robin	*Petroica boodang*	Y	Y	Y
Spotted-tailed Quoll	*Dasyurus maculatus*	Y	N	N
Varied Sittella	*Daphoenositta chrysoptera*	Y	N	N
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	Y	Y	Y

3.2 Species Credit Species

3.2.1 Threatened Species Survey Methodologies

A comprehensive understanding of the biodiversity values has been obtained over several seasons and years for the Study Area (**Appendix 1**, RPS 2011, RPS 2012, RPS 2014a RPS 2014b and RPS 2016). This information was used to populate the 'Site Survey details' data entry portal of the Biobanking Credit Calculator. **Table 13** and **Table 14** list 18 'Species Credit' species with potential to occur within the Study Area. Recorded incidence is noted. 'Assumed presence' is noted where scientific uncertainty exists.

Table 13 Species Credit Species within Northern Study Area

Common Name	Scientific Name	Recommended Survey Period	Targeted survey Y/N	Recorded in Study Area Y/N	Assumed Presence Y/N
Bathurst Copper Butterfly	*Paralucia spinifera*	All year round	Y	N	N
Black Gum	*Eucalyptus aggregata*	February-December	Y	N	N
Booroolong Frog	*Litoria booroolongensis*	November - February	Y	N	N
Broad-headed Snake	*Hoplocephalus bungaroides*	March - November	Y	N	N
Capertee Stringybark	*Eucalyptus cannonii*	All year round	Y	N	Y
Clandulla Geebung	*Persoonia marginata*	All year round	Y	N	N
Veronica blakelyi	*Veronica blakelyi*	All year round	Y	Y	N
Eastern Pygmy-possum	*Cercartetus nanus*	None specified	None specified	N	N
Giant Burrowing Frog	*Heleioporus australiacus*	September - May	Y	N	N
Green and Golden Bell Frog	*Litoria aurea*	August - March	Y	N	N
Grevillea divaricata	*Grevillea divaricata*	All year round	Y	N	N
Large-eared Pied Bat	*Chalinolobus dwyeri*	September - April	Y	Y	N
Red-crowned Toadlet	*Pseudophryne australis*	All year round	Y	N	N
Regent Honeyeater	*Anthochaera phrygia*	All year round	Y	N	N
Rosenbergs Goanna	*Varanus rosenbergi*	November - February	Y	N	N
Silver-leafed Gum	*Eucalyptus pulverulenta*	All year round	Y	N	N
Squirrel Glider	*Petaurus norfolcensis*	All year round	Y	N	N
Thick-leaf Star-hair	*Astrotricha crassifolia*	All year round	Y	N	N

Table 14 Species Credit Species within Southern Study Area

Common Name	Scientific Name	Recommended Survey Period	Targeted Survey Y/N	Recorded in Study Area Y/N	Assumed Presence Y/N
Bathurst Copper Butterfly	*Paralucia spinifera*	All year round	Y	N	N
Black Gum	*Eucalyptus aggregata*	February-December	Y	N	N
Booroolong Frog	*Litoria booroolongensis*	November - February	Y	N	N
Broad-headed Snake	*Hoplocephalus bungaroides*	March - November	Y	N	N
Capertee Stringybark	*Eucalyptus cannonii*	All year round	Y	N	Y
Clandulla Geebung	*Persoonia marginata*	All year round	Y	N	N
Veronica blakelyi	*Veronica blakelyi*	All year round	Y	N	N
Eastern Pygmy-possum	*Cercartetus nanus*	None specified	None specified	N	N
Giant Burrowing Frog	*Heleioporus australiacus*	September - May	Y	N	N
Green and Golden Bell Frog	***Litoria aurea***	**August - March**	**N**	**N**	**N**
Grevillea divaricata	*Grevillea divaricata*	All year round	Y	N	N
Large-eared Pied Bat	***Chalinolobus dwyeri***	**September - April**	**N**	**Y**	**N**
Red-crowned Toadlet	*Pseudophryne australis*	All year round	Y	N	N
Regent Honeyeater	*Anthochaera phrygia*	All year round	Y	N	N
Rosenbergs Goanna	***Varanus rosenbergi***	**November - February**	**N**	**N**	**N**
Silver-leafed Gum	*Eucalyptus pulverulenta*	All year round	Y	N	N
Squirrel Glider	*Petaurus norfolcensis*	All year round	Y	N	N
Thick-leaf Star-hair	*Astrotricha crassifolia*	All year round	Y	N	N

A small portion of the Southern Study Area was surveyed outside of the recommended survey period for species identified in bold. However, this is not of concern in this assessment for the following reasons:

- The weather conditions experienced during the most recent survey were unusually warm and generally suitable for the species indicated (see **Appendix 1**).
- Faunal habitats of Southern Study Area are contiguous with the Northern Study Area where adequate surveys have been performed. Results for the Northern Study Area are transferrable on this basis.

Numerous flora and fauna surveys were conducted across similar adjoining habitats within the Springvale Project Application Area (RPS 2011, RPS 2012, RPS 2014a, RPS 2014b, RPS 2014c and RPS 2016) and associated monitoring programs. Results are transferrable on this basis.

3.2.2 Species Polygons

A species polygon has been mapped for Species Credit species with known or potential incidence within the Study Area. The details are provided in the following sections.

3.2.2.1 Northern Study Area

Four 'Species Credit' Species have been recorded within the Northern Study Area. These include three threatened flora (*Veronica blakelyi, Persoonia hindii* and *Caesia parviflora* var. *minor*) and one threatened mammal (Large-eared Pied Bat). Only one threatened species polygon is required for the Northern Study Area as Species Credits for flora are calculated using the number of individuals.

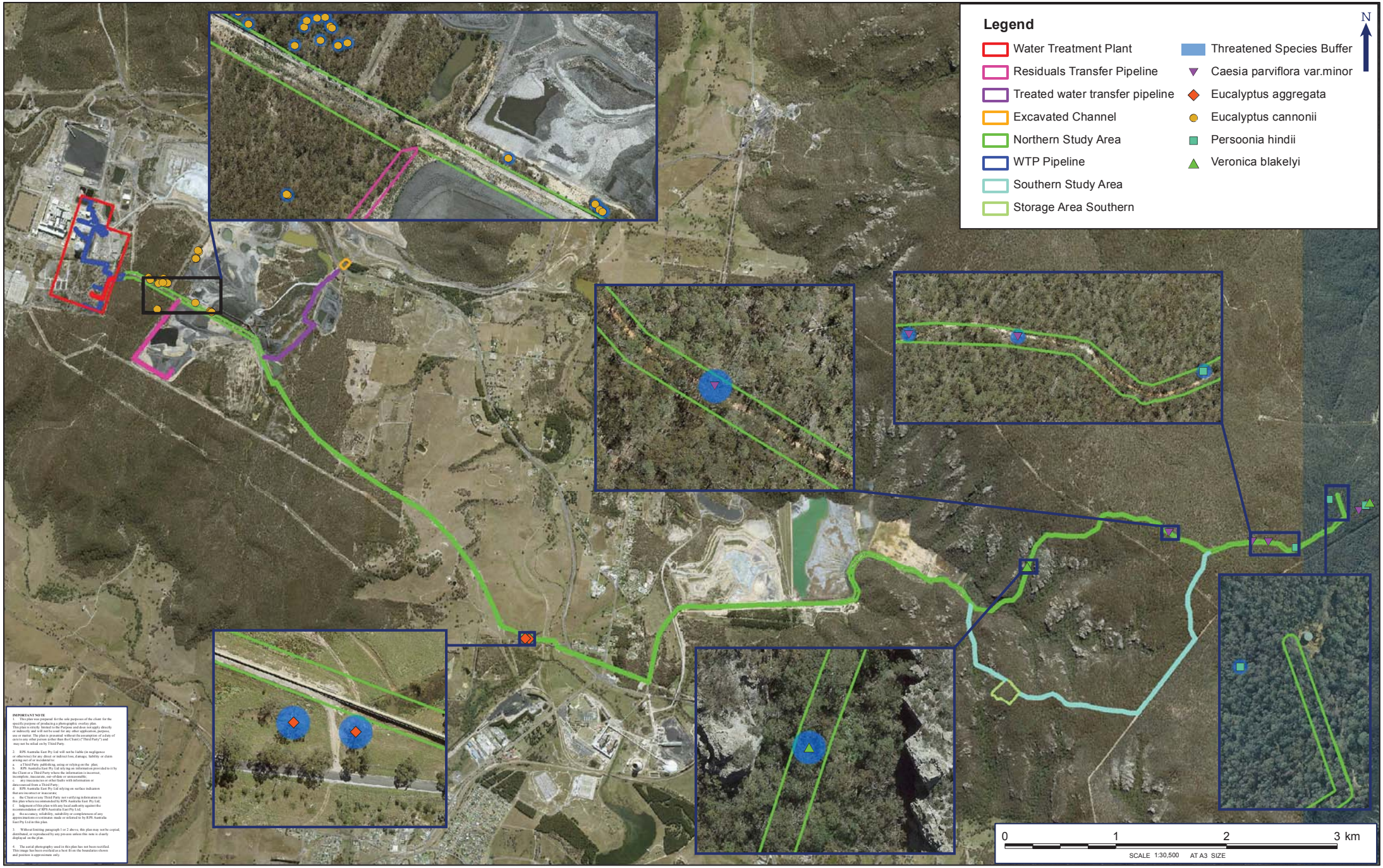
The Large-eared Pied Bat is considered to have suitable habitat within the Study Area. Sandstone cliffs located in close proximity to fertile valley woodlands (i.e. important foraging habitat) is considered habitat critical to the survival of the Large-eared Pied Bat (DECC 2007). The threatened species polygon mapped for this species is coincident HN599 (Sydney Peppermint - Narrow-leaved Peppermint shrubby open forest on sheltered slopes of the Newnes Plateau, Sydney Basin) and HN508 (Blue Mountains Mallee Ash - Dwarf Casuarina heath of the upper Blue Mountains, Sydney Basin) and is shown in **Figure 5**.

3.2.2.2 Southern Study Area

Three 'Species Credit' Species have been recorded within the Southern Study Area. These include two threatened flora (*Persoonia hindii* and *Caesia parviflora* var. *minor*) and one threatened mammal (Large-eared Pied Bat). As outlined for the Northern Study Area, only one threatened Species polygon is produced for the Southern Study Area and is shown in **Figure 5**.

3.3 Identified Populations

The Director General of OEH may develop an 'Identified Populations' Database that identifies population(s) of threatened species present in an area of land that require assessment under the BBAM (either for a Biobank or development site). To date, the BBAM has not determined any 'Identified Populations'. The Director General of OEH may develop an 'Identified Populations' Database that identifies population(s) of threatened species present in an area of land that require assessment under the BBAM (either for a Biobank or development site). To date, the BBAM has not determined any 'Identified Populations'.



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TITLE : **FIGURE 5: THREATENED SPECIES POLYGONS – DISTURBANCE AREA**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **17/08/2016**

PURPOSE: **BAR**

VERSION (PLAN BY): B A3 (Natalie.Wood)

PATH: J:\JOBS\Centennial\All Jobs\131758 JV Energy Australia Springvale\10 - Drafting\Arcgis Map Documents\Eco\BioBanking Figures\131758 Figure 5 THSP BAR B A3 20160719.mxd

CLIENT: **CENTENNIAL COAL**

JOB REF: **PR131758**

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Stage 2 – Impact Assessment (Biodiversity Values)

4.0 Potential Impacts

The Project has incorporated impact avoidance and minimisation strategies, where possible, to minimise direct and/or indirect impacts on biodiversity values (e.g. presence of threatened species and TECs) and activation of Key Threatening Processes (KTPs). Impact avoidance and minimisation strategies are outlined in the following sections.

4.1 Impact Avoidance

Impact avoidance aims to minimise impacts on threatened species and ecological communities primarily through alteration in the design of a Project. Avoidance of potential impacts has been achieved in the first instance through the preferential use of existing disturbance areas such as pipelines and tracks. Relevant impact avoidance considerations are discussed in **Table 15**.

Table 15 Impact Avoidance Considerations

Biodiversity Value	Northern versus Southern Study Areas
Native vegetation	The clearing of native vegetation within the Northern Project area would result in at least 3.60 ha being avoided by comparison to the Southern Study Area.
Hollow-bearing trees	A total of 67 hollow-bearing trees were identified in the Northern Study Area compared with 149 hollow-bearing trees within the Southern Study Area. The loss of hollow-bearing trees is a KTP. The greater loss of hollow-bearing trees would have a greater impact on the Glossy-black Cockatoo, Powerful Owl, Varied Sittella, Brown Tree-creeper and microchiropteran bats.
Threatened species	The Northern Study Area would result in a greater impact on threatened species than the Southern Study Area. Additional *Caesia parviflora* ssp. *minor* and *Veronica blakelyii* would be impacted within the Northern Study Area. A large, pure stand of *Allocasuarina littoralis* utilised by the Glossy-black Cockatoo occurs in the Southern Study Area. No impacts of this nature would occur within the Northern Study Area. Sandstone escarpment suitable for the Large-eared Pied Bat occurs in the Southern Study Area. No such sandstone escarpment occurs within the Northern Study Area, although occurs in close proximity to the alignment. Foraging habitat for this species occurs within both the Northern and Southern Study Areas. Potential Powerful Owl roost trees occur on both the Northern and Southern Study Areas, with the Powerful Owl observed in the Northern Study Area.
Threatened Ecological Communities	The Northern Study Area would result in the loss of 0.63 ha of Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions EEC compared with a 0.61 ha loss of the same EEC in the Southern Study Area.
Groundwater Dependant Ecosystems	Neither Study Area has a greater impact on GDEs.
Patch integrity	The Southern Study Area is expected to have a lower impact on patch integrity as the pipeline is proposed to align with existing areas of disturbance (i.e. existing pipeline/ tracks), thus reduce the total amount of native vegetation loss. Impacts within the Northern Study Area would require the establishment of a new pipeline easement requiring new disturbance areas that are additional to those required for the Southern Study Area.

It is evident from an analysis of information provided in **Table 15** that the Southern Study Area would likely have a greater impact on biodiversity despite the larger impact on TECs and additional edge effects predicted in the Northern Study Area.

4.2 Impact Minimisation

Both the Northern and Southern Study Areas would result in the removal of threatened plant species and hollow-bearing trees. However, by observing careful construction techniques through the course of Project

construction (i.e. use of pre-clearance surveys and minor route adjustment), opportunity exists to avoid impacts on individual threatened plants and hollow-bearing trees.

The benefit of this impact minimisation strategy is not currently known as site specific construction constraints are likely to have an important role in determining the efficacy of this strategy. As such, it is not possible to conclusively say that all threatened species and hollow-bearing trees would be avoided. Impact assumptions adopted on this basis are listed below:

- Zero loss of *P. hindii* (averting the loss of seven observed individuals);
- Three individuals of *C. parviflora* var. *minor*; and
- Three individuals of *E. cannonii*.

The above impact assumptions would be confirmed prior to construction through the completion of pre-clearance surveys to validate offsetting requirements.

4.3 Mitigation

Mitigation measures for the Project are to be implemented through a Construction Environmental Management Plan (CEMP). The following mitigation measures are recommended for inclusion in the CEMP to reduce the impacts of clearing, construction and operation of the proposed development:

- The clearing of native vegetation should be minimised as far as is practicable. Unnecessary vegetation clearing should be minimised by fencing the clearing limit.
- All contractors will be specifically advised of the designated work area. The following activities are not to occur outside of designated work areas to minimise impacts on native vegetation:
  - Vehicle movements;
  - Storage and mixing of materials;
  - Vehicle parking;
  - Liquid disposal;
  - Machinery repairs and/or refueling;
  - Combustion of any material;
  - Inappropriate stockpiling of soil, rubble or debris; and/or
  - Any filling or excavation including trenching, topsoil skimming and/or surface excavation.
- All construction and operational vehicles/machinery will use designated access tracks. Speeds will be limited to 20 kilometres per hour to reduce the potential of fauna strike and to reduce dust generation.
- Plant and machinery will be cleaned of any foreign soil and propagative material prior to being transported to the construction areas to prevent the spread of weeds and potential importation of Phytophthora.
- If machinery is transported from an area of confirmed infection of Phytophthora or Chytrid fungus to the construction areas, stringent wash down will be completed before leaving the area, removing all soil and vegetative material from cabins, trays, and under carriages.
- To minimise potential impacts on adjacent conservation lands and wetland habitats all liquids (fuel, oil, cleaning agents, drilling liquids etc.) will be stored appropriately and disposed of at suitably licensed facilities. Spill management procedures will be implemented as required. Rubbish will be collected and removed from the Project Application area.
- Appropriate erosion and sediment control measures will be managed via the implementation of an erosion and sediment control plan, in accordance with best management practices, such as the:

  - » Best Practice Erosion and Sediment Control Guidelines (IECA, 2008); and
  - » Managing Urban Stormwater: Soils and Construction 4th Ed. 'The Blue Book' (Landcom 2004).

  It is imperative that the plan ensures that any offsite discharge of stormwater (freshwater) does not significantly impact upon the adjoining aquatic environments.
- Construction personnel will be trained adequately in pest management and hygiene procedures.
- Weed management procedures will be implemented to prevent the spread of weeds both inside the Project Application Area and outside. Ongoing weed monitoring to be implemented and potential weed infestations appropriately managed to minimise the spread of weeds on the Project area. Management of noxious weeds are to be undertaken in accordance with the *Noxious Weeds Act* 1993. Weed monitoring should occur throughout the construction and operation phase and weed removal will be carried out as necessary.
- Where possible, clearing activities should be timed to avoid removal of hollow-bearing trees during breeding season of threatened species (avoiding winter and spring).
- An ecologist is to perform pre-clearance surveys with the construction manager to identify key areas of impact avoidance including threatened plant species. Impact assessment assumptions for threatened plant loss are to be validated through this pre-clearance survey.
- A qualified ecologist is to be present to supervise hollow-bearing tree clearing within the Project Application Area and that vegetation clearing is undertaken in the following manner:
  - » Hollow-bearing trees are to be clearly marked (spray paint or flagging tape) within the disturbance footprint prior to any vegetation clearing commencing.
  - » Non habitat vegetation should be removed at least one day prior to felling of hollow-bearing trees to encourage resident fauna to self relocate before felling of remaining habitat trees.
  - » Immediately prior to the felling of hollow-bearing trees, trees should be given two sharp taps with the machinery arm/bucket to encourage fauna to escape. After waiting 1–2 minutes after tapping the tree, the hollow-bearing tree should be felled as gently as possible.
  - » An ecologist is to inspect each felled hollow-bearing tree (once safe) to recover any injured fauna and seek appropriate treatment, and relocate uninjured fauna into vegetation to be retained within the Project Application Area.
  - » Felled timber is to be left in place for one night after all other vegetation is removed to allow any remaining fauna to vacate hollows.

4.4 Direct Impacts

The Project's direct impacts are discussed in the following sections. Direct impacts are calculated using a 10 m wide construction area plus additional infrastructure footprints where described in **Section 1.1**.

4.4.1 Vegetation Loss

Native vegetation loss in the Northern and Southern Study Areas is quantified in **Table 16**. The least impact on native vegetation is within the Northern Study Area with the net difference in native vegetation loss being 3.60 ha.

Table 16 Native vegetation loss within the Northern and Southern Study Areas

Vegetation Community	Northern (ha)	Southern (ha)
HN508 Blue Mountains Mallee Ash - Dwarf Casuarina heath of the upper Blue Mountains, Sydney Basin	0.00	0.17
HN514 Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands	0.47	0.47
HN558 Narrow-leaved Peppermint - Mountain Gum - Brown Barrel moist open forest on high altitude ranges, northern South Eastern Highlands	1.11	1.24
HN570 Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highland	1.49	1.49
HN570 Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highland (Poor Condition)	21.22	21.22
HN572 Ribbon Gum - Snow Gum grassy forest on damp flats, eastern South Eastern Highlands	0.63	0.61
HN599 Sydney Peppermint - Narrow-leaved Peppermint shrubby open forest on sheltered slopes of the Newnes Plateau, Sydney Basin	0.73	0.19
HN600 Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin	1.71	5.57
HN602 Tableland swamp meadow on impeded drainage sites of the western Sydney Basin and South Eastern Highlands	0.02	0.02
HN630 *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands	0.46	0.46
Total	**27.84**	**31.44**

*Cleared/disturbed lands have been ground-truthed and where they contain vegetation they may be considered as 'vegetation in low condition' (OEH 2014b). However, the temporary nature of the trenching and the subsequent re-vegetating is not considered to yield a net loss of this predominantly exotic and disturbed vegetation type within the Study Area. Consequently, this vegetation type has been omitted from the credit calculations.

4.4.2 Flora

Three threatened flora species (*Caesia parviflora* var. *minor*, *Persoonia hindii* and *Veronica blakelyi*) were recorded within the Northern and Southern Study Areas. *Persoonia hindii* and *Veronica blakelyi* are both easily detected throughout the year and as such it is considered that survey results would produce an accurate impact estimate for these species. Impact avoidance measures are proposed for *Persoonia hindii* or *Veronica blakelyi* specimens.

The endangered herb *Caesia parviflora* var. *minor* was also identified within both the Northern and Southern Study area (n=3), with two specimens observed in the eastern 'in common' section. Notwithstanding, it should be noted that survey timing for this species along the Southern Study Area was outside the flowering period and as such is likely to have underestimated impacts on this species for this part of the Study Area.

Potential habitat is present for *Lastreopsis hispida* within the moist sheltered gully habitat of MU 8 Newnes Sheltered Peppermint - Brown Barrel Shrubby Forest. This vegetation community was recorded along both the Northern and Southern Study Areas. The groundcover of this vegetation community was dominated by ferns including *Pteridium esculentum* and *Blechnum nudum*. However, this species was not detected despite the undertaking of appropriately timed targeted surveys. Impacts on this species and its habitat are expected to be negligible.

Suitable habitat for *Acacia bynoeana* occurs throughout the Newnes Plateau. If present, it is likely that a local population would extend throughout the heaths and woodlands that occur on sandy soils. No specimens of

this species were observed despite the performing of appropriately timed targeted surveys. Impacts on this species and its habitat are expected to be negligible.

Genoplesium superbum has been recorded within one location within 10 km of the Study Area. The habitat of the local occurrence of this species can be generally described as shrubby woodland on a slope. Habitats within the Study Area therefore have potential to support this species. If present, there is a high likelihood that a local population would extend outside the Study Area, given the large areas of commensurate habitat in the surrounding landscape. No specimens of this species were observed despite the performing of appropriately timed targeted surveys. Impacts on this species and its habitat are expected to be negligible.

4.4.3 Fauna

The Study Area does not include expansive areas of particularly rocky habitats, such as large rock platforms or cliffs, however it will pass through some areas considered suitable for the Broad-headed Snake. Caves or similar structures that may be used by cave dwelling microbats were recorded in close proximity to the Study Area. No loss of caves or similar structures is expected as a consequence of the Project.

The loss of mid-storey and canopy trees would remove nesting and foraging habitat for threatened bird species, as well as foraging habitats for threatened arboreal mammals, microbats and hunting habitat for the Broad-headed Snake. Specific foraging habitat niches within the proposed surface infrastructure footprint include Banksia species used by the Eastern Pygmy Possum, *Allocasuarina* species used by Glossy Black-Cockatoos and nectar producing trees and shrubs used by nectivorous birds and mammals. A primary Koala feed tree (*E. viminalis*) only occurs within a small section of the alignment. This feed tree is a component of MU 11 only and is thus not abundant within the northern Study Area. Therefore, the Koala is unlikely to be impacted by the Project.

Tree hollows recorded included some of sufficient size to support roosting of large forest owls and cockatoo species. The Project will therefore result in a loss to potential roosting or nesting trees for the Gang-Gang Cockatoo, Glossy Black-Cockatoo and threatened owls. It is noted, however, that the threatened Barking Owl, Powerful Owl and Masked Owl have specific preferences regarding hollow types, which involve hollows developing from the main stem of the tree. These hollows are less prevalent; however one suitable hollow was detected in MU 8 of the Northern Study Area. The Sooty Owl prefers moist tall forests, thus meaning there is small amount of preferred habitat for this species.

No potential breeding habitat would be removed for the Giant Burrowing Frog, Red-crowned Toadlet or Littlejohn's Tree Frog. However, the Project will run alongside an ephemeral drainage line for approximately 1 km. The proposed clearing may therefore cause a loss of potential foraging habitat for these species.

The eastern portion of the Northern Study Area is surrounded by large areas containing contiguous forest, woodland, heath, swamp and rocky habitats. These habitats continue throughout the Newnes State Forest and into the Gardens of Stone National Park, Blue Mountains National Park and Wollemi National Park. The local populations of species with high mobility, such as threatened birds, bats, arboreal mammals and terrestrial mammals would continue into these surrounding areas.

4.4.4 Groundwater Dependent Ecosystems

As discussed in **Appendix 1**, MU 53 may have some degree of dependence on groundwater for its ecological function and therefore may constitute a GDE. The Project would result in the removal of 0.02 ha of this vegetation with the post developed landscape allowing the potential rehabilitation of this vegetation. Limited potential exists for this impact to adversely affect adjoining areas of this vegetation over the medium to long term, although it is recognised that short term impacts may occur.

4.5 Indirect Impacts

Indirect impacts associated with the Project may include:

- Fragmentation;
- Introduction of exotic flora and fauna species;
- An increase in runoff from disturbed areas of land; and
- Hydrocarbons pollution from construction activities (e.g. oil spills).

The following sections discuss the potential indirect impacts associated with the Project.

4.5.1 Edge Effects

The 'edge effect' describes a collection of factors and processes that influence the presence and abundance of species at a boundary, whether they are natural boundaries (e.g. ecotones) or a disturbance of some kind (e.g. cleared lands). Edges can occur naturally within ecosystems and include situations such as the common boundary between two ecological communities (i.e. ecotones) or the boundary between burnt and unburnt vegetation.

Bali (2005) identifies the following main factors and processes that operate at a disturbed edge of an ecological community:

- Microclimate (e.g. localised changes in temperature, wind, light, humidity).
- Hydrology (i.e. localised changes in surface and subsurface water flows).
- Altered fire frequency and intensity.
- Invasion by exotic plant and animal species.
- Alteration of soil conditions (e.g. increased sedimentation and nutrient availability).
- Alteration of vegetation structure (e.g. tree death and increased shrub densities).

While biodiversity, as a collective, can adapt to the effects of an edge, some species are partially or wholly reliant on edge effects; thus resulting in 'winners' and 'losers' in such circumstances. Species that benefit from edges are generally characterised as pioneer species, a category that often includes many exotic/ weed species. Native plant species of this classification include wattles and many grasses.

On average, edge effects have been estimated to occur up to 50 metres from a road edge (Bali 2005), although much greater distances have been recorded in some road studies (Forman et al. 2003). Edge effects are particularly pronounced in patches where a large edge to area ratio exists (i.e. small vegetation patches with a proportionally large perimeter). Such conditions often result in the simplification of biodiversity values in favour of generalists or edge specialist species. These impacts already exist in the smaller more isolated vegetation patches of the study area. The Project is unlikely to have any substantial incremental edge effects on these smaller isolated patches over and above existing conditions.

Edge effects can influence ecological process by altering the flows of energy, moisture, temperature, materials or organisms and by providing access to spatially separated resources (Fletcher et al. 2007). In turn, this indirectly leads to changes in population structure, species interaction and community structure near edges (Fletcher et al. 2007).

The greatest potential for indirect impacts on native vegetation and habitat is in areas where the Project traverses through large stands of vegetation. Such impacts are either new (i.e. Northern Study Area) or

associated with the shifting of edge effects into vegetation previously unaffected by these impacts (i.e. Southern Study Area). Potential edge effects in these areas may include:

- Establishment of weeds along boundaries between native vegetation and cleared lands and potential for weed incursions into adjacent native vegetation;
- Modification of habitat attributes, through increased light and noise levels, and changes to vegetation structure, soil nutrient levels and plant species diversity;
- Changes to fauna assemblages, including alteration of woodland and forest bird assemblages by edge specialists;
- Increased predation of birds, small mammals, reptiles and frogs by species that use forest edges for foraging; and
- Increased nest predation of small insectivorous birds at forest edges.

Although the area to be cleared is not likely to fragment two or more patches of vegetation, it will increase the available edges for ecological changes to occur. “New road works through bushland will increase sunlight and air temperature, which raises soil temperature and decreases soil moisture. This may prevent seeds of shade-tolerant species from germinating and favour other place species (i.e. those that thrive on increased light)” (Rowley et al. 1999:1). Additionally, vehicles utilising this road network have the potential to spread exotic flora species that will have an increased surface area in which to establish themselves.

4.5.2 Fragmentation

Fragmentation is the process of reducing what was once a continuous area of vegetation or habitat into smaller divided and discrete patches of vegetation in isolation. Fragmentation of landscapes reduces a species’ ability to adapt to climatic conditions. Many fauna species are implicated by the process of fragmentation, including experiencing severe population declines (Robertson and Radford 2009). The overall ecology of fragmented patches may be detrimentally altered, which influences flora and fauna assemblages (Lindenmayer et al. 1999).

Indirectly, fragmentation can put stress on native flora and fauna by increasing the amount of competition for resources and space of remaining fragments (Fischer and Lindenmayer 2007). Direct clearing can impact immobile organisms such as plants (and also mobile organisms that do not escape efficiently) leaving mobile animals to traverse to other surrounding environments that could be smaller remnants. This can result in overcrowding of an already overpopulated patch, interbreeding, and increased competition (Fischer and Lindenmayer 2007).

Seed dispersal for flora is also not expected to be hindered by the areas of clearing. Although the area of direct occupancy will be reduced marginally for a select few species that exist within the surface infrastructure footprint, they are not expected to be restricted in their ability to disperse naturally within the immediate surrounding environments.

4.5.3 Exotic Flora

There is the potential for the introduction of weeds where the Project traverses intact stands of native vegetation. Further, without the use of appropriate weed management protocols, the Project has the potential to facilitate the spread of weeds into adjoining native vegetation. Mitigation measures to be implemented during the construction and operational phases of the Project are recommended to manage and control the incidence and effect of noxious and environmental weeds on the receiving environment. Matters at greatest risk of being impacted by this factor are EECs and threatened flora species.

4.5.4 Noise

Vehicle, plant and construction equipment used to install the Project would temporarily increase noise pollution within the Project area. This can cause disruption to normal fauna activity and often lead to the departure of species from an area. No operational noise is expected. Short term non-permanent impacts through the construction period are expected with impacts limited to highly mobile species such as woodland birds (e.g. Regent Honeyeater, Scarlet Robin and Varied Sittella).

4.5.5 Runoff

The removal of vegetation, including both trees and grasses will increase the risk of storm-water run-off. Operational activities also increase pollution risk within the environment, specifically the spillage of mine water. Matters at greatest risk of being impacted by this indirect impact are threatened plant species and EECs.

4.5.6 Vehicle Strike

The Project would, in places, establish a temporary trafficable surface for vehicles through areas of native vegetation thus increasing the exposure of fauna to a vehicle hazard. As a consequence, it is considered that the risk of fauna being struck by vehicles would increase. Vehicle movements would be during the day and would be controlled by speed limits imposed by construction management and actual conditions. Fauna species considered most at risk of this impact are slow moving species such as reptiles and amphibians. Nocturnal species are unlikely to be impacted by the construction traffic.

4.6 Key Threatening Processes

Key Threatening Processes (KTPs) are listed under Schedule 3 of the TSC Act. There are five KTPs that have the potential to affect the study area as a consequence of the Project, being:

- Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners (*Manorina melanocephala*);
- Loss of hollow-bearing trees;
- Removal of dead wood and dead trees;
- Clearing of native vegetation;
- Anthropogenic climate change;
- Degradation of native riparian vegetation along NSW watercourses; and
- Invasion of native plant communities by exotic perennial grasses.

"Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners *(Manorina melanocephala)"*

The removal of approximately 27.84 of native vegetation in the Study Area may contribute to an increased dispersal of Noisy Miners into surrounding vegetation. However, whilst the Project may increase their dispersal, it is unlikely, given the heavy vegetated condition of surrounding areas, that Noisy Miners will exhibit high abundance and aggressive behaviour within the study area or locality.

"Loss of hollow-bearing trees"

The Project will require the removal of between 67 hollow-bearing trees and as such will contribute to the KTP "Removal of Hollow-bearing Trees". In this respect it is considered that the Project area with the least impact on hollow-bearing trees be selected as the preferred pipeline path (i.e. Northern Study Area). The

avoidance of hollow-bearing trees during construction is recommended to minimise impacts on this habitats feature.

"Removal of dead wood and dead trees"

The removal of approximately 27.84 of native vegetation in the Study Area would result in the removal of dead trees or ground debris and as such will contribute to the KTP "Removal of Dead Wood and Dead Trees". The avoidance/ relocation of dead wood and trees during construction are recommended to minimise impacts on this habitats feature.

"Clearing of Native Vegetation"

The removal of approximately 27.84 of native vegetation in the Study Area would contribute to the KTP "Clearing of Native Vegetation". In this respect it is considered that the least impact on native vegetation is within the Northern Study Area.

"Anthropogenic Climate Change"

The removal of approximately 27.84 of native vegetation in the Study Area would reduce the bioaccumulation of CO_2 thus aid in atmospheric warming (OEH 2015a). Notwithstanding, the contribution and impact from the Project is considered to be insignificant.

"Degradation of native riparian vegetation along NSW watercourses"

Vegetation adjacent to riparian environments is proposed for removal and as such the Project may incrementally contribute to the KTP 'Degradation of native riparian vegetation along NSW watercourses'. It is considered that the Project is unlikely to result in a large impact in accordance with this KTP, however, it is prudent to consider impact minimisation and mitigation where possible to limit the effects of this KTP.

Conversely, the Project aims to reduce the amount of mine water discharge into the Coxes River. It is anticipated that this action would result in improved water quality downstream of the site, thus aid in the improvement of stream health.

"Invasion of native plant communities by exotic perennial grasses"

The Project is unlikely to directly contribute to the KTP "Invasion of native plant communities by exotic perennial grasses" due to the retention of a majority of the native grass layer and only a small area of surface vegetation to be removed for the Project. However, some disturbed areas within the impact area already contain exotic perennial grasses. The Project will provide an opportunity to enact a weed control program to ameliorate this KTP.

5.0 Development Impact Thresholds

There are matters listed in Section 9.2 of the FBA which will be directly impacted upon and therefore, require further consideration by the consent authority. These are discussed in the following sections.

5.1 Impacts on Landscape Features

The Study Area contains a 'State Significant Biodiversity Link' which is a riparian buffer of a 6th order stream, specifically, the Cox's River. Additional information is required to assess the loss of native vegetation within a 50 m buffer within either side of a 6th order stream. The following provides additional information with regards to the matters listed in section 9.2.3.3 of the FBA.

a) The Coxs River is a 6th order stream where the Study Area intersects it.

b) The total area of the riparian buffer which may potentially be impacted upon Study Area is approximately 0.02 ha. This area (0.02 ha) is made of an area of approximately 20 metres x 10 metres.

c) This area (0.02 ha) comprises a disturbed variant of HN602 Tableland swamp meadow on impeded drainage sites of the western Sydney Basin and South Eastern Highlands.

d) There is potential for indirect impacts upon the water course as a result of sediment and erosion.

e) This area which exists in a disturbed state is proposed to be temporarily impacted upon by trenching followed by rehabilitation. Consequently, the net loss of this riparian buffer is proposed to be negligible following rehabilitation. Indirect impacts from erosion and sedimentation are not anticipated provided that the minimisation measures in **Section 4.3** are adhered to.

5.2 Impacts on Native Vegetation

The Study Area contains a disturbed variant of vegetation described as HN602 (Tableland swamp meadow on impeded drainage sites of the western Sydney Basin and South Eastern Highlands), which is considered to be commensurate with *Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions* EEC. This EEC is specifically mentioned in the Secretary's Environmental Assessment Requirements (SEARs) as requiring detailed consideration. The following provides additional information in response to matters listed in Section 9.2.4.2 of the FBA.

a) Approximately 0.02 ha of the above mentioned EEC may potentially be impacted upon within Study Area. This area (0.02 ha) is made of an area of approximately 20 metres x 10 metres of disturbed and degraded condition vegetation.

b) The linear development module was used to calculate this Project, consequently, the 550 metre buffers were applied and this EEC was not identified within it.

c) An estimate of the extent within the region has been gained from the vegetation of the Western Blue Mountains (DEC 2006). Approximately 97.6 ha of the MU 53 commensurate with HN602 has been mapped within the region. Approximately 84.5 % of this HN602 is classified as being highly disturbed within the region.

d) (i) The small and temporary impacts are not anticipated to have any long term impacts to the abiotic factors critical to the survival of the EEC.

(ii) Characteristic and functional species may be temporarily impacted and these species should be replaced during rehabilitation of the area.

(iii) As a result of the ground disturbance, there is potential for indirect impacts such as; assisting the introduction of weeds and/or pathogens (e.g. Phytophthora and Chytrid fungus). These potential indirect impacts should be minimised by stringent weed control and wash down procedures as outlined in **Section 4.3**.

e) There is unlikely to be any fragmentation of the EEC following the planned rehabilitation.

f) Proposed mitigation including active rehabilitation and weed control program following Project construction would not diminish the recovery of the EEC in the IBRA subregion.

5.3 Impacts on Threatened Species

The Study Area contains an endangered flora species (*Caesia parviflora* var. *minor*) which is specifically nominated in the SEARs as requiring additional consideration. In addition, a critically endangered species avifauna species (Regent Honeyeater) has been assessed as likely to occur within the Project area. The following provides additional information with regards to the matters listed in Section 9.2.5.2 of the FBA.

Regent Honeyeater

a) The Regent Honeyeater has been well-documented from the Capertee and Glen Alice area, located within approximately 38 km north of the Study Area. One individual was recently observed on the Coxs River at Little Hartley; approximately 20 km from the Study Area (October 2015). One record exists within the Wolgan State Forest, and another record near Ben Bullen, approximately 17 km north-east of the Study Area.

b) (i) Habitat for the Regent Honeyeater occurs within the region, with areas of high importance located within Capertee Valley to the north. This species is periodically observed within the locality with the most recent Regent Honeyeater observation in October 2015 along the Coxs River at Little Hartley. Habitat critical to the survival of these species within the locality is generally associated with various Box species, particularly White Box (*Eucalyptus albens*) and Yellow Box (*Eucalyptus melliodora*). Neither of these species were observed within the Study Areas. In addition, there were few mistletoe occurrences; another indicator of habitat suitability. While the Study Area is located nearby important Regent Honeyeater habitat areas (i.e. Capertee Valley), it is considered that the absence of important habitat values such as Box species substantially limits the Study Area's value for the Regent Honeyeater.

(ii) The Project is unlikely to reduce the area of occupancy of this highly mobile species (i.e. remove, alter or fragment a habitat patch of importance to the species).

(ii) The breeding cycle of a population of the Regent Honeyeater, if present, is unlikely to be disrupted by the Project as there is no evidence of breeding or suitable breeding habitat within the Study Area.

c) *Eucalyptus albens* (White Box), *Eucalyptus melliodora* (Yellow Box), *Eucalyptus leucoxylon* (Yellow Gum) and *Eucalyptus sideroxylon* (Mugga Ironbark) growing in high quality sites, where nectar production is copious and relatively predictable, appear to be critical to the survival of the Regent Honeyeater (Menkhorst et. al. 1999). None of these tree species have been recorded within the Study Area. Therefore, no critical habitat will be affected. The small loss of potential foraging habitat from clearing would not constitute a decrease in the availability or quality of habitat to the extent that the species is likely to decline.

d) The habitat to be removed will not force fragmentation upon a population of this species, if it occurred within the Study Areas.

e) The Regent Honeyeater has been well-documented from the Capertee and Glen Alice area, located within approximately 38 km north of the Study Area. One record exists within the Wolgan State Forest, and another record near Ben Bullen, approximately 17 km north-east of the Study Area. Due to the widespread distribution of winter-flowering Eucalypt species within the region, the potential habitats in the Study Areas would not be of high importance to this species.

f) The Project is unlikely to contribute to an increase in invasive species that may be harmful to this species.

g) Proposed mitigation including active rehabilitation and weed control program following Project construction would not diminish the recovery of the species in the IBRA subregion.

Caesia parviflora* var. *minor

a) The endangered herb *C. parviflora* var. *minor* was identified in both the Northern and Southern Study Areas (n=3), with two specimens observed in the eastern 'in common' section. Notwithstanding, *C. parviflora* var. *minor* is a cryptic species that cannot be detected outside of its flowering period (spring-summer) and the surveys within the Southern Study Area were conducted outside of this period. The individuals of *C. parviflora* var. *minor* observed within the Southern Study Area, although these records were within the 'in common' part of the Northern and Southern Study Areas. Given this, a precautionary approach has been adopted whereby three individuals have been assumed present within the Southern Study Area. It is recommended that pre-clearance surveys are conducted within the Southern Study Area during the flowering period to confirm this assumption and where possible provide mitigation measures.

   For the purposes, of this assessment the local population has been defined as occurring within approximately 6 km of the Study Area. RPS have recently recorded approximately 181 individuals in unpublished findings in addition to a single location obtained from the Bionet Atlas database (i.e. one location with 24 individuals). This gives a combined local population estimate of 206 individuals. However, due to the cryptic nature of this species and the difficulty involved in positive identification (refer to section (b) below), the local population is considered to be much larger than the individuals which have been previously recorded within proximity of the site. Given the above records, it is estimated that the loss of *C. parviflora* var. *minor* would be less than 1.5% of the local population.

b) Habitat for the *Caesia parviflora* var. *minor* is described as damp places in open forest on sandstone. This variety may be more common than currently known, as Pale Grass-lilies are often not identified to variety level (OEH 2016). Two other larger varieties of *C. parviflora* have been described and are more common and widespread. A small or stunted *C. parviflora* of another variety may potentially be mistaken for *C. parviflora* var. *minor.* RPS surveys identified *Caesia parviflora* var. *minor* and individuals of *Caesia parviflora* var. *parviflora.* These identifications were also confirmed by the Royal Botanic Gardens and Domain Trust.

   The majority of the Project is located within areas where *C. parviflora* var. *minor* has not been recorded and the sandstone habitats in which it is known to occur only occur in the eastern end of the Study Areas on the Newnes Plateau. Where the suitable habitats does exist this linear development is only temporarily clearing the side of existing tracks, pipelines and powerline easements which will regrow following the initial disturbance. Therefore, the Project is unlikely to permanently decrease the available habitat for the species.

c) The ecology and biology of the residual plant population is not considered to be at a disadvantage as a result of the Project.

d) Where the suitable habitats does exist for *C. parviflora* var. *minor,* the proposed linear development is only temporarily clearing the side of existing tracks, pipelines and powerline easements which will regrow following the initial disturbance. Consequently, the development is not likely to isolate or fragment any local populations of *C. parviflora* var. *minor.*

e) Due to the limited information available with regards to *C. parviflora* var. *minor* (OEH 2016). It is currently very difficult to comment on the relationship of the local population to other populations of the species.

f) The Project is unlikely to contribute to an increase in invasive species that may be harmful to this species.

g) Proposed mitigation including active rehabilitation and weed control program following Project construction would not diminish the recovery of the species in the IBRA subregion.

5.4 Impacts for which the Assessor is Required to Determine an Offset

The Project involves the removal of PCTs (with a site value score of >17) associated with threatened species habitat. Therefore, a biodiversity offset requirement is to be calculated via application of the FBA BioBank Calculator.

5.5 Impacts for which the Assessor is Not Required to Determine an Offset

All relevant considerations have been captured by above categories.

5.6 Impacts that Do Not Require Further Assessment by the Assessor

All relevant considerations have been captured by above categories.

6.0 Offset Requirements

6.1 Credit Report

The Development BioBank Credit Report generated by the BioBanking Credit Calculator is provided in **Appendix 2**. A summary of the ecosystem credits required is provided in **Table 17** and a summary of the species credits required is provided in **Table 18**.

Table 17 Summary of Ecosystem Credits Required

Vegetation Community	Northern Area (ha)	Northern Credits	Southern Area (ha)	Southern Credits
HN508 Blue Mountains Mallee Ash - Dwarf Casuarina heath of the upper Blue Mountains, Sydney Basin	0.00	0	0.17	6
HN514 Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands	0.47	22	0.47	22
HN558 Narrow-leaved Peppermint - Mountain Gum - Brown Barrel moist open forest on high altitude ranges, northern South Eastern Highlands	1.11	58	1.24	70
HN570 Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highland (Poor Condition)	21.22	779	21.45	793
HN570 Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highland	1.49	79	1.26	67
HN572 Ribbon Gum - Snow Gum grassy forest on damp flats, eastern South Eastern Highlands	0.63	24	0.61	21
HN599 Sydney Peppermint - Narrow-leaved Peppermint shrubby open forest on sheltered slopes of the Newnes Plateau, Sydney Basin	0.73	35	0.19	9
HN600 Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin	1.71	91	5.57	248
HN602 Tableland swamp meadow on impeded drainage sites of the western Sydney Basin and South Eastern Highlands	0.02	1	0.02	1
HN630 *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands	0.46	8	0.46	8
Total	**27.84**	**1097**	**31.44**	**1245**

In interpreting the credit quantum's outlined in Table 17 it should be noted that a maximum impact liability has been calculated for the area where the water treatment plant is to be constructed. It is noted that the impact extent for HN570 (in poor condition) within that area is estimated to be 19.44 ha and that there is potential for the Project to reduce the loss of HN570 through careful placement and design. These impact avoidance outcomes are not yet known and can only be calculated once further design details are available for analysis.

Table 18 Summary of Species Credits Required

Species	Northern Study Area	Northern Species Credits	Southern Study Area	Southern Species Credits
Eucalyptus cannonii (Capertee Stringybark)	3	39	3	39
Caesia parviflora var. *minor* (Pale Grass-lily)	3	42	3	42
Large-eared Pied Bat (*Chalinolobus dwyeri*)	0.73 ha	9	0.36 ha	5
Total	**-**	**90**	**-**	**86**

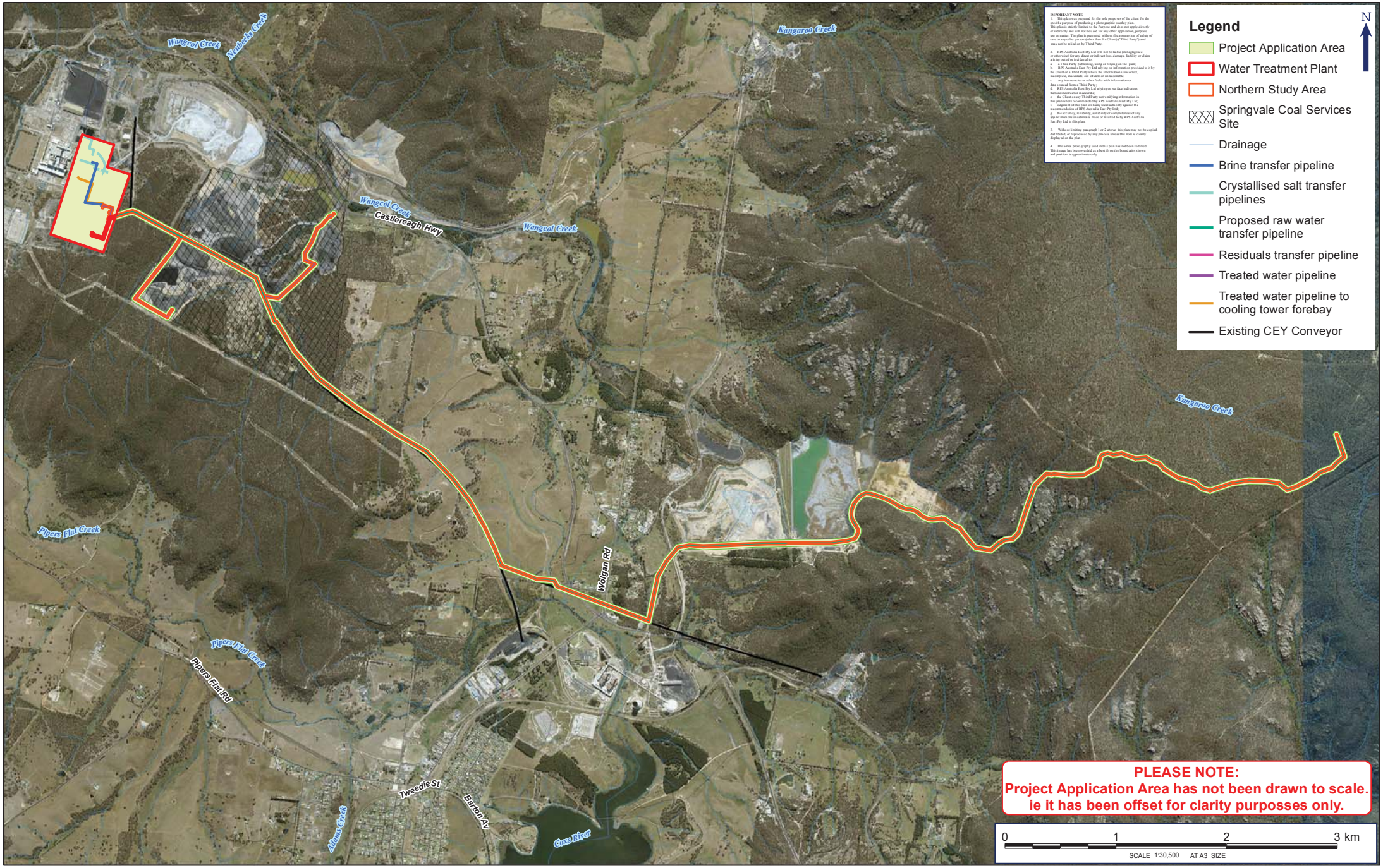
The Southern Study Area would result in approximately 3.60 ha of additional clearing when compared to the Northern Study Area. Consequently, the ecosystem credit requirements for the Southern Study Area are 157 credits higher than that of the Northern Study Area. Conversely, the Northern Study Area requires a slightly higher number of Species credits to be retired as a result of the larger area of potential habitat for the Large-eared Pied Bat which is proposed to be impacted upon. Based upon these findings, the Northern Study Area will result in less biodiversity impacts when compared to the Southern Study Area.

6.2 Project Application Area

This report provides survey results and impact assessments for both the Northern and Southern Study areas. A comparison of potential impacts for the two study areas is included in **Section 4.0**. The comparison concluded the Southern Study Area would likely have a greater impact on biodiversity. The vegetation clearing within the Northern Study Area is less than the vegetation clearing (31.44 ha) required for the Southern Study Area.

The Northern Study Area, as shown in **Figure 1**, has been selected as the preferred route and is hereafter referred to as the Project Application Area as shown in **Figure 6**. Consequently, the Southern Study Area is not discussed any further in this report.

The Project Application Area corresponds to the area surveyed and assessed within the Northern Study Area described in **Section 1.2**, and includes the northern pipeline route on Newnes Plateau. This option has been selected based on the ecological assessment (this report) in conjunction with geomorphological assessments undertaken for the two study areas. Vegetation clearing within the Project Application Area will be 27.84 ha and corresponds to the disturbance footprint noted in **Section 1.3** for the Northern Study Area. It is this quantum of vegetation clearing that has been used in the Projects' biodiversity offset calculations in accordance with FBA (OEH, 2014) and reported in **Section 7.0**.



TITLE : **FIGURE 6: PROJECT APPLICATION AREA**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **17/08/2016**

PURPOSE: **BAR**

VERSION (PLAN BY): A A3 (Natalie.Wood)

PATH: J:\JOBS\Centennial\All Jobs\131758 JV Energy Australia Springvale\10 - Drafting\Arcgis Map Documents\Eco\BioBanking Figures\131758 Figure 6 PAA BAR A A3 20160812.mxd

CLIENT: **CENTENNIAL COAL**

JOB REF: **PR131758**

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Stage 3 – Biodiversity Offset Package

7.0 Biodiversity Offset Package

7.1 Overview

The Project fits within the Western Region Biodiversity Offset Package (WRBOP) (Centennial Coal 2016 *in prep.*) and has been relied on in the compilation of the BOP for this Project. The WRBOP comprises a number of Centennial owned/ controlled sites identified in the Strategic Lands Assessment (Centennial 2012) as suitable for biodiversity offsetting purposes. The WRBOP includes offset lands, land management initiatives and rehabilitation as part of a holistic approach to conservation and enhancement of biodiversity values within the greater Lithgow area (Centennial Coal 2016 *in prep.*). The following sections outline how the WRBOP (Centennial Coal 2016 *in prep.*) was used to address the offsetting requirements for this Project. These sites are listed below in **Table 19**.

Table 19 Summary of Potential Biodiversity Offset Site

Description	Site	Lot and DP
Direct Offset	Airly	Lot 59 DP755757 Lot 135 DP755757 Lot 163 DP48336
	Wolgan Road North	Lot 56 DP751636 Lot 100 DP1033592
	Commonwealth Colliery	Lot 1 DP65810 Lot 1 DP52856
Land Management	Wolgan Road South	Lot 1 DP597541, Lot 25 DP827626 and Lot 27 DP827626
	Brays Lane	Lot 164 DP751651 Lot 4 DP1088207 Two lots - Lot 101 DP 1137972
	Coxs River	Lot 1 DP751636 Lot 15 DP751636 Lot 2 DP751636 Lot 24 DP751636 Lot 28 DP751636 Lot 4 DP751636 Lot 6 DP751636 Lot 23 DP827626 Lot 26 DP827626 Lot 358 DP44086

The WRBOP was initially prepared for the Springvale Mine Extension Project EIS (SSD 5594) (RPS 2014) and is presently being updated to address the offsetting needs for this Project (Centennial Coal 2016 *in prep.*). The following sections outline how the WRBOP (Centennial Coal 2016 *in prep.*) would be used to address the offsetting requirements for this Project.

7.2 Preliminary Assessment of Ecological Values to be Addressed

The Project will result in the loss of approximately 27.84 ha within the preferred route (Northern Study Area), as outlined in **Section 6.1**. The Biodiversity Offset Package designed to address these impacts is provided in the WRBOP (Centennial Coal 2016 *in prep*). A summary of how this package would address the Project impacts is outlined in the following sections.

7.3 Suitability

The biodiversity offsets would be land based and are within an area owned/ controlled by Centennial Coal. A combination of direct and land management offsets are proposed. The suitability of these offsets for the Project have been assessed using 'ecosystem' and 'species' credits, as outlined in the following sections.

7.3.1 Ecosystem Credits

A credit profile for an ecosystem credit defines two attributes that collectively represent the key criterion for offsetting rules, these being:

- IBRA subregion
- PCT.

Potential offset sites considered in this analysis are listed in the WRBOP. The following sections discuss offset site suitability against the PCT and IBRA subregion eligibility criteria.

7.3.1.1 IBRA Subregions

According to the FBA, ecosystem credits can only be sourced from the IBRA subregion that the development occurs within, any adjoining IBRA subregion of the same IBRA region or any other adjoining IBRA subregion. As the Project crosses two IBRA subregions, this means that the offset site(s) for ecosystem credits must be located within those regions or adjacent regions, these being:

- Capertee (Sydney Basin Bioregion) – Project impact.
- Wollemi (Sydney Basin Bioregion) – Project impact.
- Burragoorang (Sydney Basin Bioregion) – Adjacent subregion.
- Hill End (South Eastern Highlands Bioregion) – Adjacent subregion.

The suitability of potential offset sites described in the WRBOP (Centennial Coal 2016 *in prep*), with regards to the IBRA subregion criteria, is outlined in **Table 20**.

Table 20 Potential Offset Site Suitability: IBRA subregions

Potential Offset Site (WRBOP)	IBRA subregion	Suitable?
Direct		
Airly	Capertee (Part B)	Yes
Wolgan Road North	Capertee (Part B)	Yes
Lamberts Gully	Capertee (Part B)	Yes
Commonwealth Colliery	Capertee (Part B)	Yes
Land Management		
Wolgan Road South	Capertee (Part B)	Yes
Brays Lane	Capertee (Part B)	Yes
Coxs River	Capertee (Part B)	Yes

7.3.1.2 PCTs

The BioBanking Credit reports provided in **Appendix 2** outline the 'like for like' PCT offset options available for each of the PCTs impacted by the Project. **Table 21** lists the PCTs impacted by the Project and corresponding PCT offset options.

Table 21 Potential Offset Site Suitability: IBRA Subregions

PCT (Impact)	PCT Offset Options
Narrow-leaved Peppermint - Mountain Gum - Brown Barrel moist open forest on high altitude ranges, northern South Eastern Highlands Bioregion, (HN558)	Narrow-leaved Peppermint - Mountain Gum - Brown Barrel moist open forest on high altitude ranges, northern South Eastern Highlands Bioregion, (HN558) Blaxland's Stringybark - Blue Mountains Ash - Blackwood moist open forest on basalt caps of the Blue Mountains, Sydney Basin Bioregion, (HN507) Brown Barrel - Mountain Grey Gum tall moist forest on basalts of the Southern Highlands Bioregion and Sydney Basin Bioregion, (HN516) Sydney Peppermint - White Stringybark moist shrubby forest on elevated ridges, Sydney Basin Bioregion, (HN601)
Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion, (HN514)	Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion, (HN514) Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion, (HN614) Ribbon Gum - Yellow Box grassy woodland on undulating terrain of the eastern tablelands, South Eastern Highlands Bioregion, (HN573)
Ribbon Gum - Snow Gum grassy forest on damp flats, eastern South Eastern Highlands Bioregion, (HN572)	Ribbon Gum - Snow Gum grassy forest on damp flats, eastern South Eastern Highlands Bioregion, (HN572)
Sydney Peppermint - Narrow-leaved Peppermint shrubby open forest on sheltered slopes of the Newnes Plateau, Sydney Basin Bioregion, (HN599)	Sydney Peppermint - Narrow-leaved Peppermint shrubby open forest on sheltered slopes of the Newnes Plateau, Sydney Basin Bioregion, (HN599) Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin Bioregion, (HN600)
Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin Bioregion, (HN600)	Sydney Peppermint - Narrow-leaved Peppermint shrubby open forest on sheltered slopes of the Newnes Plateau, Sydney Basin Bioregion, (HN599) Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin Bioregion, (HN600)
Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion, (HN570)	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion, (HN570) Inland Scribbly Gum - Brittle Gum low woodland of the eastern tablelands, South Eastern Highlands Bioregion, (HN543)
Tableland swamp meadow on impeded drainage sites of the western Sydney Basin Bioregion and South Eastern Highlands Bioregion, (HN602)	Tableland swamp meadow on impeded drainage sites of the western Sydney Basin Bioregion and South Eastern Highlands Bioregion, (HN602)

PCTs included in the WRBOP are listed in **Table 22**. A suitability analysis on the basis of 'like for like' PCTs, as impacted by the Project, is also provided.

Table 22 Potential Offset Site Suitability: 'Like for Like' PCTs

Potential Offset Site	Western Blue Mountains Vegetation Community (DEC 2006)	PCT	Suitable
Direct			
Airly	MU13 Tableland Gully Ribbon Gum - Blackwood - Apple Box Forest	HN501	No
	MU20 Capertee Rough-barked Apple - Redgum - Yellow Box Grassy Woodlands	HN614	Yes (HN514)
	MU20 Capertee Rough-barked Apple - Redgum - Yellow Box Grassy Woodlands (Derived grasslands)	HN614	Yes (HN514)
	MU21 Capertee - Wolgan Slopes Red Box - Grey Gum - Stringybark Grassy Open Forest	HN534	No
	MU38 Capertee Grey Gum - Narrow-leaved Stringybark - Scribbly Gum - Callitris - Ironbark Shrubby Open Forest	HN534	No
	MU38 Capertee Grey Gum - Narrow-leaved Stringybark - Scribbly Gum - Callitris - Ironbark Shrubby Open Forest (Derived grasslands)	HN534	No
	MU42 Capertee Hills White Box - Tumbledown Redgum - Ironbark - Callitris Shrubby Woodland	HN544	No
	MU54 Capertee - Wolgan Riparian Rough-barked Apple - River Oak Open Forest	HN574	No
Wolgan Road North	MU8 Newnes Sheltered Peppermint - Brown Barrel Shrubby Forest	HN599	Yes (HN599)
	MU11 Tableland Gully Snow Gum - Ribbon Gum Montane Grassy Forest	HN572	Yes (HN572)
	MU11 Tableland Gully Snow Gum - Ribbon Gum Montane Grassy Forest (derived grasslands)	HN572	Yes (HN572)
	MU15 Tableland Hollows Black Gum - Black Sally Open Forest	HN504	No
	MU15 Tableland Hollows Black Gum - Black Sally Open Forest (derived grasslands)	HN504	No
	MU28 Sandstone Plateau And Ridge Scribbly Gum - Silver-top Ash Shrubby Woodland	HN600	Yes (HN600)
	MU29 Sandstone Slopes Sydney Peppermint Shrubby Forest	HN600	Yes (HN600)
	MU30 Exposed Blue Mountains Sydney Peppermint - Silver-top Ash Shrubby Woodland	HN600	Yes (HN600)
	MU35 Tableland Gully Mountain Gum - Broad-leaved Peppermint Grassy Forest	HN590	No
	MU37 Coxs Permian Red Stringybark - Brittle Gum Woodland	HN570	Yes (HN570)
	MU37 Coxs Permian Red Stringybark - Brittle Gum Woodland (derived grasslands)	HN570	Yes (HN570)
	MU43 Pagoda Rock Sparse Shrubland	HN544	No
	MU53 Mountain Hollow Grassy Fen	HN602	Yes (HN602)
Lamberts Gully	MU11 Tableland Gully Snow Gum - Ribbon Gum Montane Grassy Forest	HN572	Yes (HN572)
	MU15 Tableland Hollows Black Gum - Black Sally Open Forest	HN504	No
Commonwealth Colliery	MU11 Tableland Gully Snow Gum - Ribbon Gum Montane Grassy Forest	HN572	Yes (HN572)
	MU15 Tableland Hollows Black Gum - Black Sally Open Forest	HN504	No
	MU33 Tableland Broad-leaved Peppermint - Brittle Gum - Red Stringybark Grassy Open Forest	HN514	Yes

Potential Offset Site	Western Blue Mountains Vegetation Community (DEC 2006)	PCT	Suitable
Land Management			
Wolgan Road South	MU11 Tableland Gully Snow Gum - Ribbon Gum Montane Grassy Forest	HN572	Yes (HN572)
	MU15 Tableland Hollows Black Gum - Black Sally Open Forest	HN504	No
	MU37 Coxs Permian Red Stringybark - Brittle Gum Woodland	HN570	Yes (HN570)
Brays Lane	MU15 Tableland Hollows Black Gum - Black Sally Open Forest (derived grassland)	HN504	No
Coxs River	MU15 Tableland Hollows Black Gum - Black Sally Open Forest	HN504	No
	MU15 Tableland Hollows Black Gum - Black Sally Open Forest (derived grassland)	HN504	No

7.3.1.3 WRBOP Adequacy

The BioBanking Credit reports provided in **Appendix 2** outline the 'like for like' PCT offset options available for each of the PCTs impacted by the Project. **Table 23** listed the PCTs impacted by the Project and corresponding PCT offset options. Negative balances are presented in (brackets).

Table 23 Net Balance: PCT 'Like for Like' Ecosystem Credits

Vegetation Community	Available Credits WRBOP	Northern Study Area	
		Required Credits	WRBOP Net Balance
HN514 Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands	1,165	22	1,143
HN558 Narrow-leaved Peppermint - Mountain Gum - Brown Barrel moist open forest on high altitude ranges, northern South Eastern Highlands	(953)	58	(1,011)
HN570 Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highland	(84)	858	(942)
HN572 Ribbon Gum - Snow Gum grassy forest on damp flats, eastern South Eastern Highlands	237	24	216
HN599 Sydney Peppermint - Narrow-leaved Peppermint shrubby open forest on sheltered slopes of the Newnes Plateau, Sydney Basin	(34)	35	(69)
HN600 Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin	(2,137)	91	(2,228)
HN602 Tableland swamp meadow on impeded drainage sites of the western Sydney Basin and South Eastern Highlands	10	1	9
HN630 *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands	0	8	(8)
Total	**-1,796**	**1,097**	**-2,890**

Considerable opportunity exists to reduce the impact on HN570 within the area where the water treatment plant is to be constructed. The ecosystem credit to area ratio is 36.96 ecosystem credits per hectare, with the maximum potential impact reduction possible for this part of the Study Area being 19.44 ha. Detailed design is required to substantiate any impact avoidance outcomes gained for this part of the Project.

A comparison between the Projects' offsetting requirements and WRBOP ecosystem credit availability at a vegetation formation level (i.e. variation rule Section 10.5.4.1 of the FBA) is provided in **Table 24** to investigate the alternative trading arrangements available under the FBA. Negative balances are presented in (brackets).

Table 24 Net Balance: Formation 'Like for Like' Ecosystem Credit

Formation	WRBOP	Northern Study Area	
		Required Credits	WRBOP Net Balance
Grassy Woodlands	3,518	22	3,496
Dry Sclerophyll Forests (Shrubby subformation)	2,267	984	1,283
Wet Sclerophyll Forests (Shrubby subformation)	(953)	58	(1,011)
Freshwater Wetlands	10	9	1
Total	**4,852**	**1,082**	**3,770**

Using FBA variation rule Section 10.5.4.2(a), the WRBOP would satisfy the ecosystem credit demand for all PCTs impacted by the Project with the exception of HN558 Narrow-leaved Peppermint - Mountain Gum - Brown Barrel moist open forest on high altitude ranges, northern South Eastern Highlands Bioregion (i.e. offsetting at a vegetation formation level). As HN558 is not listed as a threatened ecological community under the EPBC Act, it is possible to consider the application of FBA variation rule Section 10.5.4.2(b) to address this shortfall. Pending consideration of this offsetting approach by the OEH, it is considered that the Project can satisfy its biodiversity offsetting requirements in a manner compliant with the FBA.

7.3.2 Species Credits

Threatened species included in the WRBOP are listed in **Table 25**. A 'like for like' suitability analysis of the WRBOP relative to the Project impacts is also provided.

Table 25 Potential Offset Site Suitability: 'Like for Like' Threatened Species

Species	WRBOP	Northern Study Area	
		Required Credits	WRBOP Net Balance
Eucalyptus cannonii (Capertee Stringybark)	36	39	(3)
Caesia parviflora var. *minor* (Pale Grass-lily)	0	42	(42)
Large-eared Pied Bat (*Chalinolobus dwyeri*)	(1,015)	9	(1,024)
Total		**90**	

Table 25 identifies the WRBOP to be deficient in the provision of 'like for like' species credits for all three species. Section 10.5.7.1 of the FBA allows for a variation to species credit trading as specified in Section 10.5.6 (i.e. like for like species credits). A comparison between the Projects offsetting requirements and WRBOP species credit availability at a life-form (flora) or 'order' (fauna) level, as permitted under Section 10.5.7.3 of the FBA, is provided in **Table 26** to investigate the alternative trading arrangements available under the FBA.

Table 26 Potential Offset Site Suitability: 'Like for Like' Threatened Species

Impact Species	WRBOP Alternative species[5]	WRBOP	Project Application Area (Northern Study Area)	
			Required Credits	WRBOP Net Balance
Eucalyptus cannonii (Capertee Stringybark)	*Eucalyptus aggregata* (Black Gum)	2,436	39	2,397
Caesia parviflora var. *minor* (Pale Grass-lily)	No Schedule 1 or 1A species available as alternative	0	42[6]	(42)
Large-eared Pied Bat (*Chalinolobus dwyeri*)	Large-eared Pied Bat (*Chalinolobus dwyeri*)	(1,015)	9	(1,024)
Total		**4,322**	**90**	**1,331**

The WRBOP would satisfy, at a life-form or 'order' level, the Projects' species credit demand for one of the three species impacted (i.e. use of variation rule specified under Section 10.5.7.3(b) of the FBA). Variation rules cannot be applied to the Large-eared Pied Bat (*Chalinolobus dwyeri*), as this species is listed on the EPBC Act (exclusion identified under Section 10.5.7.2(b)). The WRBOP would be in deficit for this species.

However, alternative offsetting arrangements exist for *Caesia parviflora* var. *minor* (Pale Grass-lily) despite the unavailability of a 'like for like' or suitable variation option under Section 10.5.7.3(b) of the FBA). Additional species credit trading options would need to be incorporated into the WRBOP to satisfy a variation under Section 10.5.7.3(b) (i.e. find an offset site containing an endangered or critically endangered flora species listed under the TSC Act) or consider options for supplementary measures for species credits under Section 10.5.7.5. The most suitable offsetting approach would be determined following the consideration of impact avoidance options available at the detailed design and/ or construction stage (i.e. use of pre-clearance surveys to achieve impact avoidance outcomes).

7.4 Assessment of the Biodiversity Offset Package Against Principles for Biodiversity Offsetting

The following provides an assessment of the proposed biodiversity offsets against these principles.

7.4.1 Impact Avoidance and Mitigation

Global design initiatives used in the Project for avoiding disturbances on biodiversity values are listed below:

- Alignment of the pipeline, where possible, with existing disturbances (e.g. cleared lands, existing pipelines) to reduce the need for vegetation clearing; and
- Placement of the water treatment plant within a previously disturbed area.

[5] Plant species identified as being potentially suitable for offsetting under FBA variation rule Section 10.5.7.3(b)
[6] Assumed impact. Liability may be reduced following implementation of impact avoidance during detailed design/ construction stages (i.e. pre-clearance surveys).

Notwithstanding these design imperatives, two separate pipeline routes were considered. At a native vegetation scale it was found that the Northern Study Area would have a lesser impact on biodiversity values (i.e. 3.60 ha).

Further opportunity still exists to reduce the Project impacts, specifically in the area where the water treatment plant would be established (i.e. the impact footprint for the water treatment plant is approximately half the area assessed). Through careful design, it is considered that the calculated ecosystem credit liability for HN570 may be reduced by a maximum of 719 ecosystem credits should an impact outcome of 19.44 ha be achieved within this part of the Study Area.

Other key impact management actions include various mitigation strategies as outlined in **Sections 4.3**.

7.4.2 Basis for Assessing Biodiversity Losses and Gains

The BOP has been developed to target the PCTs and threatened species impacted by the Project. Where there is a shortfall in ecosystem credits for PCTs impacted by the Project, additional offsets have been provided in the WRBOP at the vegetation formation level. Further opportunity to provide additional ecosystem credits through the WRBOP exists utilising high conservation value PCTs such as NH504 (MU15 Tableland Hollows Black Gum - Black Sally Open Forest) and HN614 (MU20 Capertee Rough-barked Apple - Redgum - Yellow Box Grassy Woodlands), which are both listed as TECs.

7.4.3 Offsets must be Targeted to the Biodiversity Values Being Lost

The Project impacts can be largely satisfied by the WRBOP at a vegetation formation level as allowed for under Section 10.5.4.1 of the FBA. The shortfall in suitable vegetation formation level offsets for impacts on HN558 would be addressed through the current revision process being performed for the WRBOP (Centennial 2016 *in prep*.).

7.4.4 Offsets must be Additional to Other Legal Requirements

The offset lands provided for in the WRBOP satisfy the ‘additionality’ rule outlined in the FBA.

7.4.5 Offsets must be Enduring, Enforceable and Auditable

The WRBOP outlines the conservation mechanisms used to deliver biodiversity offsets. They are designed to be enduring, enforceable and auditable.

7.4.6 Supplementary Measures can be Used in Lieu of Offsets

No supplementary measures are proposed as it is intended to deliver the biodiversity offsets through the WRBOP.

7.4.7 Offsets can be Discounted Where Significant Social and Economic Benefits Accrue to NSW

No proposal to request a discounted biodiversity offset requirement is included in this BOP.

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Appendix 1

Biodiversity Inventory and EPBC Act Assessment (RPS 2016)

Springvale Water Treatment Project

Biodiversity Inventory and EPBC Act Assessment

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Approval for Issue

Name	Signature	Date
Arne Bishop		11 August 2016

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Terms & Abbreviations

Abbreviation	Description
API	Aerial Photograph Interpretation
CEEC	Critically Endangered Ecological Community
DBH	Diameter at Breast Height
DEC	NSW Department of Environment and Conservation – now known as OEH
DECC	NSW Department of Environment and Climate Change – now known as OEH
DECCW	NSW Department of Environment, Climate Change and Water– now known as OEH
DLWC	Former NSW Department of Land and Water Conservation
DoE	Commonwealth Department of the Environment
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EP&A Act	NSW *Environmental Planning and Assessment Act* 1979
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999
GDE	Groundwater Dependent Ecosystem
GIS	Geographic Information System
GPS	Global Positioning System
KTP	Key Threatening Process
LGA	Local Government Area
MU	Map Unit
NES	National Environmental Significance
NPWS	NSW National Parks and Wildlife Services
NSW Fisheries	NSW Department of Industry & Investment - Fisheries
OEH	NSW Office of Environment and Heritage
PFC	Projected Foliage Cover
ROTAP	Rare or Threatened Australian Plants
RPS	RPS Australia East Pty Ltd
SEPP	State Environmental Planning Policy
TEC	Threatened Ecological Community
TSC Act	NSW *Threatened Species Conservation Act* 1995

Summary

Introduction

RPS Australia East Pty Ltd (RPS) has been engaged by Springvale Coal Pty Limited to undertake a Biodiveristy Assessment Report (BAR) inclusive of a Biodiversity Inventory and EPBC Act Assessment Report (this report) for the proposed Springvale Water Treatment Project (the Project). The Project comprises a 20 m wide linear pipeline corridor extending between the existing Gravity Tank on Newnes Plateau and the Water Treatment Plant location within the Mount Piper Power Station (MPPS) site, the existing Gravity Tank site compound, the water treatment plant location at MPPS and a network of pipelines from the water treatment plant to the Springvale Coal Services Site and the cooling towers at MPPS.

Two potential pipeline alignments on Newnes Plateau have been investigated for the pipeline section traversing between the Gravity Tank and the existing Springvale Mine's licensed discharge point (LDP) 009; a northern and southern alignment. In this report the study area with the northern pipeline alignment is referred to as the Northern Study Area while study area with the southern pipeline alignment is referred to as the Southern Study Area. The Northern and Southern Study Areas are collectively referred to as the Study Area.

An improved environmental outcome is proposed in the Project through the transfer of water from existing underground mine dewatering facilities for treatment within the water treatment plant and subsequent reuse at the MPPS's cooling towers. Treated water that is not able to be used at MPPS will be discharged into Wangcol Creek, within the upper catchment of the Coxs River.

Objectives

This report aims to describe the biodiversity values within the Study Area as part of an BAR performed in accordance with the Framework for Biodiversity Assessment (FBA). The FBA assessment is to consider threatened species, populations or ecological communities listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This report also provides an assessment of the Matters of National Environmental Significance (MNES) and any other matters such as relevant State Environmental Planning Policies (SEPPs) which are currently not assessed under the FBA.

Key Vegetation and Flora Findings

There were 15 vegetation types in accordance with DEC (2006) identified within the Study Area. Those listed forming part of a listed ecological community are listed below:

- MU 11 corresponds to Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions Endangered Ecological Communtiy (EEC) listed under the TSC Act; and
- MU 53 corresponds to Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions EEC listed under the TSC Act.

A total of 174 flora species were identified within the Study Area. Three threatened flora species were detected within the Northern Study Area, whilst two threatened flora were detected within the Southern Study Area, as listed below:

- *Caesia parviflora* var. *minor* (Small Pale Grass Lily) (Northern and Southern Study Areas);
- *Persoonia hindii* (Northern and Southern Study Area); and

- *Veronica blakelyi* (Northern Study Area).

Additionally, two threatened flora species were detected immediately adjacent both Study Areas, including:

- *Eucalyptus aggregata* (Black Gum); and
- *Eucalyptus cannonii* (Capertee Stringybark).

Key Fauna Findings

A total of 98 fauna species were detected within the Study Areas during field surveys, including 23 mammals, 70 birds, three reptiles and two frog species. Eleven threatened fauna species listed under the TSC Act and/or EPBC Act were detected during RPS surveys across both the Northern and Southern Study Areas:

- Scarlet Robin (*Petroica boodang*);
- Little Eagle (*Hieraaetus morphnoides*);
- Gang-gang Cockatoo (*Callocephalon fimbriatum*);
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*);
- Powerful Owl (*Ninox strenua*) (Northern Study Area only);
- Brown Treecreeper (eastern subsp.) (*Climacteris picumnus victoriae*);
- Large-eared Pied Bat (*Chalinolobus dwyeri*);
- Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*);
- Greater Glider (*Petauroides volans*);
- Speckled Warbler (*Chthonicola sagittata*) (Southern Study Area only); and
- Little Lorikeet (*Glossopsitta pusilla*) (Southern Study Area only).

Assessment

Assessments performed in accordance with the *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance* (DoE 2013a) have assessed Matters of National Environmental Significance (MNES) listed under the EPBC Act with the potential to be impacted by the Project. These assessments have concluded that the Project is not likely to have a significant impact on MNES. The State listed threatened biodiversity have been assessed in accordance with the FBA and are provided in the BAR.

1.0 Introduction

1.1 Background

This Biodiversity Inventory and EPBC Act Assessment Report is an appendix to the BAR, which forms part of the Environmental Impact Statement (EIS) for the Springvale Water Treatment Project (hereafter referred to as the 'Project'). The Project aims to improve environmental outcomes and water quality in the upper Coxs River catchment through water transfers from existing underground mine dewatering facilities for reuse at the Mount Piper Power Station (MPPS) rather than discharge into the catchment.

The Project components comprise a linear 10 m wide impact footprint located within a 20 m wide corridor, and a water treatment plant, shown in **Figure 1**. Two pipeline alignments are assessed separately in this report; a northern alignment (Northern Study Area: **Figure 2**) and a southern alignment (Southern Study Area: **Figure 3**), however, only one alignment will ultimately be selected for final placement of the proposed pipeline between the existing Gravity Tank on Newnes Plateau and the water treatment plant at MPPS.The Northern and Southern Study Areas are collectively referred to as the Study Area. Biodiversity investigations have been performed within the Study Area to determine the alignment with the least impact.

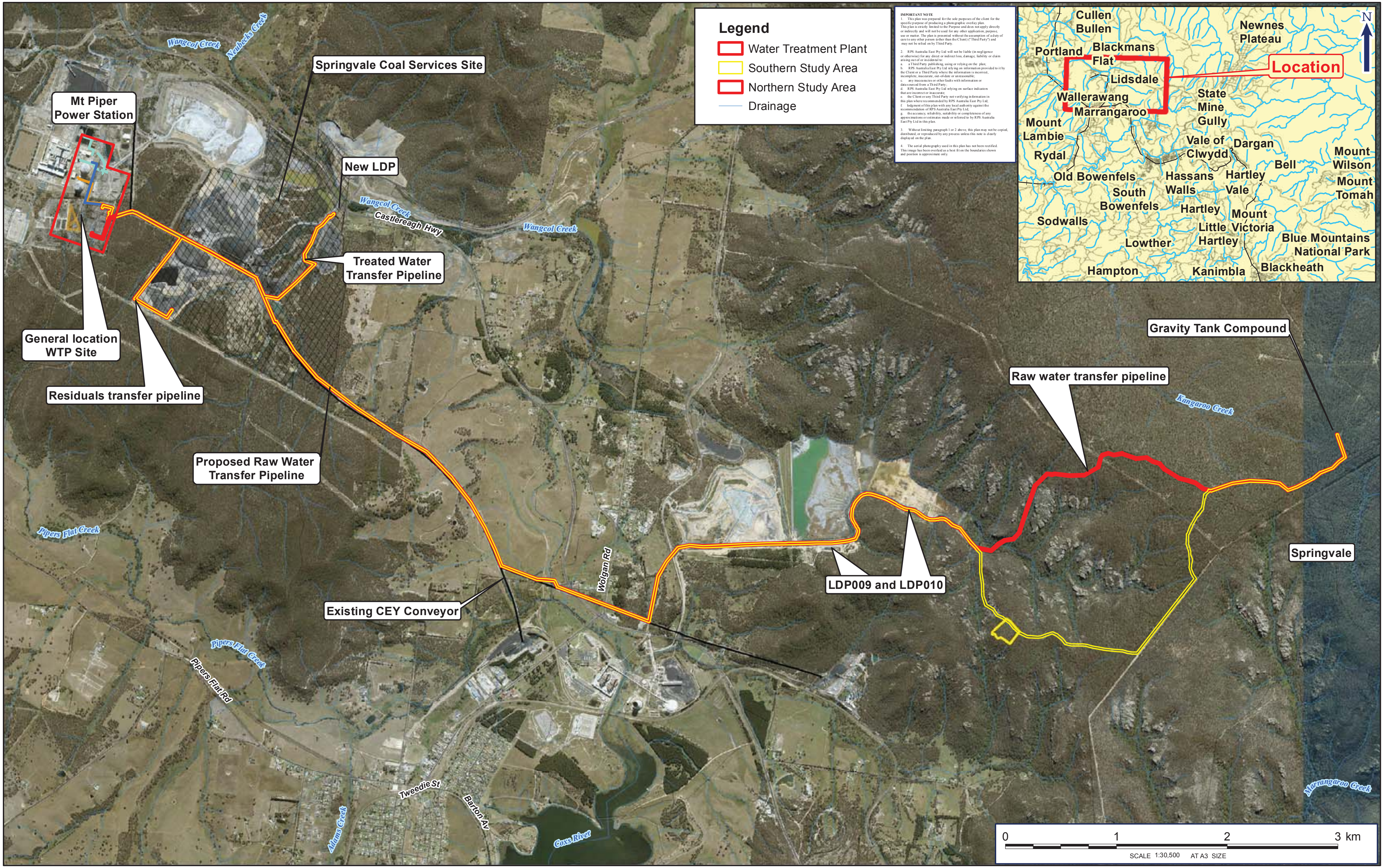
1.2 Project Description

Springvale Mine and Angus Place Colliery operate a water management scheme, referred to as the Springvale Delta Water Transfer Scheme (SDWTS), for the management of safe water levels in the underground workings at both mines. The SDWTS incorporates a network of trenched pipelines connecting the dewatering bore facilities on the Newnes Plateau to Springvale Mine's licensed discharge points (LDP) 009 and LDP010, where the mine water is currently discharged to Coxs River via the Swayers Swamp Creek.

EnergyAustralia owns and operates the MPPS, about eight kilometres west of the Springvale Mine pit top. MPPS has a high demand for make-up water for use in the cooling tower system. Water is currently drawn from the Coxs River and Fish River water supply schemes. MPPS operates as a zero discharge site with no release of water or by-products (e.g. brine) from the cooling tower system to receiving waters. MPPS has an existing brine management system for the treatment and disposal of brine on site.

The Project involves establishing a pipeline and ancillary facilities to transfer water from existing dewatering facilities on the Newnes Plateau for treatment and reuse at MPPS. An overview of the Project components is shown on **Figure 1** and includes the following major elements:

- A system to transfer up to 36 ML/day of dewatered mine water from the existing approved gravity tank (Springvale Mine dewatering facilities) on the Newnes Plateau, to a new water treatment plant at MPPS;
- A new water treatment plant incorporating desalination processes to reduce the salinity in mine water to a standard suitable for either industrial reuse or environmental release;
- Transfer of treated water from the water treatment plant to the MPPS cooling tower to contribute to the demand for make-up water;
- Transfer of any excess treated water to the Springvale Coal Services site (Western Coal Services Project, SSD 5579) for direct environmental release to Wangcol Creek via a new licensed discharge point;
- Transfer of the saline brine stream from the water treatment plant to the MPPS cooling tower blowdown system for integration with existing treatment and brine disposal practices;
- Installation of a crystalliser to provide further treatment of the additional salt load generated within the MPPS cooling tower blowdown system; and
- A truck turning bay and pipeline storage area along the southern alignment only.



Legend
Water Treatment Plant
Southern Study Area
Northern Study Area
Drainage
IMPORTANT NOTE
1. This plan was prepared for the sole purposes of the client for the specific purpose of producing a photographic overlay plan.
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Cullen Bullen
Newnes Plateau
Portland
Blackmans Flat
Location
Lidsdale
Wallerawang
Marrangaroo
State Mine Gully
Mount Lambie
Vale of Clwydd
Dargan
Rydal
Bell
Mount Wilson
Old Bowenfels
Hassans Walls
Hartley Vale
South Bowenfels
Mount Tomah
Hartley
Mount Victoria
Sodwalls
Little Hartley
Lowther
Blue Mountains National Park
Hampton
Kanimbla
Blackheath
N
Wangcol Creek
Neubecks Creek
Springvale Coal Services Site
Mt Piper Power Station
New LDP
Wangcol Creek
Castlereagh Hwy
Wangcol Creek
Treated Water Transfer Pipeline
General location WTP Site
Residuals transfer pipeline
Proposed Raw Water Transfer Pipeline
Gravity Tank Compound
Raw water transfer pipeline
Kangaroo Creek
Pipers Flat Creek
Wolgan Rd
Springvale
LDP009 and LDP010
Existing CEY Conveyor
Pipers Flat Creek
Pipers Flat Rd
Tweedie St
Barton Av
Marrangaroo Creek
Adams Creek
Coxs River
0
1
2
3 km
SCALE 1:30,500
AT A3 SIZE

TITLE : **FIGURE 1: STUDY AREA**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **17/08/2016**

PURPOSE: **ECOLOGY**

VERSION (PLAN BY): A A3 (Natalie.Wood)

PATH: J:\JOBS\Centennial\All Jobs\131758 JV Energy Australia Springvale\10 - Drafting\Arcgis Map Documents\Eco\Report Figures\131758 Figure 1 Location B A3 20160809.mxd

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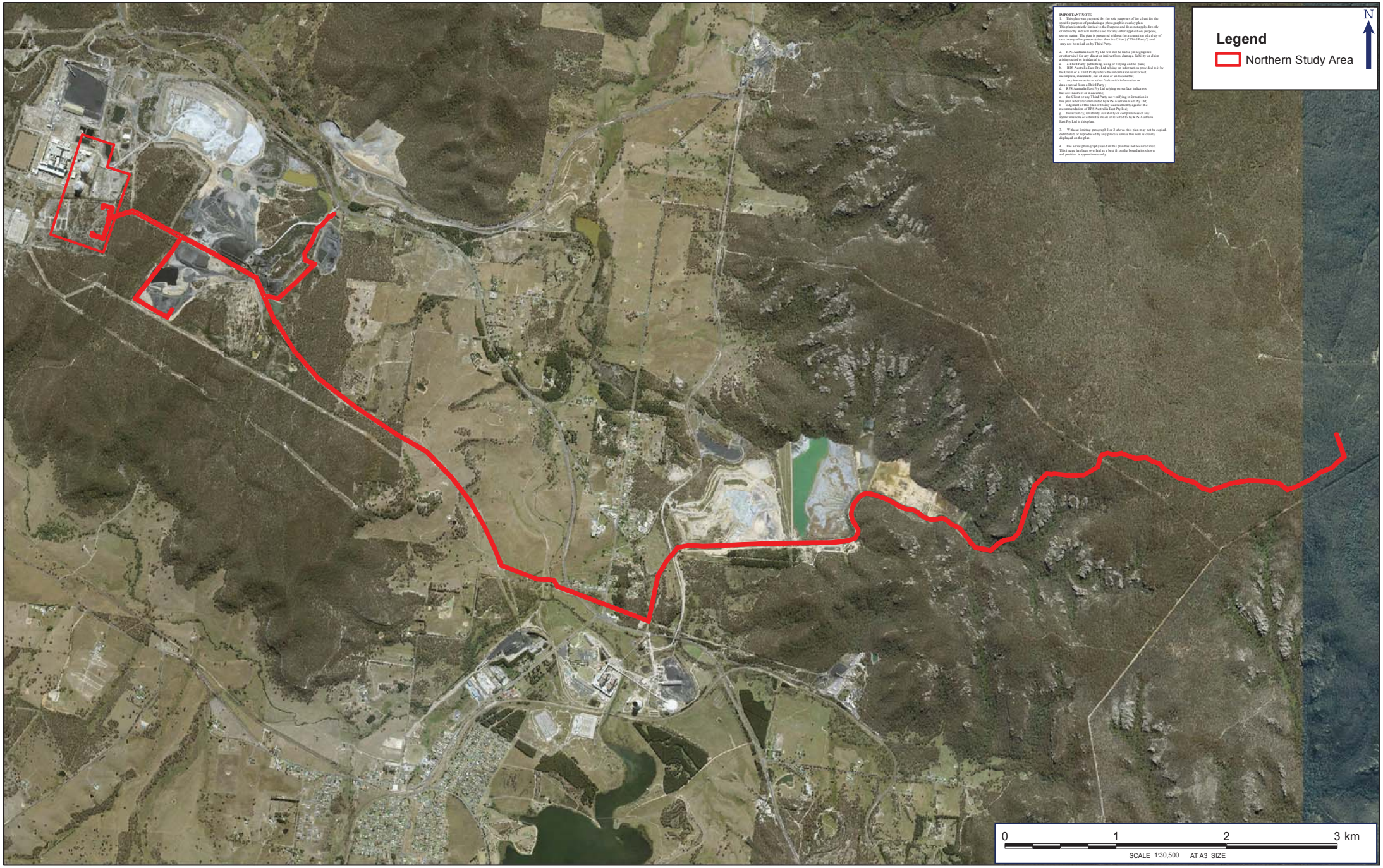

TITLE : **FIGURE 2: NORTHERN STUDY AREA**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **17/08/2016**

PURPOSE: **ECOLOGY**

VERSION (PLAN BY): B A3 (Natalie.Wood)

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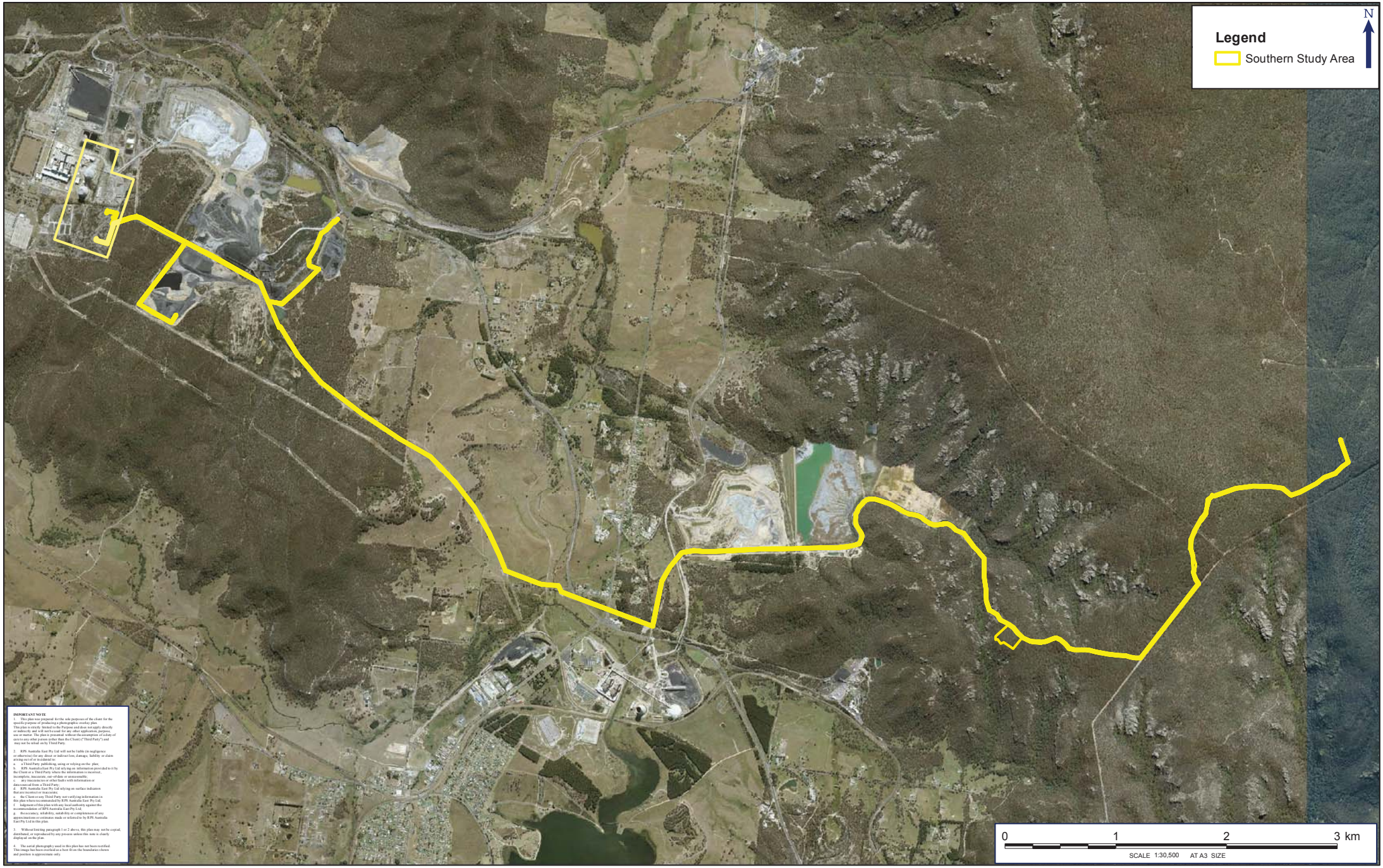

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TITLE : **FIGURE 3: SOUTHERN STUDY AREA**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **17/08/2016**

PURPOSE: **ECOLOGY**

VERSION (PLAN BY): B A3 (Natalie.Wood)

PATH: J:\JOBS\Centennial\All Jobs\131758 JV Energy Australia Springvale\10 - Drafting\Arcgis Map Documents\Eco\Report Figures\131758 Figure 3 South B A3 20160812.mxd

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1.3 Study Area

The location and extent of the Study Area is shown in **Figure 1**. The Study Area has an area of approximately 98 ha comprising two pipeline corridors of 20 m width, which are separately referred to as the:

- Northern Study Area; and
- Southern Study Area.

Survey effort, desktop analysis and results have been considered for the entire Study Area, whilst the disturbance or impact footprint is referred to when considering the Project's direct impacts. The preferred route, termed the Project Application Area, is described in the Stage 3 section of the Biodiversity Assessment Report following a detailed consideration of the impacts within the Northern Study Area and Southern Study Area.

1.4 Impact Footprint

For the purposes of this assessment the impact area or disturbance footprint is defined by the extent of native vegetation removal within the preferred route. Native vegetation removal will be restricted to a 10 m wide corridor along the preferred route within which all construction works associated with pipeline installation are to be contained. Two potential disturbance footprints, these being the Northern and Southern Study Areas, have been mapped. The native vegetation footprint for each study area is calculated below:

- Northern Study Area (~27.84 ha of native vegetation cover); and
- Southern Study Area (~31.44 ha of native vegetation cover).

1.5 Purpose

The purpose of this report is to:

- Document the biodiversity values of the Study Area specifically:
  - The extent of native vegetation cover and condition; and
  - Presence of threatened species, populations, ecological communities and their habitats (i.e. threatened biodiversity) listed under the *Threatened Species Conservation Act 1995* (TSC Act) and/or *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act); and
- Provide information compatible with the assessment requirements specified in the Secretary's Environmental Assessment Requirements (SEARs), which includes:
  - Framework for Biodiversity Assessment (FBA) (OEH 2014); and
  - BioBanking Assessment Methodology 2014 (BBAM 2014).
- Provide an assessment of the Matters of National Environmental Significance (MNES) and any other matters such as relevant State Environmental Planning Policies (SEPPs) which are currently not assessed under the FBA.

1.6 Investigation Scope

The investigation scope is listed below:

- Undertake an assessment of the likely biodiversity impacts of the project in accordance with the FBA (OEH 2014);
- Identify and map the vegetation communities and areas to be cleared within the Study Area;
- Assess the status of identified plant species and vegetation communities under relevant legislation;

- Identify existing habitat types within the Study Area and assess the habitat potential for threatened species, populations, or ecological communities known from the proximate area;
- Identify potential threatened terrestrial fauna and flora within the Study Area;
- Identify potential threatened aquatic fauna and flora within the Study Area;
- Assess the potential of the project to have a significant impact on any threatened species, populations or ecological communities identified during field surveys or as having potential habitat in the Study Area; and
- Provide recommendations and measures to avoid, reduce or mitigate impacts on biodiversity.

1.7 Site Particulars

Locality

The pipeline extends from Springvale Mine on the Newnes Plateau westwards to the Mount Piper Power Station in the Lithgow Local Government Area.

Boundaries

The western portion of the Study Area is surrounded by industrial and agricultural lands accommodating infrastructure, cleared lands and road networks. The Newnes State Forest occurs to the eastern end of the Study Area and bounds the north, east and the southeast of the Study Area.

Current Land Use

Part of the Study Area is contained within Newnes State Forest which is managed by Forestry Corporation of NSW. Other portions of the Study Area are situated within Centennial owned lands, private lands and EnergyAustralia lands with uses such as mining related activities, forestry, pastoral farming and energy resources.

Topography

The landscape in this region ranges from flat to gently inclined rises on broad (>300 m) valley floors away from drainage lines. The local relief is <25 m with a slope gradient typically <10% (King 1993). The main drainage line is the Wangcol Creek, to the north of the western portion of the Study Area, orientated on an approximate east-west axis. The Study Area traverses the Coxs River at Lidsdale, within the central portion of the Study Area.

Geology and Soils

The Study Area extends from Mount Piper Power Station on the west near Blackmans Flat to the existing Gravity Tank in th east on the Newnes Plateau in the Blue Mountains. The Newnes Plateau surface is gently to moderately inclined covered by friable Narrabeen Group sandstones and pagoda rock formations on the plateau margins. Vertical sandstone cliffs descend from the edge of the plateau in the eastern part of the Study Area. The western part of the Study Area is characterised by gently undulating to rolling hills on the Permian and Devonian sedimentary sequences and minor Carboniferous granites (King 1993: 2-3). Much of the Study Area is in disturbed terrain.

The geology for the Study Area is primarily an undifferentiated mix of sandstone, shale and tuff, formed on the Narrabeen Group, laid down in the Triassic period. This is bounded by nearby deposits of the Illawarra Coal Measures (Pi) laid down in the Permian period, comprising shale, sandstone, conglomerate and chert, with coal and seams of torbanite and a quaternary alluvium of gravel, sand, silt and clay, found mainly along watercourses (Bryan, 1966).

Vegetation

Vegetation within the Study Area is dominated by three distinct vegetation types; dense low swamp shrubby vegetation along the drainage lines; eucalypt forest and

woodland vegetation on the slopes and flats; and ridges and dry rocky heath along cliffs and ridgetops.

1.8 Regulatory context

1.8.1 NSW *Environmental Planning and Assessment Act 1979*

The Project is declared as a State Significant Development under the *State Environmental Planning Policy (State and Regional Development)* 2011, which requires consent under Part 4 Division 4.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The FBA applies as specified in the SEARs issued for the Project. This report aims to supplement Stage 1 of the FBA assessment by examining the likelihood of occurrence of threatened species, populations or ecological communities (i.e. threatened biodiversity) listed under the TSC Act and EPBC Act.

1.8.2 Framework for Biodiversity Assessment

A Biodiversity Assessment Report (BAR) prepared in accordance with the FBA for SSD is based on an application of the NSW BioBank Assessment Methodology 2014 (BBAM 2014) (OEH 2014b). The FBA provides a dual assessment process for the developments impact and evaluation of suitable biodiversity offset options within a three stage investigation as listed below:

Stage 1 – Biodiversity Assessment;

Stage 2 – Impact Assessment (Biodiversity Values); and

Stage 3 – Biodiversity Offset Strategy.

This Ecological Assessment report forms an appendix to the BAR, which has the purpose of defining the biodiversity values of the Study Area. In addition to the BAR this report provides an assessment of the MNES and any other matters such as relevant SEPPs which are currently not assessed under the FBA.

1.8.3 Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

The Commonwealth EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, defined in the EPBC Act as MNES. MNES identified in the Act include:

- World heritage properties.
- National heritage places.
- Wetlands of international importance (listed under the Ramsar Convention).
- Threatened species and communities (Section 18 and 18A).
- Migratory species protected under international agreements.
- Commonwealth marine areas.
- The Great Barrier Reef Marine Park.
- Nuclear Actions.
- A water resource, in relation to coal seam gas development and large coal mining development (the water trigger).

The first step in considering MNES protected under the EPBC Act (e.g. threatened species and communities listed under Section 18 and 18A) is a self assessment performed in accordance with the *Significant Impact*

Guidelines 1.1 - Matters of National Environmental Significance (DoE 2013). This is performed to determine if there is likelihood for a proposed action to have a significant impact on MNES. Regulatory approval from the Commonwealth Minister for the Environment is required for actions that have, or are likely to have, a significant impact on MNES. The decision to refer a proposed action must have due regard for directions specified under Section 68 of the Act.

1.8.4 NSW *Threatened Species Conservation Act 1995*

The TSC Act provides legal status for biota of conservation significance in NSW. The Act aims to, *inter alia*, 'conserve biological diversity and promote ecologically sustainable development'. It provides for:

- The listing of 'threatened species, endangered populations and EECs' under Schedule 1.
- 'Critically endangered' species and Critically Endangered Ecological Communities (CEEC) listed under Schedule 1A.
- Vulnerable species and communities listed under Schedule 2.
- 'Key Threatening Processes' listed under Schedule 3.
- The preparation and implementation of Recovery Plans and Threat Abatement Plans.
- Requirements, or otherwise, for the preparation of a SIS.

The lists of threatened species, populations and ecological communities gazetted under the TSC Act are relevant to this assessment and have been considered in the preparation of this constraints report.

1.8.5 NSW *National Parks and Wildlife Act 1974*

Part 8A of the *National Parks and Wildlife Act 1974* (NPW Act) regulates the undertaking of activities which may impact on threatened species, populations and ecological communities listed under the TSC Act and their habitats. The NPW Act provides that a person must not harm any animal that is a threatened species, population or ecological community; pick any plant which is part of a threatened species, population or ecological community; damage any critical habitat; or damage any habitat of a threatened species, population or ecological community without a licence being obtained under the NPW Act or TSC Act or unless another exception applies.

1.8.6 State Environmental Planning Policy (SEPP) No. 44 (Koala Habitat Protection)

Schedule 2 of State Environmental Planning Policy (SEPP) No. 44 – 'Koala Habitat Protection' aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range, and reverse the current state trend of koala population decline. SEPP 44 applies to the Lithgow Local Government Area (LGA).

1.8.7 NSW Noxious Weeds Act 1993

The *NSW Noxious Weeds Act 1993* provides for the identification and classification for noxious weeds in each NSW LGA. The Act imposes obligations on occupiers of land to control noxious weeds declared for their LGA.

1.8.8 Groundwater Dependent Ecosystems Policy 2002

The definitions for Groundwater Dependent Ecosystems (GDEs) have been adopted based on the following three literature sources:

- The NSW State Groundwater Dependent Ecosystems Policy (Department of Land and Water Conservation 2002) defines GDEs as: '*Ecosystems which have their species composition and their natural ecological process determined by groundwater*' (ARNCANZ & ANZECC, 1996 as cited in DLWC,

2002).

- Identifying groundwater dependent ecosystems, a guide for land and water managers (Eamus 2009) defines GDEs as: '*ecosystems whose current composition, structure and function are reliant on a supply of groundwater*'.
- Risk assessment guidelines for groundwater dependent ecosystems (Serov et al. 2012) defines GDEs as: '*any ecosystem that uses groundwater at any time or for any duration in order to maintain its composition and condition*'.

As defined by Eamus (2009) GDEs are; 'ecosystems whose current composition, structure and function are reliant on a supply of groundwater. This reliance might be expressed every day of the year, or only for a few months every few years, but the reliance becomes apparent when the supply of groundwater is removed for a sufficient length of time that changes in plant function (typically rates of water use decline first) are observable'.

Vegetation within the Study Area that is dependent on sub-surface flows (i.e. have rooting zones which overlap the sub-surface water interface such as floodplain vegetation) or are located such that surface flows originate from sub-surface flows (i.e. areas of impeded drainage) are all classified as GDEs.

1.8.9 Guidelines for developments adjoining land managed by the Office of Environment and Heritage (2013)

The goal of these guidelines is to guide consent and planning authorities when assessing development applications that adjoin land managed by OEH. The aim of this advice is to avoid and minimise any direct or indirect adverse impacts on this land. The guidelines will also be of assistance to planning authorities in the development of environmental planning instruments (such as local environmental plans) applying to land adjoining, or in the vicinity of, land managed by OEH. The Study Area does not directly adjoin any OEH estate. However, reference has been made to it because it was in the SEARS.

1.9 Qualifications

This report was written by Mrs Lauren Eather BSc. and reviewed by Mr Mark Aitkens BSc. of RPS.

1.10 Licensing

Research was conducted under the following licences:

- NSW National Parks and Wildlife 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);
- 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); and
- Forestry Corporation of NSW Forest Permit – Research (Licence number PB54359) (Valid 01 July 2016).

2.0 Methodology

Investigation methods, including desktop information sources and survey methods, are detailed in the following sections.

2.1 Guidelines and standards

2.1.1 Survey Guidelines

Surveys were performed using methods outlined in relevant guidelines as listed below:

- Threatened biodiversity survey and assessment: guidelines for development and activities - Working Draft (NSW Department of Environment and Conservation, 2004);
- Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna – Amphibians (DECC 2009);
- NSW BioBanking Assessment Methodology (OEH 2016b), including the consideration of An operational method to assess impacts of land clearing on terrestrial biodiversity (BioMetric) (Gibbons et al. 2009)
- Survey guidelines for Australia's threatened mammals (DEWHA, 2011a);
- Survey guidelines for Australia's threatened birds (DEWHA, 2010b);
- Survey guidelines for Australia's threatened bats (DEWHA, 2010c);
- Survey guidelines for Australia's threatened reptiles (DEWHA, 2011b); and
- Survey guidelines for Australia's threatened frogs (DEWHA, 2010a).

Amendments to the BBAM (OEH 2014b), as introduced by the FBA for assessing development under Part 4 Division 4.1 of the EP&A Act (State Significant Development), is also recognised and has been referred to in preparing this report. Some methods have been varied, where necessary, to suit species, populations and communities identified as relevant to the Project.

2.1.2 Identification guidelines

The following documents were used to identify the presence of listed threatened ecological communities (TECs) within the site:

- Approved Conservation Advice (including listing advice) for the Natural Temperate Grassland of the South Eastern Highlands (Threatened Species Scientific Committee 2016);
- Approved Conservation Advice (including listing advice) for the Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion (Threatened Species Scientific Committee 2011);
- Commonwealth listing advice and conservation advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (TSSC 2006);
- EPBC Act policy statement 3.5 - White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grasslands (DEH 2006a);
- EPBC Act policy statement 3.5 - White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grasslands: Species list (DEH 2006b);
- Identification Guidelines for Endangered Ecological Communities: Tableland Basalt Forest in the Sydney Basin and South Eastern Highland Bioregions (DECCW 2010);
- Identification Guidelines for Endangered Ecological Communities: Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern

Highlands and Australian Alps bioregions (DECC 2008); and

- Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion - endangered ecological community listing (NSW Scientific Committee Final determination 2005);
- Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions - endangered ecological community listing (NSW Scientific Committee Final determination 2011).

2.1.3 Data Recording

A hand held Trimble differential global positioning system (D-GPS), accurate to less than one metre, was used to record the location of survey methodologies along with notable results including the location of threatened flora and/or fauna species.

2.1.4 Nomenclature

2.1.4.1 Plant taxonomy

Plant taxonomy used was consistent with the nomenclature of the Flora of NSW (Harden 1990-1993; 2000; 2002), except where more recent revisions have been published in recognised scientific journals and National Herbarium of New South Wales website (PlantNet web site http://plantnet.rbgsyd.nsw.gov.au/).

2.1.4.2 Fauna Taxonomy

Taxonomy and common names of fauna in this report were from the following sources.

- Mammals: Menkhorst and Knight (2010), Churchill (2008), Pennay et al. (2004).
- Birds: Simpson and Day (2010).
- Reptiles: Wilson and Swan (2010).
- Frogs: Tyler and Knight (2009).

2.1.4.3 Plant Community Types (PCTs)

The assigning of PCTs to describe mapped vegetation cover was in accordance with the NSW Vegetation Types Database (OEH 2016a). Published scientific literature, where available, was used to aid in the interpretation of this database (e.g. referenced source documents).

2.2 Desktop Assessment

2.2.1 Literature

Gray literature was reviewed in preparing the background analysis of the sites biodiversity values. Information sources reviewed are listed below:

- RPS (2011) Flora and Fauna Assessment for Proposed Longwalls 416 and 417. Prepared for Springvale Coal Pty Limited;
- RPS (2012) Flora and Fauna Assessment for Proposed Surface Mine Dewatering Facility Bore 8. Prepared for Springvale Coal Pty Limited;
- RPS (2014a) Springvale to Mount Piper Conveyor Duplication Project: Impact Assessment. Draft report.
- RPS (2014b) Flora and Fauna Assessment for Proposed Springvale Mine Extension Project. Prepared for Springvale Coal Pty Limited;

- 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);
- Fauna monitoring within the subsidence management plan area at Angus Place Colliery from 2004 to 2012. Unpublished reports to Centennial Coal by Mount King Ecological Surveys (2004-2009) and Biodiversity Monitoring Services (BMS) (2010-2012);
- Fauna monitoring within the subsidence management plan area at Clarence Colliery from 2004 to 2012. Unpublished reports to Centennial Coal by Mount King Ecological Surveys (2008) and Biodiversity Monitoring Services (2009-2010);
- Unpublished results from flora and fauna surveys conducted partly along this Study Area; and
- Vegetation of the Western Blue Mountains – including the Capertee, Coxs, Jenolan and Gurnang Areas (DEC 2006).

2.2.2 Biodiversity Databases

A review of relevant information was performed to gain an understanding of ecological values occurring or potentially occurring within the site. Information sources reviewed for a 10 km radius of the site (i.e. locality) included:

- Fauna and flora records contained in the Office of Environment and Heritage (OEH) Atlas of NSW Wildlife that may occur within the locality (OEH 2016); and
- Fauna and flora records contained in the Department of the Environment (DoE) Protected Matters Search tool that may occur within the locality (DoE 2016a).

The results of these database searches formed the basis for a preliminary 'likelihood of occurrence' assessment. This assessment was used as a framework for determining investigation methods necessary for performing adequate site investigation (i.e. determine target species and appropriate investigation methods).

2.2.3 Spatial Datasets

The following spatial datasets were interrogated to evaluate landscape condition of the Study Area:

- Geographic Information System (GIS) data including (but not limited to) aerial photography, topographic maps and Soil Landscapes;
- Mitchell Landscapes (NPWS 2003);
- IBRA Region and subregion mapping (IBRA7); and
- Vegetation of the Western Blue Mountains – including the Capertee, Coxs, Jenolan and Gurnang Areas (DEC 2006).

In addition, the latest aerial photography was inspected to qualitatively appreciate the currency / accuracy of these spatial datasets.

2.3 Survey Design

2.3.1 Survey Stratification

Biological data was systematically collected through surveys performed in accordance with a stratified sampling regime (DEC, 2004), which is described by the NSW Office of Environment and Heritage (OEH) as:

> *"A logical, objective and efficient method of undertaking surveys and ensures that the full range of potential habitats and vegetation types will be systematically sampled"* (OEH 2014).

Stratification units were determined through aerial photography interpretation; a visual method commonly used to objectively identify areas of homogenous land cover suitable for classification purposes (e.g. woodland, open woodland, shrubland and grassland).

2.3.2 Timing

Surveys were performed in 2015 and 2016 for both proposed pipeline alignments from 7-13 December 2015, 4 January 2016, 11-14 January 2016, 18-22 April 2016 and 2-6 May 2016.

2.4 Likelihood of Occurrence

A preliminary likelihood of occurrence analysis was performed prior to field surveys for the purpose of guiding investigation methods and effort. This analysis was reviewed and updated following the completion of field investigations. Four 'likelihood of occurrence' categories were attributed to threatened biodiversity as outlined in **Table 1**.

Table 1 Likelihood of Occurrence Criteria

Likelihood Rating	Threatened Flora Criteria	Threatened and Migratory Fauna Criteria
Known	The species was observed within the Study Area.	The species was observed within the Study Area.
Likely	PCT and micro-habitat conditions present. Habitat condition moderate to high. Species recorded within locality.	PCT and micro-habitat conditions present. Habitat condition moderate to high and likely to support important lifecycle processes such as breeding. Species recorded within locality.
May	Based on broad habitat predictor (i.e. PCT). Habitat condition low (i.e. micro-habitat conditions either disturbed or of limited suitability). Species records may not occur within locality.	Based on broad habitat predictor (i.e. PCT). Habitat condition low (i.e. micro-habitat conditions either disturbed or of limited suitability). Species records may not occur within locality. If present, the species would likely be a transient visitor and unlikely to rely on habitat for important lifecycle processes.
Unlikely	Habitat unsuitable for the species.	Habitat unsuitable for the species.

Habitat descriptions for each species were generally obtained from the online Threatened Species Profile Database (OEH 2016).

2.5 Flora Surveys

2.5.1 Vegetation Mapping

DECC (2006) was used as the basis for guiding preliminary vegetation mapping and survey stratification (i.e. flora and fauna) for the Study Area. This vegetation mapping was updated where improved vegetation boundary and/or classification accuracy is available (i.e. prior RPS surveys). Preliminary vegetation was field validated using BioBanking plots, transects and random meanders and updated where necessary to produce vegetation zones as described in the BBAM (OEH 2014b).

2.5.2 Field Investigation Techniques

2.5.2.1 BioBanking Plots

Vegetation plots and transects were undertaken in accordance with BioBanking Assessment Methodology (OEH 2014b), as amended by FBA (OEH 2014), to delineate vegetation zones and corresponding plant community type (PCT). BioBanking plots comprise a detailed investigation of a 50 m X 20 m area (i.e. 1,000 m^2) to measure 10 variables, as indicated below:

- Native plant species richness (NPSR);

- Native Overstorey Cover;
- Native Midstorey Cover;
- Native Groundcover Grasses;
- Native Groundcover Shrubs;
- Native Groundcover Other;
- Exotic Species;
- Overstorey Regeneration;
- Fallen Log Length; and
- Number of Hollow-bearing Trees.

Survey effort was performed in accordance with BBAM 2014 as detailed in **Table 2**.

Table 2 BioBanking Plot Survey Effort

Vegetation Community	Northern Alignment	Southern Alignment	Total Number of BB Plots*
MU 7 Newnes Plateau Narrow-leaved Peppermint - Mountain Gum - Brown Stringybark Layered Forest	1	2	2
MU 8 Newnes Sheltered Peppermint – Brown Barrel Shrubby Forest	1	1	2
MU 11 Tableland Gully Snow Gum - Ribbon Gum Montane Grassy Forest	2	1	2
MU 26 Newnes Plateau Narrow-leaved Peppermint - Silver-top Ash Layered Open Forest	3	3	4
MU 28 Sandstone Plateau and Ridge Scribbly Gum – Silvertop Ash Shrubby Woodland	-	2	2
MU 29 Sandstone Slopes Sydney Peppermint Shrubby Forest	-	1	1
MU 33 Tableland Broad-leaved Peppermint - Brittle Gum - Red Stringybark Grassy Open Forest	1	1	1
MU 35 Tableland Gully Mountain Gum – Broad-leaved Peppermint Grassy Forest	0	0	0
MU 37 Coxs Permian Red Stringybark - Brittle Gum Woodland	2	2	2
MU 43 Pagoda Rock Sparse Shrubland	0	1	1
MU 44 Sandstone Plateaux Tea Tree - Dwarf Sheoak - Banksia Rocky Heath	0	1	1
MU 53 Mountain Hollow Grassy Fen	1	1	1
MU 58 Acacia Thickets	4	4	4
MU 59 Non-native Vegetation – Pine Plantation / Woodlot / Shelter	0	0	0
MU 62 Cleared/disturbed lands	1	1	1
Total	**16**	**21**	**24**

*Note that some plots are overlapping due to the northern and southern alignments covering the same area.

2.5.2.2 Flora Inventory

NPSR and exotic plant species were recorded within a 400 m^2 plot nested within the 1,000 m^2 BioMetric plot. Cover abundance for each plant species was estimated and recorded, as outlined below in **Table 3**.

Table 3 Floristic Survey Data Collected within the Flora Quadrat

Attribute	Survey Requirement
Stratum (& layer)	Stratum & layer in which each species occurs
Growth form	Growth form for each recorded species
Species name	Scientific name and common name
Cover	A measure or estimate of the appropriate cover measure for each recorded species; recorded from 1–5% and then to the nearest 5%. If the cover of a species is less than 1% and the species is considered important, then the estimated cover should be entered (e.g. 0.4)
Abundance rating	A relative measure of the number of individuals or shoots of a species within the plot. Use the following intervals; numbers above about 20 are estimates only: 1,2,3,4,5,6,7,8,9,10,20,50,100,500,1000 or specify a number greater than 1000 if required

2.5.2.3 Targeted Surveys

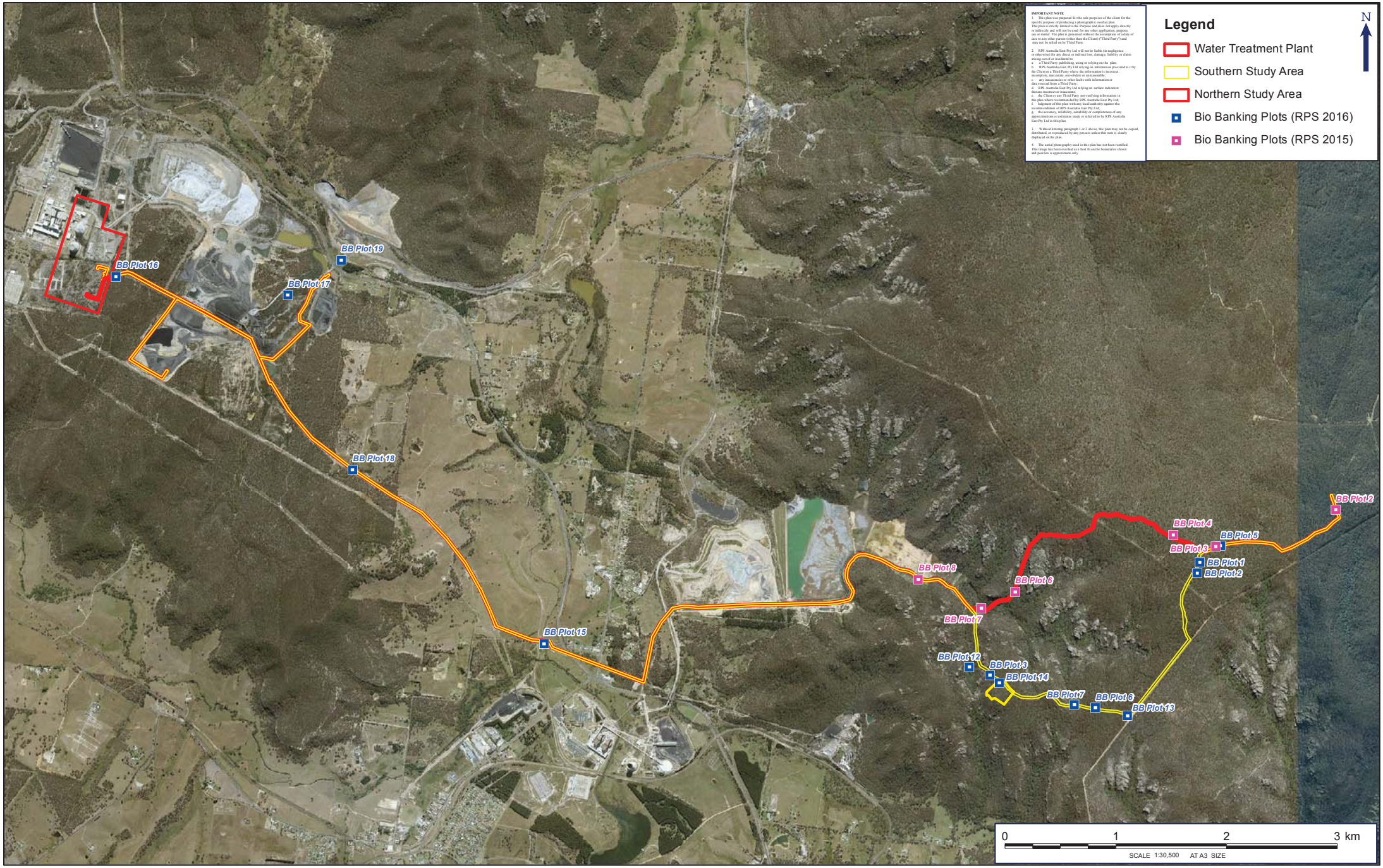
Targeted searches for flora species of conservation significance were performed within potential habitat using the *Random Meander Technique* (Cropper 1993). Plant specimens of unknown or significant status were collected for later identification or lodgement with the National Herbarium in Sydney.

2.5.3 Site Value Scores

Table 4 below provides a qualitative description for site value scores generated from BioBanking plot data for mapped vegetation zones.

Table 4 Descriptions of Site Value Scores

Site Value Score	Condition	Description
0-34	Low condition	Woody vegetation that is likely to have no overstorey or mid-storey. Weed cover is likely to be high. Native plant species richness is low. Requires substantial and sustained management for regeneration/ recovery. Scores below 20 are likely to represent vegetation and habitat that is no longer characteristic of a native plant community type.
>34-45	Moderate/ good (poor)	Vegetation and habitat demonstrating impaired condition with clear evidence of effects from past or present impacts/ threats. Requires routine, landscape wide management to assist regeneration/ recovery (e.g. management of weeds and feral fauna).
>45-69	Moderate/ good (medium)	Vegetation and habitat demonstrating resilient condition capable for recovering without assistance other than for the removal of threats. Generally requires targeted management to facilitate improved condition (e.g. targeted weed removal).
>70-100	Moderate/ good (high)	Vegetation and habitat close to benchmark condition. Limited ecological benefit would be gained through management.



TITLE : **FIGURE 4: FLORA SURVEY METHODOLOGIES**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **17/08/2016**

PURPOSE: **ECOLOGY**

VERSION (PLAN BY): B A3 (Natalie.Wood)

PATH: J:\JOBS\Centennial\All Jobs\131758 JV Energy Australia Springvale\10 - Drafting\Arcgis Map Documents\Eco\Report Figures\131758 Figure 4 Flora SM B A3 20160812.mxd

CLIENT: **CENTENNIAL COAL**

JOB REF: **PR131758**

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2.6 Fauna Surveys

Fauna surveys were conducted within the Study Area using formal and informal survey techniques. Fauna surveys included:

- Terrestrial and arboreal Elliott trapping;
- Hair tube trapping;
- Infrared camera surveys;
- Microbat echolocation call recording;
- Avifauna surveys; herpetofauna surveys;
- Call playback;
- Spotlighting;
- Secondary indications (e.g. scats, scratches and diggings); and
- Incidental observations.

Surveys were conducted on foot and by vehicle, with all species observations and evidence of fauna presence recorded. A description of survey timing, effort and methods is provided in the following sections.

2.6.1 Survey Dates and Weather Conditions

Fauna surveys were undertaken over three weeks from 7-11 December 2015, 18-22 April 2016 and 2-6 May 2016. Survey dates, methods and weather conditions is provided in **Table 5**.

Table 5 Survey Dates, Methods, Weather Conditions, Sunrise/ Sunset and Methods

Date	Temp Min-Max (°C)	Rain (24 hrs to 9:00am) (mm)	Sun Rise - Sun Set	Surveys Undertaken							
				Vegetation & Targeted Flora Surveys	Elliot and Hair Traps	Infra Red Camera	AnaBat	Bird Census	Spotlighting	Call Playback	General Fauna / Opportunistic Surveys
7 Dec 2015	8.5-27.6	0	04:42-18:59	x	x	x	x				x
8 Dec 2015	12.0-26.7	0	04:42-19:00	x	x	x	x	x	x	x	x
9 Dec 2015	16.6-28.6	5.6	04:43-19:00	x	x	x	x	x	x	x	x
10 Dec 2015	13.9-28.9	8.8	04:43-19:01	x	x	x	x	x			x
11 Dec 2015	11.9-26.8	0	04:43-19:02	x	x	x	x				x
12 Dec 2015	7.0-24.5	0	04:43-19:03	x							x
13 Dec 2015	12.1-26.3	0	04:43-19:03	x							x
4 Jan 2016	12.9-17.4	9.2	04:45-19:13	x							x
11 Jan 2016	14.5-32.0	0	05:01-19:13	x							x
12 Jan 2016	15.0-31.5	0.4	05:02-19:13	x							x
13 Jan 2016	12.1-33.8	0	05:03-19:13	x							x
14 Jan 2016	21.2-32.5	0	05:04-19:13	x							x
18 April 2016	10.9-18.5	0.2	06:24-17:34		x	x	x				x
19 April 2016	12.0-20.7	0.6	06:25-17:32		x	x	x	x	x	x	x
20 April 2016	7.1-22.0	0	06:25-17:31		x	x	x	x	x	x	x
21 April 2016	8.1-23.8	0	06:26-17:30		x	x	x	x			x
22 April 2016	5.5-20.2	0	06:27-17:29		x	x	x				x

Date	Temp Min-Max	Rain (24 hrs to 9:00am)	Sun Rise - Sun Set	Surveys Undertaken							
2 May 2016	4.0-18.3	0	06:34-17:18	x	x	x	x			x	x
3 May 2016	6.9-17.7	0	06:35-17:18	x	x	x	x	x	x	x	x
4 May 2016	10.4-18.2	0	06:36-17:17	x	x	x	x	x			x
5 May 2016	0.1-19.6	0	06:37-17:16	x	x	x	x	x			x
6 May 2016	2.5-NA	0	06:37-17:15	x	x	x	x				x

Source: BOM (2016) http://www.bom.gov.au/climate/dwo/201605/html/IDCJDW2075.201605.shtml
Geoscience Australia (2016):
http://www.ga.gov.au/bin/geodesy/run/gazmap_sunrise?placename=Lithgow&placetype=0&state=0#loc

2.6.2 Survey Effort

In total, seven survey sites were selected in different stratification units as shown in **Figures 5** and **6** for the Northern and Southern Study Area respectively. Targeted surveys were also performed to map hollow-bearing trees. Survey effort for the northern and southern alignments is provided in **Tables 6** and **7** respectively.

2.6.3 Field Investigation Techniques

2.6.3.1 Terrestrial Trapping

Terrestrial traps targeted small terrestrial mammals such as dasyurids (e.g. Antechinus and Dunnarts) and rodents (e.g. rats and mice). Elliott traps were baited with a mixture of rolled oats, peanut butter and honey. Traps were checked within two hours of sunrise each morning, with any captures identified and released at point of capture and any traps re-baited. The locations of the trap lines focused on stratification units as well as areas consisting of understorey that would provide protection for terrestrial mammal species.

2.6.3.2 Arboreal Trapping

Arboreal traps targeted arboreal mammals such as the threatened Squirrel Glider (*Petaurus norfolcensis*) which has been previously recorded from the surrounding area. Traps were mounted on brackets set at approximately two metres high on trees with a diameter at breast height greater than 30 cm. Traps were baited with a rolled oats, peanut butter and honey mixture and the tree trunks were sprayed liberally with a brown sugar and water mix each day in the late afternoon. Similarly to terrestrial trapping efforts, traps were checked within two hours of sunrise each morning.

2.6.3.3 Hair Tubes

Surveys were undertaken using Faunatech Hair Tubes within the designated traplines, baited with rolled oats, peanut butter and honey. A combination of 10 terrestrial hair tubes and 10 arboreal hair tubes were set. Hair tubes targeted small-medium sized mammals such as dasyurids (e.g. antechinus and dunnarts), rodents (e.g. rats and mice), gliders and bandicoots.

Table 6 Survey Effort and Stratification Units for Northern Alignment

Fauna Stratification Unit	Vegetation Community	Area (Ha) of Fauna Stratification Unit	Number of Terrestrial Elliot A and B Trap Nights	Number of Arboreal Trap Nights	Number of Hair Tube Trap Nights	Anabats (nights)	Infrared Camera (nights)	Call Playback	Bird Census	Spot Lighting (hours)
Group 1	MU 7 Newnes Plateau Narrow-leaved Peppermint - Mountain Gum - Brown Stringybark Layered Forest	6.56	0[1]	0[1]	0[1]	0[1]	0[1]	0[1]	0[1]	0[1]
	MU 26 Newnes Plateau Narrow-leaved Peppermint - Silver-top Ash Layered Open Forest									
	MU 29 Sandstone Slopes Sydney Peppermint Shrubby Forest									
Group 2	MU 8 Newnes Sheltered Peppermint – Brown Barrel Shrubby Forest	1.43	200	24	80	2	4	1	2	4
Group 3	MU 11 Tableland Gully Snow Gum - Ribbon Gum Montane Grassy Forest	1.60	400	48	160	4	4	1	1	2
Group 4	MU 33 Tableland Broad-leaved Peppermint - Brittle Gum - Red Stringybark Grassy Open Forest	31.03	200	24	80	2	4	1	2	6
	MU 35 Tableland Gully Mountain Gum – Broad-leaved Peppermint Grassy Forest									
	MU 37 Coxs Permian Red Stringybark - Brittle Gum Woodland									
	MU 58 Acacia Thickets									
	MU 62 Cleared/Disturbed Lands	44.85	0	0	0	0	0	0	0	4
Total			**800**	**96**	**320**	**8**	**12**	**5**	**5**	**16**

[1] See **Table 7** for survey effort performed in this stratification unit

Table 7 Survey Effort and Stratification Units for Southern Alignment

Fauna Stratification Unit	Vegetation Community	Area (Ha) of Fauna Stratification Unit	Number of Terrestrial Elliot A and B Trap Night	Number of Arboreal Trap Nights	Number of Hair Tube Trap Nights	Anabats (nights)	Infrared Camera (nights)	Call Playback	Bird Census	Spot Lighting (hours)
Group 1	MU 7 Newnes Plateau Narrow-leaved Peppermint - Mountain Gum - Brown Stringybark Layered Forest	7.35	200	24	80	4	8	1	3	4
	MU 26 Newnes Plateau Narrow-leaved Peppermint - Silver-top Ash Layered Open Forest									
	MU 29 Sandstone Slopes Sydney Peppermint Shrubby Forest									
Group 2	MU 8 Newnes Sheltered Peppermint – Brown Barrel Shrubby Forest	0.38	0[2]	0	0	0	0	0	0	0
Group 3	MU 11 Tableland Gully Snow Gum - Ribbon Gum Montane Grassy Forest	1.68	200	24	80	2	4	0	1	6
Group 4	MU 33 Tableland Broad-leaved Peppermint - Brittle Gum - Red Stringybark Grassy Open Forest	31.16	200	24	80	2	4	1	1	6
	MU 35 Tableland Gully Mountain Gum – Broad-leaved Peppermint Grassy Forest									
	MU 37 Coxs Permian Red Stringybark - Brittle Gum Woodland									
	MU 58 Acacia Thickets									
Group 5	MU 28 Sandstone Plateau and Ridge Scribbly Gum – Silvertop Ash Shrubby Woodland	4.47	200	24	80	2	8	1	1	0
Group 6	MU 43 Pagoda Rock Sparse Shrubland	0.37	200	24	80	2	4	1	2	0
	MU 44 Sandstone Plateaux Tea Tree - Dwarf Sheoak - Banksia Rocky Heath									
	MU 62 Cleared and Disturbed Lands	47.10	0	0	0	0	0	0	1	0
Total			**1000**	**120**	**400**	**12**	**28**	**4**	**9**	**16**

[2] See **Table 6** for survey effort performed in this stratification unit

2.6.3.4 Bat Echolocation Call Recording

Microbat echolocation calls were recorded using an Anabat II Detector and CF ZCAIM unit at each Elliott trapline. Recorders were set in potential flyways to remotely record the echolocation calls of microchiropteran bats for the entire night (6pm to 6am). Recordings were analysed by microbat specialist Dr Anna McConville from Echo Ecology. Each call sequence ('pass') was assigned to one of three categories, according to the confidence with which identification could be made, being:

- Definite - pass identified to species level and could not be confused with another species;
- Probable - pass identified to species level and there is a low chance of confusion with another species; or
- Possible - pass identified to species level, but short duration or poor quality of the pass increases the chance of confusion with another species.

2.6.3.5 Diurnal Avifauna Survey

The observation of avifauna within the Study Area was via systematic diurnal censuses and opportunistic surveys during all field work. During a systematic census, all birds occurring at that location were identified during a 20 minute period. Birds were identified by direct observation, recognition of calls or through detection of distinctive features such as nests, feathers, and owl regurgitation pellets. The potential for threatened avifauna to use the Study Area was also assessed by identification of habitat attributes and their capacity to support threatened species that are known to occur in the wider locality.

2.6.3.6 Herpetofauna Survey

Targeted and opportunistic herpetofauna searches were conducted within the Study Area across a diverse range of habitats. Herpetofauna searches involved inspecting rock crevices, caves and overhangs, raking leaf litter and turning logs, rocks and other debris. Where present, water bodies were inspected diurnally and nocturnally for the presence of amphibians.

2.6.3.7 Spotlighting

Spotlighting was undertaken across the Study Area to identify roosting birds or active nocturnal birds and mammals. Ecologists used 75-Watt hand-held spotlights and head torches during walking and/or from a vehicle moving at a speed of 1km/hour.

2.6.3.8 Call Playback

Pre-recorded calls of owl and nocturnal mammal species with the potential to occur across the Study Area were broadcast during the surveys in an effort to elicit vocal responses or to attract fauna to the playback site. The calls were broadcast through an amplification system (loud hailer) designed to Project the sound for at least 1 km under still night conditions.

As described by Kavanagh and Peake (1993) and Debus (1995), the call of each species was broadcast for at least five minutes, followed by five minutes of listening, and stationary spotlighting. Following the final broadcast and listening, the area was spotlighted on foot. Species targeted included the Powerful Owl (*Ninox strenua*), Barking Owl (*N. connivens*), Sooty Owl (*Tyto tenebricosa*) and Masked Owl (*T. novaehollandiae*).

2.6.3.9 Infrared Camera Surveys

Infrared cameras were set up in suitable habitat within the Study Area. The cameras are designed to detect motion and take photographs when movement triggers the sensor. Each camera is secured to a tree approximately 1.5 m from the ground. Tinned cat food was placed approximately 1 m in front of the camera on

the ground as bait. Camera traps have been used to replace cage traps as they are considered to be less invasive and more successful. Target species included the Spotted-tailed Quoll (*Dasyurus maculatus maculatus*).

2.6.3.10 Secondary Indications and Incidental Observations

Opportunistic sightings of secondary indications of resident fauna were noted. The following indicators were sought during surveys:

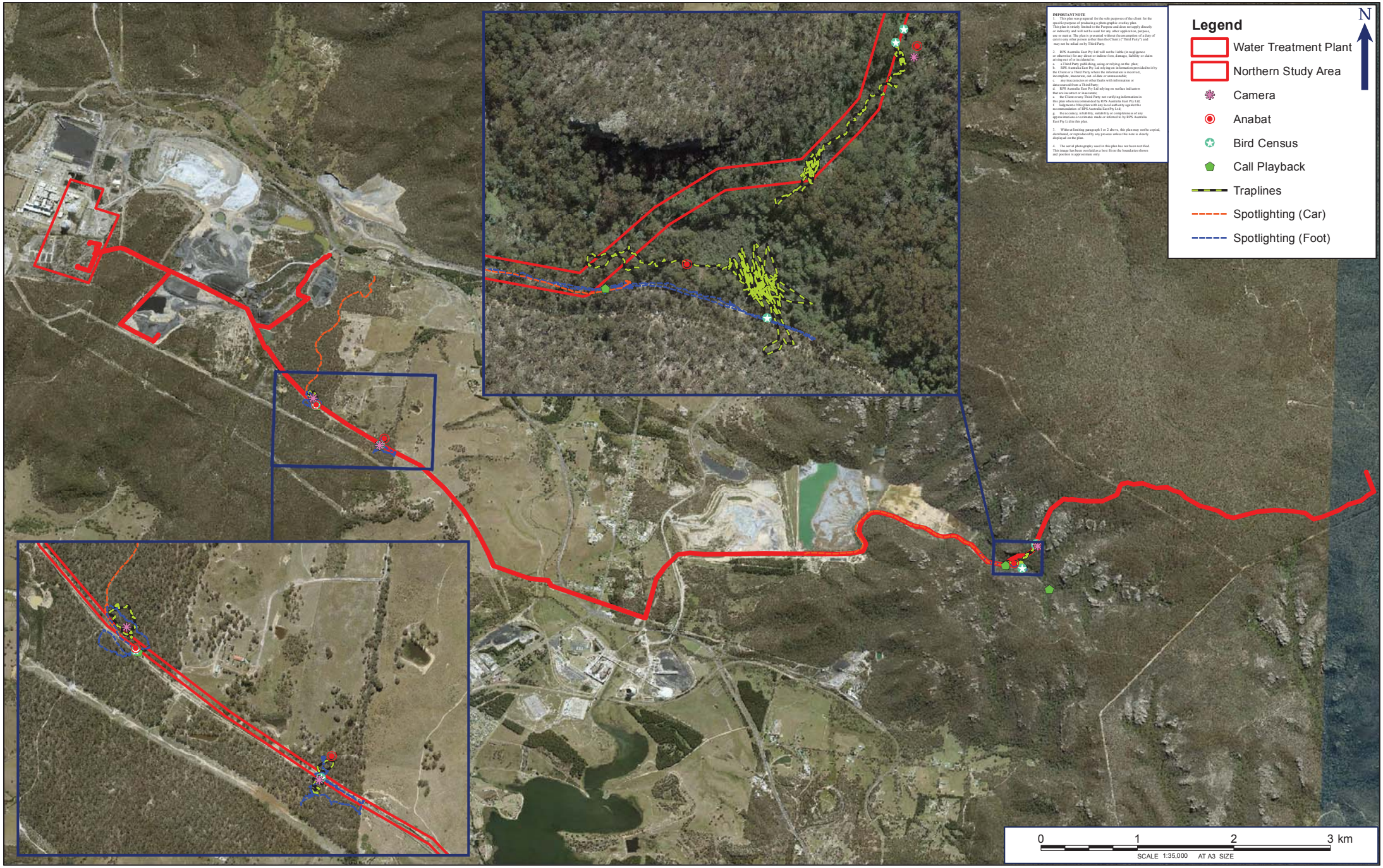
- Distinctive scats and scents left by mammals;
- Burrows;
- Feather, fur remains, skin and skeletal material of vertebrate fauna ;
- Tracks, scratches or diggings;
- Nests made by various guilds of birds;
- Whitewash, regurgitation pellets and prey remains from owls;
- Chewed she-oak (*Allocasuarina* spp.) cones indicative of feeding by Glossy Black-Cockatoo (*Calyptorhynchus lathami*); and
- Chewed fruit remains indicative of past feeding by frugivorous birds such as fruit-doves.

2.6.4 Habitat Assessment

An assessment of the relative habitat value present within the Study Area was undertaken. This assessment focused primarily on the identification of specific habitat types and resources in the Study Area favoured by known threatened species from the region. The assessment also considered the potential value of the Study Area (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;
- Presence of foraging opportunities such as flowering eucalypts, fruits, seeds or other nectar bearing native plants; and
- Presence and abundance of various potential prey species.

Habitat assessment was based on the specific habitat requirements of each threatened fauna species in regards to home range, feeding, roosting, breeding, movement patterns and corridor requirements. Consideration was given to contributing factors including topography, soil, light and hydrology for threatened flora and assemblages.



TITLE : **FIGURE 5: NORTHERN FAUNA SURVEY METHODOLOGIES**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GCS GDA 1994

DATE : **17/08/2016**

PURPOSE: **ECOLOGY**

VERSION (PLAN BY): B A3 (Natalie.Wood)

PATH: J:\JOBS\Centennial\All Jobs\131758 JV Energy Australia Springvale\10 - Drafting\Arcgis Map Documents\Eco\Report Figures\131758 Figure 5 NFSM B A3 20160812.mxd

CLIENT: **CENTENNIAL COAL**

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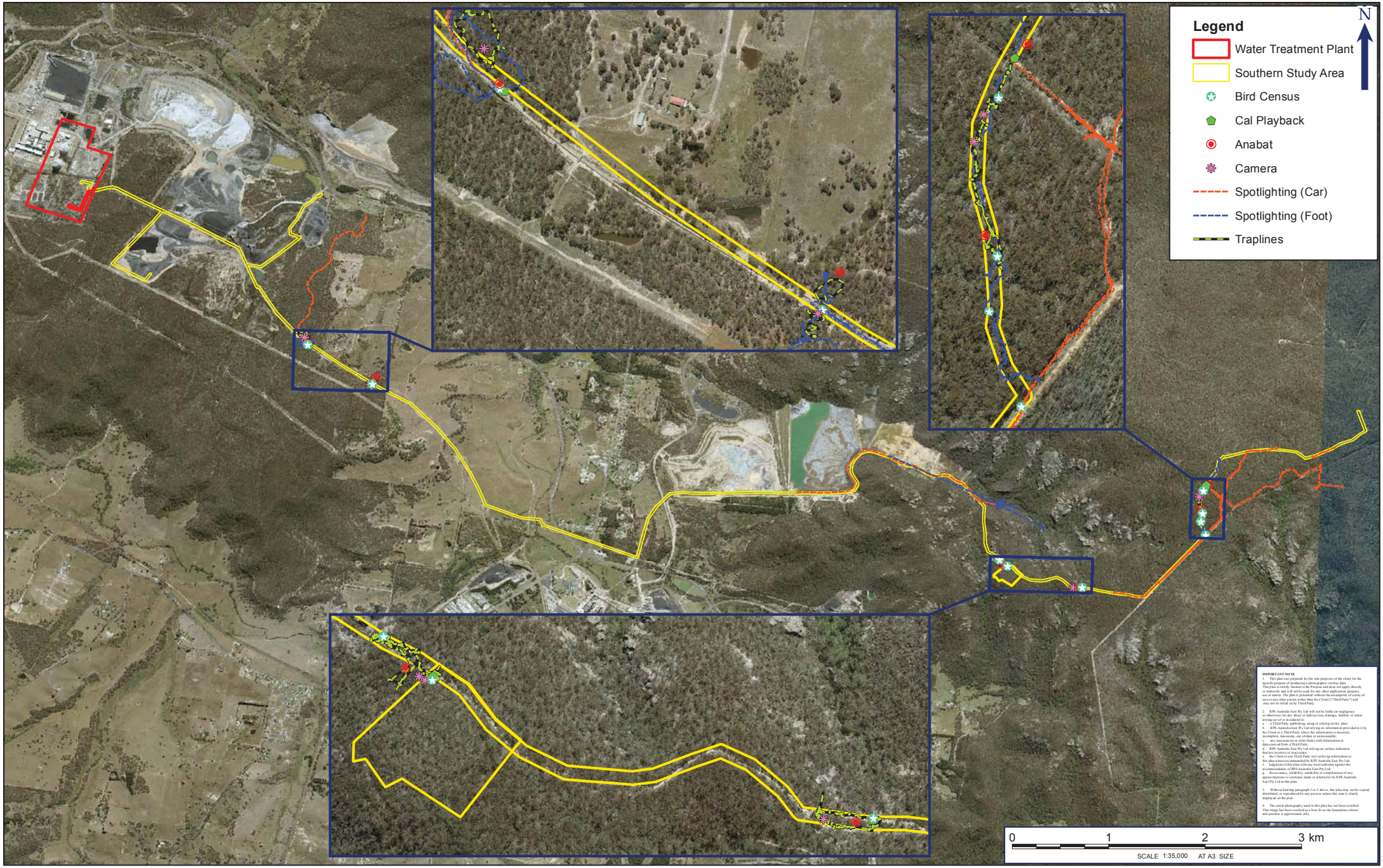

TITLE : **FIGURE 6: SOUTHERN FAUNA SURVEY METHODOLOGIES**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GCS GDA 1994

DATE : **17/08/2016**

PURPOSE: **ECOLOGY**

VERSION (PLAN BY): B A3 (Natalie.Wood)

PATH: J:\JOBS\Centennial\All Jobs\131758 JV Energy Australia Springvale\10 - Drafting\Arcgis Map Documents\Eco\Report Figures\131758 Figure 6 SFSM B A3 20160812.mxd

CLIENT: **CENTENNIAL COAL**

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2.7 Survey Limitations

2.7.1 Seasonality

The effects of seasonality have been addressed, where possible, through a review of relevant literature and through a likelihood of occurrence analysis. Identification of potential habitats for flora and fauna species and assessment of the potential for targeted species to occur on the Study Area based on:

- Previous records;
- The type and condition of habitats present;
- The land use throughout the Study Area and surrounds; and
- The landscape context.

The precautionary principle was applied where marginal habitat was identified or predicted to occur or where species are migratory or nomadic and were therefore likely to utilise habitat components at some stage during their life cycle.

2.7.1.1 Flora

Survey timing is important for detecting cryptic plant species, such as annuals, which are present in the seed bank for much of the year. Other plant species are perennial but are inconspicuous or difficult to identify unless flowering. The survey timing and flowering period for targeted threatened flora species is shown in **Table 8**.

Table 8 Threatened Flora Species with Potential to Occur within the Study Area, Flowering Periods (shaded) and Recommended Survey Timing (seasonality)

Threatened Flora Species	Recommended Survey Time	Flowering Period in Months of the Year											
		January	February	March	April	May	June	July	August	September	October	November	December
Acacia meiantha	Survey Anytime							■	■	■	■		
Caesia parviflora var. *minor*	Survey During Flowering	✳									■	■	✳
Veronica blakelyi	Survey Anytime	✳	■										✳
Dillwynia tenuifolia	Survey Anytime	✳	■	■					■	■	■	■	✳
Eucalyptus cannonii	Survey Anytime	✳				✳							✳
Eucalyptus aggregata	Survey Anytime	✳				✳							✳
Eucalyptus cannonii	Survey Anytime	✳	■	■	■								
Eucalyptus pulverulenta	Survey Anytime									■	■	■	
Genoplesium superbum	Survey During Flowering	✳	■	■									✳
Leucopogon fletcheri subsp. *fletcheri*	Survey Anytime								■	■			
Lastreopsis hispida	Survey Anytime	✳				✳							✳
Leucochrysum albicans var. *tricolor*	Survey Anytime	✳	■							■	■	■	✳
Persoonia acerosa	Survey Anytime	✳	■	■	■	✳							✳
Persoonia hindii	Survey Anytime	✳	■	■									
Persoonia marginata	Survey Anytime	✳	■			✳	■	■	■	■	■	■	✳
Prostanthera cryptandroides subsp. *cryptandroides*	Survey Anytime	✳	■	■	■	✳				■	■	■	✳
Thesium australe	Survey Anytime	✳	■							■	■	■	✳

Note:✳ = Timing of flora surveys

2.7.1.2 Fauna

Similarly, some fauna species that have been recorded in the local area occur on a seasonal or migratory basis, may be absent from the locality for much for the year. Fauna behaviours may have also affected detection; species that are easily disturbed or cryptic may not have been detected during surveys. It is possible that a number of flora and fauna species occurring in the Study Area were not detected during the current survey due to the above factors.

2.7.2 Data Availability and Accuracy

The accuracy and reliability of threatened flora and fauna species records for the region, as provided by NSW Atlas of Wildlife Database or BioNet (OEH 2016) is variable. 'Reliable' data extracted from BioNet was limited to records with a reported accuracy of less than 100 m. Data with positional accuracy exceeding 100 m was used at a landscape scale. Data recorded by RPS during the survey period, has been gathered with a Trimble Differential GPS unit, which is capable of sub-metre accuracy following post processing.

3.0 Results

3.1 Desktop Review

3.1.1 Database Searches

The results of database searches using the OEH Atlas of NSW Wildlife (Accessed May 2016) and the EPBC Protected Matters Search (Accessed April 2016) identified 29 threatened flora species, 52 threatened fauna species and seven Endangered Ecological Communities (EECs) within the locality. These species are listed in **Table 9** below.

Table 9 Threatened Flora and Fauna within 10km of the Study Area

Family	Scientific Name	Common Name	TSC Act	EPBC Act	Record within 10 km
Flora					
Anthericaceae	*Caesia parviflora* var. *minor*	Small Pale Grass-lily	E	-	24
Araucariaceae	*Wollemia nobilis*	Wollemi Pine	CE	E	0
Asteraceae	*Leucochrysum albicans* var. *tricolor*	Hoary Sunray	-	E	0
Dryopteridaceae	*Lastreopsis hispida*	Bristly Shield Fern	E	-	1
Ericaceae	*Leucopogon fletcheri* subsp. *fletcheri*	-	E	-	7
Fabaceae (Faboideae)	*Acacia bynoeana*	Bynoe's Wattle	E	V	0
	Acacia meiantha	-	E	-	0
	Dillwynia tenuifolia	-	V	-	2
	Pultenaea glabra	Smooth Bush-pea	V	V	0
Geraniaceae	*Pelargonium* sp. Striatellum (G.W.Carr 10345)	Omeo Stork's-bill	-	E	0
Lamiaceae	*Prostanthera cryptandroides* subsp. *Cryptandroides*	Wollemi Mint-bush	V	V	1
Myrtaceae	*Eucalyptus aggregata*	Black Gum	V	V	211
	Eucalyptus cannonii	Capertee Stringybark	V	-	488
	Eucalyptus pulverulenta	-	V	V	3
	Eucalyptus robertsonii subsp. *Hemisphaerica*	Robertson's Peppermint	V	V	0
	Homoranthus darwinioides	-	V	V	0
Orchidaceae	*Cryptostylis hunteriana*	Leafless Tongue-orchid	V	V	0
	Genoplesium superbum	Superb Midge Orchid	E	-	13
	Microtis angusii	Angus's Onion Orchid	E	E	0
	Prasophyllum petilum	Tarengo Leek Orchid	E	E	0
	Prasophyllum sp. Wybong (C. Phelps ORG 5269)	-	-	CE	0
Orobanchaceae	*Euphrasia arguta*	-	CE	CE	0
Plantaginaceae	*Veronica blakelyi*	-	V	-	1410
Proteaceae	*Persoonia acerosa*	Needle Geebung	V	V	1
	Persoonia hindii	-	E	-	3560
	Persoonia marginata	Clandulla Geebung	V	V	78

Family	Scientific Name	Common Name	TSC Act	EPBC Act	Record within 10 km
Rutaceae	*Asterolasia elegans*	-	E	E	0
	Boronia deanei	Deane's Boronia	V	V	192
Santalaceae	*Thesium australe*	Austral Toadflax	V	V	4
Amphibians					
Myobatrachidae	*Heleioporus australiacus*	Giant Burrowing Frog	V	V	0
	Mixophyes balbus	Stuttering Frog	E	V	1
	Pseudophryne australis	Red-crowned Toadlet	V	-	0
Hylidae	*Litoria booroolongensis*	Booroolong Frog	E	E	0
	Litoria littlejohni	Littlejohn's Tree Frog	V	V	4
Reptiles					
Elapidae	*Hoplocephalus bungaroides*	Broad-headed Snake	E	V	1
Pygopodidae	*Aprasia parapulchella*	Pink-tailed Worm-lizard	V	V	0
Scincidae	*Eulamprus leuraensis*	Blue Mountains Water Skink	E	E	276
Varanidae	*Varanus rosenbergi*	Rosenberg's Monitor	V	-	1
Birds					
Anatidae	*Oxyura australis*	Blue-billed Duck	V	-	10
Accipitridae	*Hieraaetus morphnoides*	Little Eagle	V	-	8
	Lophoictinia isura	Square-tailed Kite	V	-	1
Cacatuidae	*Callocephalon fimbriatum*	Gang-gang Cockatoo	V	-	345
	Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	13
Psittacidae	*Glossopsitta pusilla*	Little Lorikeet	V	-	7
	Lathamus discolor	Swift Parrot	E	E	0
Strigidae	*Ninox connivens*	Barking Owl	V	-	6
	Ninox strenua	Powerful Owl	V	-	43
Tytonidae	*Tyto novaehollandiae*	Masked Owl	V	-	2
	Tyto tenebricosa	Sooty Owl	V	-	2
Climacteridae	*Climacteris picumnus victoriae*	Brown Treecreeper	V	-	80
Acanthizidae	*Chthonicola sagittata*	Speckled Warbler	V	-	3
Meliphagidae	*Anthochaera phrygia*	Regent Honeyeater	CE	CE	0
	Grantiella picta	Painted Honeyeater	V	-	1
	Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V	-	2
Pomatostomidae	*Pomatostomus temporalis temporalis*	Grey-crowned Babbler (eastern subspecies)	V	-	4
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	V	-	56
Petroicidae	*Melanodryas cucullata cucullata*	Hooded Robin	V	-	9
	Petroica boodang	Scarlet Robin	V	-	328
	Petroica phoenicea	Flame Robin	V	-	478
Rostratulidae	*Rostratula australis*	Australian Painted Snipe	E	V	0
Estrildidae	*Stagonopleura guttata*	Diamond Firetail	V	-	1

Family	Scientific Name	Common Name	TSC Act	EPBC Act	Record within 10 km
Mammals					
Dasyuridae	*Dasyurus maculatus maculatus*	Spotted-tailed Quoll	V	E	8
Peramelidae	*Isoodon obesulus obesulus*	Southern Brown Bandicoot	E	E	0
Phascolarctidae	*Phascolarctos cinereus*	Koala	V	V	5
Burramyidae	*Cercartetus nanus*	Eastern Pygmy-possum	V	-	16
Petauridae	*Petaurus australis*	Yellow-bellied Glider	V	-	2
	Petaurus norfolcensis	Squirrel Glider	V	-	6
	Petauroides volans	Greater Glider	-	V	225
Macropodidae	*Petrogale penicillata*	Brush-tailed Rock-wallaby	E	V	1
Molossidae	*Mormopterus norfolkensis*	Eastern Freetail-bat	V	-	1
Muridae	*Pseudomys novaehollandiae*	New Holland Mouse	-	V	1
Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox	V	V	0
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V	-	7
Vespertilionidae	*Chalinolobus dwyeri*	Large-eared Pied Bat	V	V	22
	Nyctophilus corbeni	Corben's Long-eared Bat,	V	V	0
	Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	20
	Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	33
	Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	7
	Vespadelus troughtoni	Eastern Cave Bat	V	-	5
Insects					
Lycaenidae	*Paralucia spinifera*	Bathurst Copper Butterfly	E	V	1892
Petaluridae	*Petalura gigantea*	Giant Dragonfly	E	-	38
Ecological Communities					
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions			E	-	NA
Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion			E	-	
Natural Temperate Grassland of the South Eastern Highlands			-	CE	
Temperate Highland Peat Swamps on Sandstone			-	E	
Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions			E	-	
Tableland Basalt Forest in the Sydney Basin and South Eastern Highland Bioregions (TSC Act)/ Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion (EPBC Act)			E	E	
White Box – Yellow-box – Blakely's Red Gum Grassy Woodland (TSC Act) White Box – Yellow-box – Blakely's Red Gum Grassy Woodland and Derived native Grassland (EPBC Act)			E	CE	

Notes: V = Vulnerable Species
E = Endangered Species
CE = Critically Endangered Species

\- = Not listed

Migratory terrestrial and wetland species listed under the EPBC Act have also been considered under this assessment. A Protected Matters Search was undertaken (accessed April 2016) which lists potential migratory species. **Table 10** displays the potentially occurring migratory species within a 10 km radius of the Study Area.

Table 10 Potentially Occurring Migratory Species within a 10 km Radius of the Study Area

Scientific Name	Common Name	EPBC Act Status
Ardea alba	Great Egret	M
Ardea ibis	Cattle Egret	M
Gallinago hardwickii	Latham's Snipe	M
Hirundapus caudacutus	White-throated Needletail	M
Merops ornatus	Rainbow Bee-eater	M
Monarcha melanopsis	Black-faced Monarch	M
Motacilla flava	Yellow Wagtail	M
Myiagra cyanoleuca	Satin Flycatcher	M
Pandion haliaetus	Eastern Osprey	M
Rhipidura rufifrons	Rufous Fantail	M

Key:
M Migratory
CE Critically Endangered

3.1.2 Landscape Context

The Study Area is located within the Wollemi and Capertee subregions of the Sydney Basin Interim Biogeographic Regionalisation for Australia (IBRA). Both subregions are generically described below:

Wollemi Subregion

"Geology consists of Hawkesbury Sandstone and equivalent quartz sandstones of Narrabeen Group, sub-horizontal bedding, strong vertical joint patterns with a few volcanic necks. Characteristic landforms include being the highest part of the Blue Mountains. Sandstone plateau with benched rock outcrops. Creek direction controlled by jointing deep gorge of the Capertee and Wolgan Rivers. Soils consist of thin sands or deep yellow earths on plateau, thin texture contrast soils on shale benches. Organic sands in swamps and joint crevices, bouldery slope debris below cliffs, sandy alluvium in pockets along streams.

Vegetation on plateaus and heaths includes the following tree species: *Corymbia gummifera* (Red Bloodwood), *Corymbia eximia* (Yellow Bloodwood), *Angophora floribunda* (Rough-barked Apple), *Angophora costata* (Smooth-barked Apple), *Eucalyptus sclerophylla* (Hard-leaved Scribbly Gum), and *Eucalyptus punctata* (Grey Gum). *Angophora costata* (Smooth-barked Apple), *Eucalyptus piperita* (Sydney Peppermint), *Eucalyptus agglomerata* (Blue-leaved Stringybark) and *Syncarpia glomulifera* (Turpentine) occur in gully rainforest and canyon heads. Ribbon gum and *Eucalyptus blaxlandii* (Blaxland's Stringybark) occur on Basalt with *Casuarina cunninghamiana* (River Oak) occurring along main streams" (Morgan 2011 in OEH 2016b).

Capertee Subregion

"Geology consists of Permian shoalhaven Group conglomerates. Sandstones and shales with coal at the base of the Sydney Basin and exposure of underlying Devonian shale, siltstone or quartzite. Eastern margin of Narrabeen sandstone on cliffs. Characteristic landforms include wide valleys, low rolling hills below sandstone cliffs with isolated flat top mountains in the valleys formed as pinnacles or remnant pieces

of plateau. Steep, boulder debris slope below cliffs. Shoulder slopes with stone pillars or 'pagodas' above steep canyons on tributary streams falling into gorges. Low gradient swampy stream lines. Soils are typically shallow stony texture contrast profiles, usually with gritty well drained A horizons over touch yellow or grey poorly drained soils. Bouldery debris with clay matrix below cliffs. Organic sands in swamps and red brown structured loams on basalts.

Woodlands support *Angophora floribunda* (Rough-barked Apple), *Eucalyptus macrorhyncha* (Red Stringybark), *Eucalyptus polyanthemos* (Red Box), *Eucalyptus melliodora* (Yellow Box), *Eucalyptus blakelyi* (Blakely's Red Gum) with a shrubby understorey and *Austrodanthonia* sp. (Wallaby Grass) in open valleys. *Eucalyptus sclerophylla* (Hard-leaved Scribbly Gum), *Eucalyptus macrorhyncha* (Red Stringybark), *Eucalyptus polyanthemos* (Red Box) and *Eucalyptus fibrosa* (Broad-leaved Ironbark) occur on talus slopes. Black Ash, and *Eucalyptus piperita* (Sydney Peppermint) occur on sandstone peaks with *Allocasuarina defungens* (Dwarf Casuarina), *Leptospermum* sp. (Tea Tree) and sedge occurring on pagoda margins " (Morgan 2011 in OEH 2016) " (Morgan 2011 in OEH 2016b).

Regional vegetation mapping (DEC 2006) identifies the native vegetation types or mapping units (MU) listed in **Table 11** as occurring within the Study Area. Plant Community Type (PCT) and TEC equivalents are also provided.

Table 11 Regional Vegetation Types and PCT Equivalent

Vegetation (DEC 2006)	PCT	TEC
MU 7 Newnes Plateau Narrow-leaved Peppermint - Mountain Gum - Brown Stringybark Layered Forest	HN558 Narrow-leaved Peppermint - Mountain Gum - Brown Barrel moist open forest on high altitude ranges, northern South Eastern Highlands	-
MU 8 Newnes Sheltered Peppermint – Brown Barrel Shrubby Forest	HN599 Sydney Peppermint - Narrow-leaved Peppermint shrubby open forest on sheltered slopes of the Newnes Plateau, Sydney Basin	-
MU 11 Tableland Gully Snow Gum - Ribbon Gum Montane Grassy Forest	HN572 Ribbon Gum - Snow Gum grassy forest on damp flats, eastern South Eastern Highlands	Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions
MU 26 Newnes Plateau Narrow-leaved Peppermint - Silver-top Ash Layered Open Forest	HN600 Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin	-
MU 28 Sandstone Plateau and Ridge Scribbly Gum – Silvertop Ash Shrubby Woodland	HN600 Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin	-
MU 29 Sandstone Slopes Sydney Peppermint Shrubby Forest	HN600 Sydney Peppermint - Silvertop Ash healthy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin	-
MU 33 Tableland Broad-leaved Peppermint - Brittle Gum - Red Stringybark Grassy Open Forest	HN514 Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands	-
MU 35 Tableland Gully Mountain Gum – Broad-leaved Peppermint Grassy Forest	HN590 Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands	-

Vegetation (DEC 2006)	PCT	TEC
MU 37 Coxs Permian Red Stringybark - Brittle Gum Woodland	HN570 Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highland	-
MU 43 Pagoda Rock Sparse Shrubland	HN508 Blue Mountains Mallee Ash - Dwarf Casuarina heath of the upper Blue Mountains, Sydney Basin	-
MU 44 Sandstone Plateaux Tea Tree - Dwarf Sheoak - Banksia Rocky Heath	HN508 Blue Mountains Mallee Ash - Dwarf Casuarina heath of the upper Blue Mountains, Sydney Basin	-
MU 53 Mountain Hollow Grassy Fen	HN602 Tableland swamp meadow on impeded drainage sites of the western Sydney Basin and South Eastern Highlands	Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions
MU 58 Acacia Thickets	HN 570 Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highland	-
MU 59 Non-native Vegetation – Pine Plantation / Woodlot		-
MU 62 Cleared/disturbed lands		-

3.1.3 Potential Groundwater Dependent Ecosystems

One vegetation type within the Study Area (falls within the alignment for both the Northern and Southern Study Area) was found to fall into the category of a GDE, namely:

- MU 53 Mountain Hollow Grassy Fen.

Groundwater and surface water flow are important in sustaining this community (DEC 2006). A small portion of this MU is mapped in **Figure 9**.

3.2 Likelihood of Occurrence

Desktop investigations performed in **Sections 3.1** to **3.2** culminated in a list of 16 threatened flora species and 42 threatened fauna species that may occur within the Study Area (**Table 12**). The field validated likelihood of occurrence analysis is provided in **Appendix 1.**

Table 12 Threatened Species likely to occur

Scientific Name	Common Name	TSC Act	EPBC Act
Flora			
Caesia parviflora var. *minor*	Small Pale Grass-lily	E	-
Leucochrysum albicans var. *tricolor*	Hoary Sunray	-	E
Lastreopsis hispida	Bristly Shield Fern	E	-
Leucopogon fletcheri subsp. *fletcheri*	-	E	-
Acacia meiantha	-	E	-
Dillwynia tenuifolia	-	V	-
Prostanthera cryptandroides subsp. *Cryptandroides*	Wollemi Mint-bush	V	V
Eucalyptus aggregata	Black Gum	V	V
Eucalyptus cannonii	Capertee Stringybark	V	-
Eucalyptus pulverulenta	-	V	V

Scientific Name	Common Name	TSC Act	EPBC Act
Genoplesium superbum	Superb Midge Orchid	E	-
Veronica blakelyi	-	V	-
Persoonia acerosa	Needle Geebung	V	V
Persoonia hindii	-	E	-
Persoonia marginata	Clandulla Geebung	V	V
Thesium australe	Austral Toadflax	V	V
Amphibians			
Heleioporus australiacus	Giant Burrowing Frog	V	V
Pseudophryne australis	Red-crowned Toadlet	V	-
Litoria littlejohni	Littlejohn's Tree Frog	V	V
Reptiles			
Hoplocephalus bungaroides	Broad-headed Snake	E	V
Varanus rosenbergi	Rosenberg's Monitor	V	-
Birds			
Hieraaetus morphnoides	Little Eagle	V	-
Lophoictinia isura	Square-tailed Kite	V	-
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-
Glossopsitta pusilla	Little Lorikeet	V	-
Ninox connivens	Barking Owl	V	-
Ninox strenua	Powerful Owl	V	-
Tyto novaehollandiae	Masked Owl	V	-
Tyto tenebricosa	Sooty Owl	V	-
Climacteris picumnus victoriae	Brown Treecreeper	V	-
Chthonicola sagittata	Speckled Warbler	V	-
Anthochaera phrygia	Regent Honeyeater	CE	CE
Grantiella picta	Painted Honeyeater	V	-
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V	-
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V	-
Daphoenositta chrysoptera	Varied Sittella	V	-
Melanodryas cucullata cucullata	Hooded Robin	V	-
Petroica boodang	Scarlet Robin	V	-
Petroica phoenicea	Flame Robin	V	-
Stagonopleura guttata	Diamond Firetail	V	-
Mammals			
Dasyurus maculatus maculatus	Spotted-tailed Quoll	V	E
Isoodon obesulus obesulus	Southern Brown Bandicoot	E	E
Phascolarctos cinereus	Koala	V	V
Cercartetus nanus	Eastern Pygmy-possum	V	-
Petaurus australis	Yellow-bellied Glider	V	-
Petaurus norfolcensis	Squirrel Glider	V	-
Petauroides volans	Greater Glider	-	V

Scientific Name	Common Name	TSC Act	EPBC Act
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V
Mormopterus norfolkensis	Eastern Freetail-bat	V	-
Pseudomys novaehollandiae	New Holland Mouse	-	V
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-
Chalinolobus dwyeri	Large-eared Pied Bat	V	V
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-
Vespadelus troughtoni	Eastern Cave Bat	V	-
Paralucia spinifera	Bathurst Copper Butterfly	E	V
Vegetation Communities			
Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions		E	
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions		E	

3.3 Flora Survey

3.3.1 Northern Study Area

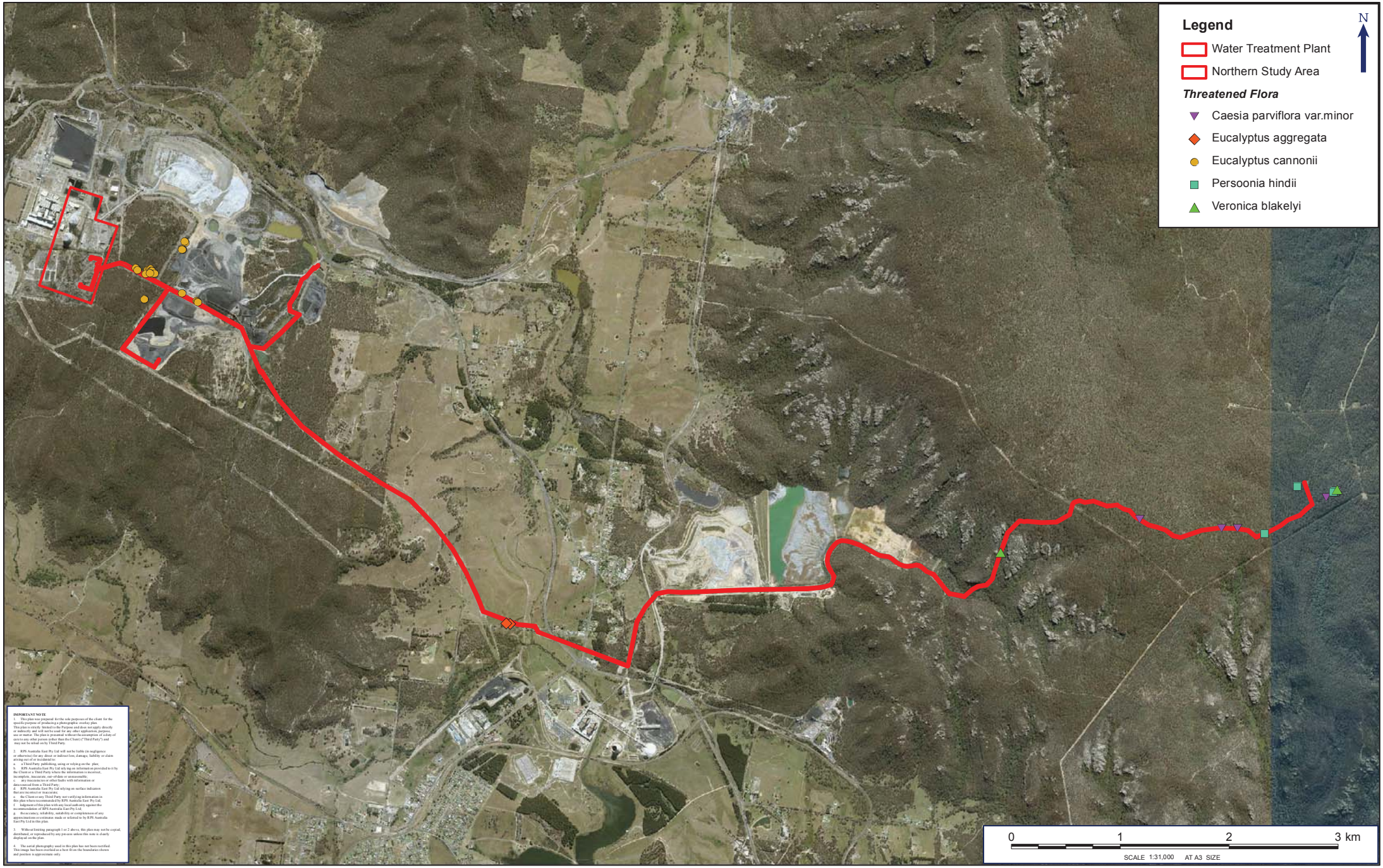
BioBanking plots resulted in the detection of 157 flora species, comprising 129 native species, 28 exotic species. Three threatened flora species were positively identified within the eastern portion of Study Area on Newnes Plateau during current and previous (RPS 2014) field survey, specifically:

- *Caesia parviflora* var. *minor* (Small Pale Grass Lily) - approximately three individuals (RPS 2016);
- *Persoonia hindii* – approximately seven individuals (current surveys, RPS 2016 and RPS 2014); and
- *Veronica blakelyi* – one individual (RPS 2014).

Two additional species were detected immediately adjacent to the Study Area, with potential juvenile species occurring within the Study Area, specifically:

- *Eucalyptus aggregata* (Black Gum) – two individuals (central portion of the Study Area); and
- *Eucalyptus cannonii* (Capertee Stringybark) – approximately 26 (western portion of the Study Area).

Eucalyptus cannonii and *V. blakelyi* are listed as vulnerable under the TSC Act and *Persoonia hindii* and *C. parviflora* var. *minor,* is listed as endangered under the TSC Act. *Eucalyptus aggregata* is listed as vulnerable under both the TSC Act and EPBC Act. A substantial quantum of *Caesia parviflora* var. *minor* was also detected in the immediate surrounding areas adjacent to the Study Area. The locations of recorded individuals are displayed in **Figure 7.** A full list of recorded flora is contained in **Appendix 2**.



TITLE : **FIGURE 7: NORTHERN STUDY AREA THREATENED FLORA**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **17/08/2016**

PURPOSE: **ECOLOGY**

VERSION (PLAN BY): B A3 (Natalie.Wood)

PATH: J:\JOBS\Centennial\All Jobs\131758 JV Energy Australia Springvale\10 - Drafting\Arcgis Map Documents\Eco\Report Figures\131758 Figure 7 NTFL B A3 20160812.mxd

CLIENT: **CENTENNIAL COAL**

JOB REF: **PR131758**

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

RPS

3.3.2 Southern Study Area

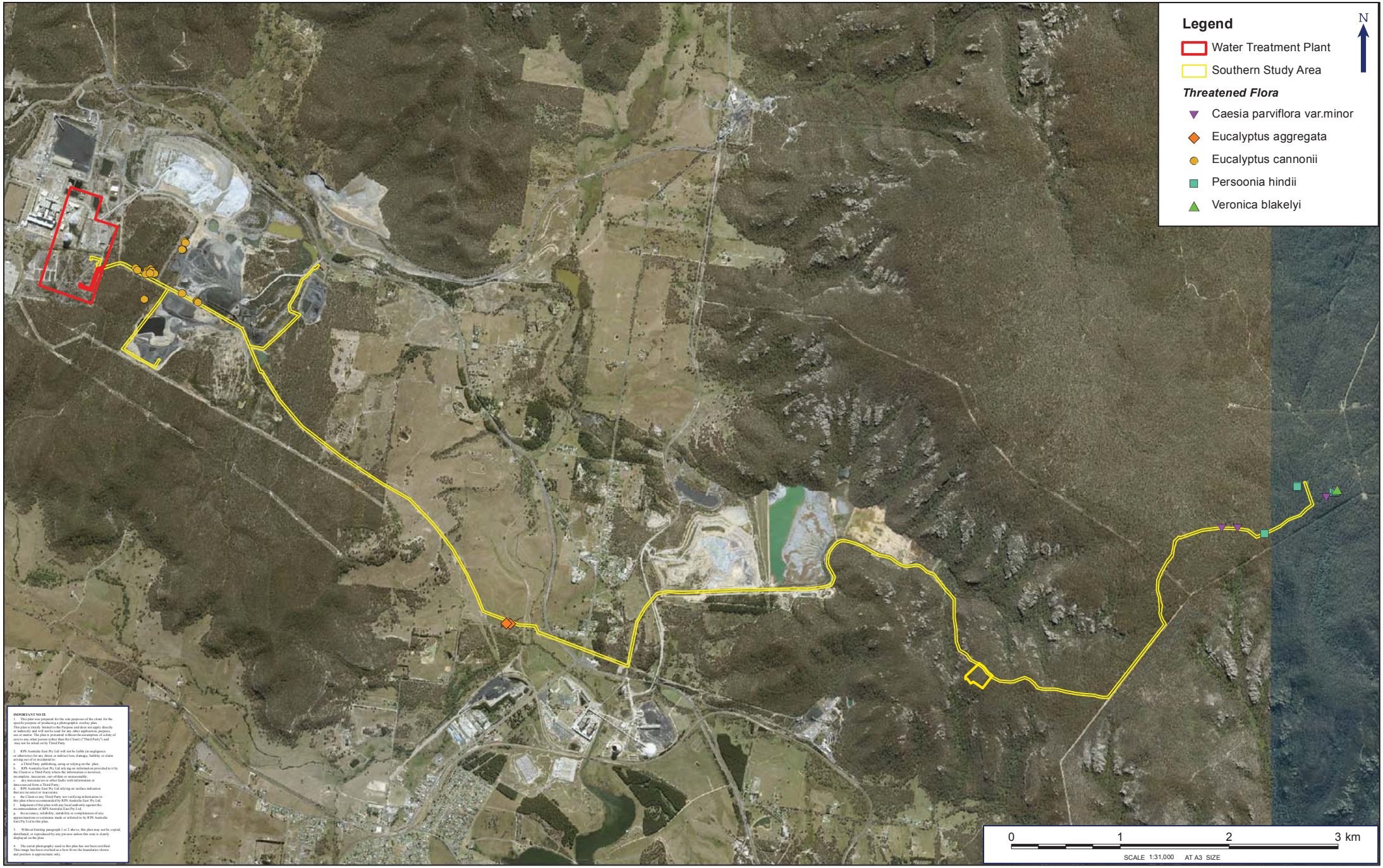
BioMetric plots resulted in the detection of 186 flora species, comprising 159 native species, 27 exotic species. Two threatened flora species were positively identified within the Study Area during current and previous (RPS 2014 and RPS 2016) field surveys, specifically:

- *Caesia parviflora* var. *minor* (Small Pale Grass Lily) - approximately two individuals (RPS 2016); and
- *Persoonia hindii* – approximately seven individuals (current surveys, RPS 2016 and RPS 2014).

Two additional species were detected immediately adjacent to the Study Area, with potential juvenile species occurring within the Study Area, including:

- *Eucalyptus aggregata* (Black Gum) – approximately 2 individuals (central portion of the Study Area); and
- *Eucalyptus cannonii* (Capertee Stringybark) – approximately 26 individuals (western portion of the Study Area).

Eucalyptus cannonii is listed as vulnerable under the TSC Act and *Persoonia hindii* and *C. parviflora* var. *minor,* is listed as endangered under the TSC Act. *Eucalyptus aggregata* is listed as vulnerable under both the TSC Act and EPBC Act. It should be noted that targeted surveys for *Caesia parviflora* var. *minor* were not conducted within the Southern Study Area during the flowering period, and given the known abundance of records along the northern pipeline alignment on Newnes Plateau, it is likely to occur on this alignment. The locations of recorded individuals are displayed in **Figure 8.** A full list of recorded flora is contained in **Appendix 2**.



TITLE : **FIGURE 8: SOUTHERN STUDY AREA THREATENED FLORA**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **17/08/2016**

PURPOSE: **ECOLOGY**

VERSION (PLAN BY): B A3 (Natalie.Wood)

PATH: J:\JOBS\Centennial\All Jobs\131758 JV Energy Australia Springvale\10 - Drafting\Arcgis Map Documents\Eco\Report Figures\131758 Figure 8 STFL B A3 20160812.mxd

CLIENT: **CENTENNIAL COAL**

JOB REF: **PR131758**

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3.4 Vegetation Communities

3.4.1.1 Existing Vegetation Mapping

Vegetation types of the Study Area were previously mapped and described in *The Vegetation of the Western Blue Mountains* (DEC 2006). DEC (2006) mapped 15 vegetation communities within the Study Area, as listed below:

- MU 7 Newnes Plateau Narrow-leaved Peppermint - Mountain Gum - Brown Stringybark Layered Forest;
- MU 8 Newnes Sheltered Peppermint – Brown Barrel Shrubby Forest;
- MU 11 Tableland Gully Snow Gum - Ribbon Gum Montane Grassy Forest;
- MU 26 Newnes Plateau Narrow-leaved Peppermint - Silver-top Ash Layered Open Forest;
- MU 28 Sandstone Plateau and Ridge Scribbly Gum – Silvertop Ash Shrubby Woodland;
- MU 29 Sandstone Slopes Sydney Peppermint Shrubby Forest;
- MU 33 Tableland Broad-leaved Peppermint - Brittle Gum - Red Stringybark Grassy Open Forest;
- MU 35 Tableland Gully Mountain Gum – Broad-leaved Peppermint Grassy Forest;
- MU 37 Coxs Permian Red Stringybark - Brittle Gum Woodland;
- MU 43 Pagoda Rock Sparse Shrubland;
- MU 44 Sandstone Plateaux Tea Tree - Dwarf Sheoak - Banksia Rocky Heath;
- MU 58 Acacia Thickets;
- MU 59 Non-native Vegetation – Pine Plantation / Woodlot / Shelter;
- MU 61 Unclassified; and
- MU 62 Cleared and Severely Disturbed Lands.

This regional scale mapping is subject to accuracy limitations at the site scale and has accordingly been used as a guide in determining the spatial extent of vegetation types within the Study Area.

3.4.1.2 Groundtruthed Vegetation Mapping

Revised native vegetation mapping following ground truthing within the Northern and Southern Study Areas is outlined in **Table 13** and displayed on **Figure 9**.

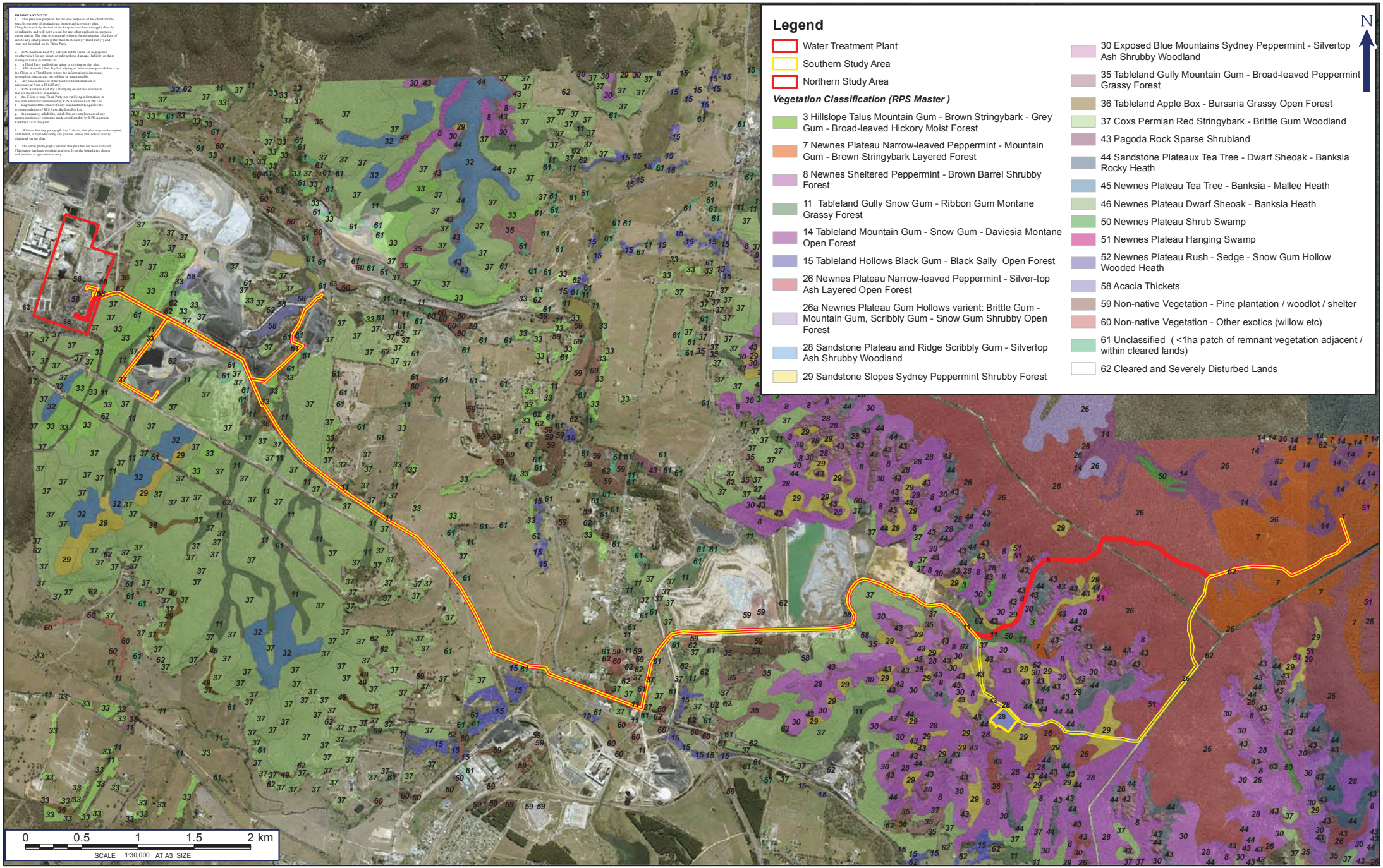
Table 13 Native Vegetation Cover of the Study Area

Vegetation Map Unit Number (MU) and Description	Northern Total Area (ha)	Southern Total Area (ha)
MU 7 Newnes Plateau Narrow-leaved Peppermint - Mountain Gum - Brown Stringybark Layered Forest	2.63	2.88
MU 8 Newnes Sheltered Peppermint – Brown Barrel Shrubby Forest	1.43	0.38
MU 11 Tableland Gully Snow Gum - Ribbon Gum Montane Grassy Forest	1.60	1.68
MU 26 Newnes Plateau Narrow-leaved Peppermint - Silver-top Ash Layered Open Forest	3.70	3.42
MU 28 Sandstone Plateau and Ridge Scribbly Gum – Silvertop Ash Shrubby Woodland	0.00	4.47
MU 29 Sandstone Slopes Sydney Peppermint Shrubby Forest	0.22	1.06
MU 33 Tableland Broad-leaved Peppermint - Brittle Gum - Red Stringybark Grassy Open Forest	1.65	1.65
MU 35 Tableland Gully Mountain Gum – Broad-leaved Peppermint Grassy Forest	0.00	0.11
MU 37 Coxs Permian Red Stringybark - Brittle Gum Woodland	8.33	8.33
MU 43 Pagoda Rock Sparse Shrubland	0.00	0.12
MU 44 Sandstone Plateaux Tea Tree - Dwarf Sheoak - Banksia Rocky Heath	0.00	0.21
MU 53 Mountain Hollow Grassy Fen	0.02	0.02
MU 58 Acacia Thickets	21.04	21.06
MU 59 Non-native Vegetation – Pine Plantation / Woodlot / Shelter	0.01	0.01
MU 62 Cleared/disturbed lands	47.11	44.85
Total	**92.51**	**85.48**

Two of these communities are listed as Endangered Ecological Communities, as listed below:

- MU 11 corresponds to Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions EEC listed under the TSC Act; and
- MU 53 corresponds to Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions EEC listed under the TSC Act.

Profiles for each vegetation community in which a BioBanking plot was undertaken are detailed below.



TITLE : **FIGURE 9: VEGETATION COMMUNITIES**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **17/08/2016**

PURPOSE: **ECOLOGY**

VERSION (PLAN BY): B A3 (Natalie.Wood)

PATH: J:\JOBS\Centennial\All Jobs\131758 JV Energy Australia Springvale\10 - Drafting\Arcgis Map Documents\Eco\Report Figures\131758 Figure 9 Veg B A3 20160812.mxd

CLIENT: **CENTENNIAL COAL**

JOB REF: **PR131758**

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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: A tall to very tall forest with a relatively open understorey.

Canopy Layer: 22 to 38 m – 44% Percentage Foliage Cover (PFC). Dominant species include: *Eucalyptus radiata* (Narrow-leaved Peppermint), *Eucalyptus oreades* (Blue Mountains Ash) and *Eucalyptus dalrympleana* (Mountain Gum). Other non-dominant species include: *Eucalyptus sieberi* (Silvertop Ash).

Shrub Layer: 1 to 2 m – 60 PFC. Dominant shrub species included: *Daviesia latifolia* (Hop Bitter-pea) and *Leucopogon lanceolatus* (Lance-leaf Beard-heath). Other non-dominant species include *Hakea dactyloides* (Broad-leaved Hakea) and *Acacia dorothea* (Dorothy's Wattle).

Ground Layer: 0 to 0.5 m – 33 PFC. Dominant species included: *Poa sieberiana* var. *cyanophylla*, *Monotoca scoparia* (Crinkle Bush), *Joycea pallida* (Silvertop Wallaby Grass), *Patersonia sericea* (Silky Purple Flag), *Lomandra longifolia* (Spiny-headed Mat-rush) and *Pteridium esculentum* (Bracken).

Classification: Not commensurate with any TSC Act or EPBC Act listed EEC.

MU 8 – Newnes Sheltered Peppermint - Brown Barrel Shrubby Forest

Plate 2 Newnes Sheltered Peppermint - Brown Barrel Shrubby Forest

Description: This vegetation 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).

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 obtusifolia* (Blunt-leaf Wattle) and *Acacia falciformis* (Broad-leaved Hickory).

Ground Layer: 0 to 1 m – 60 PFC. Dominant species included: *Lomandra longifolia* (Mat Rush), *Pteridium esculentum* (Bracken),*Coronidium scorpioides* (Button Everlasting), *Blechnum cartilagineum* (Gristle Fern)*, Oxalis perrenans, Centella asiatica* (Indian Pennywort) and *Gonocarpus teucroides* (Raspwort).

Classification: Not commensurate with any TSC Act or EPBC Act listed EEC.

MU 11 – Tableland Gully Snow Gum - Ribbon Gum Montane Grassy Forest

Plate 3 Tableland Gully Snow Gum - Ribbon Gum Montane Grassy Forest

Description: This vegetation community occurs as a tall forest with a dense grassy groundcover. Occupies lower slopes, gullies and flats on a range of geological substrates.

Canopy layer: 20 to 40 m – 20-50 PFC. Dominant species include: *Eucalyptus rubida* subsp. *rubida* (Candlebark) and *E. viminalis* (Ribbon Gum).

Shrub Layer: 1 to 2 m – 10-40 PFC. Dominant shrub species included: *Acacia implexa* (Hickory Wattle), *Leptospermum obovatum*, *Leptospermum polygalifolium* (Tantoon), *Acacia dealbata* (Silver Wattle) and *Cassinia aculeata* (Dolly Bush).

Ground layer: 0 to 0.5 m – 5-20 PFC. Dominant species included: *Cynodon dactylon* (Common Couch), *Microlaena stipoides* (Weeping Grass), *Echinopogon ovatus* (Forest Hedgehog Grass), *Centella asiatica* (Indian Pennywort) and *Blechnum cartilagineum* (Gristle Fern).

Classification: This community corresponds to the TSC Act listed EEC *Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions*.

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

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

Description: This vegetation community forms tall woodlands on the ridgetops and central plateaux. This vegetation community was generally open in structure with a sparse shrub layer.

Canopy Layer: 12 to 30 m – 30 PFC. Dominant species included: *Eucalyptus sieberi* (Silvertop Ash), *Eucalyptus radiata* (Narrow-leaved Peppermint) and *Eucalyptus blaxlandii* (Red Stringybark). Non dominant species included *E. dalrympleana* (Mountain Gum) and *E. oreades*.

Shrub Layer: 1 to 4 m – 2 to 25 PFC. Dominant shrub species included: *Daviesia latifolia* (Hop Bitter-pea), *Acacia dorothea* (Dorothy's Wattle), *Persoonia levis* (Broad-leaved Geebung), and *Pteridium esculentum* (Bracken).

Ground Layer: 0 to 1 m – 30 PFC. Dominant species included: *Lomatia silaifolia* (Crinklebush), *Poa sieberiana* var. *cyanophylla*, *Rytidosperma pallida* (Silvertop Wallaby Grass), *Microlaena stipoides* (Weeping Grass), *Lomandra glauca* (Pale Mat-rush), *Lomandra multiflora* (Many-flowered Mat-rush) and *Entolasia stricta* (Wiry Panic).

Classification: Not commensurate with any TSC Act or EPBC Act listed EEC.

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: A community found on the shallow soils and rocky sites within the eastern section of the Study Area. Usually an open forest or woodland characterised by a diverse midstratum that may be quite dense.

Canopy Layer: 7 to 20 m – 25 to 35% PFC. Dominant species include: *Eucalyptus sclerophylla* (Hard-leaved Scribbly Gum) and *Eucalyptus sieberi* (Silver-top Ash).

Shrub Layer: 0.5 to 6.0 m – 3 to 15% PFC. Dominant shrub species included: *Acacia dorothea* (Dorothy's Wattle), *Acacia terminalis* (Sunshine Wattle), Banksia spinulosa var. collina (Hairpin Banksia), *Hakea dactyloides* (Broad-leaved Hakea), *Daviesia squarrosa*, *Monotoca scoparia* and *Persoonia myrtilloides* (Myrtle Geebung).

Ground Layer: 0 to 1.0 m – 30 to 65% PFC. *Platysace linearifolius*, *Phyllota squarrosa* (Dense Phyllota), *Joycea pallida* (Silvertop Wallaby Grass), Lomandra glauca (Pale Mat-rush), Caustis flexuosa (Curly Wig), *Dampiera stricta* (Blue Dampiera), *Persoonia laurina* (Laurel Geebung) and *Hibbertia obtusifolia* (Hoary Guinea Flower).

Classification: Not commensurate with any TSC Act or EPBC Act listed EEC.

MU 29 – Sandstone Slopes Sydney Peppermint Shrubby Forest

Plate 6 Sandstone Slopes Sydney Peppermint Shrubby Forest

Description: This vegetation community occurs on semi sheltered sandstone slopes and deeper soils on ridges.

Canopy Layer: 15.5 to 35 m - 35 to 70% PFC. The dominant species were *Eucalyptus radiata* (Narrow-leaved Peppermint) with less dominant occurrences of *Eucalyptus sclerophylla* (Hard-leaved Scribbly Gum), *Eucalyptus blaxlandii* (Blaxland's Stringybark) and *Eucalyptus sieberi* (Silvertop Ash).

Shrub Layer: 0.4 to 10 m – 5 to 60% PFC. Dominant shrub species included: *Daviesia Squarrosa*, *Acacia caesiella* (Tableland Wattle), *Acacia dorothea* (Dorothy's Wattle), *Acacia buxifolia* (Box-leaf Wattle), *Monotoca scoparia*, *Leptomeria acida* (Native Currant), *Acacia obtusifolia*, Hakea dactyloides (Broad-leaved Hakea), *Leucopogon* sp. and *Lissanthe strigosa* (Peach Heath).

Ground Layer: 0 to 1.0 m – 5 to 40% PFC. Dominant species included: *Patersonia sericea, Platysace linearifolius*, *Joycea pallida* (Wallaby Grass), *Pteridium esculentum* (Bracken), Dianella revoluta (Blue Flax Lily), *Lomandra glauca* (Pale Mat-rush), *Boronia microphylla* (Small-flower Boronia), *Hibbertia obtusifolia* (Hoary Guinea Flower) and *Amperea xiphoclada.*

Classification: Not commensurate with any TSC Act or EPBC Act listed EEC.

MU 33 – Tableland Broad-leaved Peppermint - Brittle Gum - Red Stringybark Grassy Open Forest

Plate 7 Tableland Broad-leaved Peppermint – Brittle Gum – Red Stringybark Grassy Open Forest

Description: This community is a low open forest and woodland community occurring on the flats of the western portions of the Study Area.

Canopy Layer: 16 to 18 m – 30% PFC. Dominant species include *Eucalyptus mannifera* (Brittle Gum) and *E. pauciflora* (Snow Gum). Other non-dominant species include *E. dalrympleana* (Mountain Gum).

Shrub Layer: 1 to 3 m – 5% PFC. Shrub layer consisted of *Cassinia arcuata* (Sifton Bush) and *Acacia dealbata* (Silver Wattle).

Ground Layer: 0 to 1.2 m – 85% PFC. A largely native groundcover existed in this community, dominated by the grasses, *Aristida ramosa* (Spear Grass), *Echinopogon caespitosus* (Hedgehog Grass), *P. sieberiana*, *Joycea pallida* (Wallaby Grass) along with herbs including *Coronidium scorpioides* (Button Everlasting) and *Lomandra glauca* (Pale Mat-rush). Weeds were also present in this community, including *Plantago lanceolata* (Lambs Tongue), *Conyza bonariensis* (Fleabane) and *Senecio madagascariensis* (Fireweed).

Classification: Not commensurate with any TSC Act or EPBC Act listed EEC.

MU 37 – Coxs Permian Red Stringybark - Brittle Gum Woodland

Plate 8 Coxs Permian Red Stringybark - Brittle Gum Woodland

Description: This vegetation community occurs on low slopes above finer-grained Permian age sediments, ranging in altitude from 840 to 1,020 metres above sea level. Open understorey and little groundcover beneath a woodland to open forest canopy of brittle gum.

Canopy Layer: 7 to 15 m – 20-40 PFC. Dominant species include; *Eucalyptus radiata* (Sydney peppermint), with lesser occurrences of *E. mannifera* (Brittle Gum) *E. dives* (Broad-leaved Peppermint) and *E. rossii* (Inland Scribbly Gum).

Shrub Layer: 0.6 to 2 m – 5 to 10 PFC. Dominant shrub species included *Monotoca scoparia*, *Acacia buxifolia* (Box-leaf Wattle), *Exocarpos cupressiformis*(Native Cherry), *Podolobium ilicifolium* (Prickly Shaggy Pea), *Leucopogon lanceolata*, *Lissanthe strigosa*, and *Acacia obtusifolia* (Blunt-leaf Wattle).

Ground Layer: 0 to 0.8 m – 5 to 70 PFC. Dominant species included; Poa sieberiana, *Dianella revoluta* (Blue Flax Lily), *Joycea pallida* (Wallaby Grass), *Gonocarpus tetragynus, Lomandra longifolia* (Mat Rush)*, Billardiera scandens* (Apple berry), *Lomandra filiformis* (Wattle Mat-rush).

Classification: Not commensurate with any TSC Act or EPBC Act listed EEC.

MU 43 – Pagoda Rock Sparse Shrubland;

Plate 9 Pagoda Sparse Rock Shrubland

Description: This vegetation community occurs in many small patches primarily in the far eastern end of the Study Area along the edge of the Newnes Plateau. It is found along the upper and middle reaches of steep slopes associated with drainages or the plateau edge. Low heath forms around pagoda rock formations and on shallow soils fringing slabs of bare sandstone. The density of vegetation varies with soil depth, with patches of dense vegetation occupying the soils collected in bowls or fissures in the rock formations, interspersed with patchy and sometimes extensive unvegetated areas of bare rock.

Canopy Layer: Absent.

Shrub Layer: 1 to 3 m – 5 to 50% PFC. Dominant shrub species included: *Allocasuarina littoralis* (Black She-oak), *Leptospermum parvifolium*, *Leucopogon muticus* (Blunt Beard-heath), *Acacia caesiella* (Tableland Wattle), *Pomaderris ledifolia* (Sydney Pomaderris) and *Cassinia arcuata* (Sifton bush).

Ground Layer: 0.1 to 1 m – 3% PFC. Dominant species included: *Entolasia stricta* (Wiry Panic), *Joycea pallida* (Wallaby Grass), *Lomandra filiformis* (Mat Rush), *Dianella revoluta* (Blue Flax Lily), *Cheilanthes sieberi* (Rock Fern), *Pomax umbellata* and *Amperea xiphoclada*.

Classification: Not commensurate with any TSC Act or EPBC Act listed EEC.

MU 44 – Sandstone Plateaux Tea Tree – Dwarf Sheoak – Banksia Rocky Heath

Plate 10 Sandstone Plateaux Tea Tree – Dwarf Sheoak – Banksia Rocky Heath

Description: This vegetation community occurs in small parts of the eastern portions of theStudy Area. It occurs in pockets amongst areas of exposed rock outcrops and above gullies on the exposed sandstone escarpments.

Canopy Layer: 4 to 6 m with 2% PFC. Dominated by *Eucalyptus piperita* (Sydney Peppermint) and *Eucalyptus sclerophylla* (Hard-leaved Scribbly Gum).

Shrub Layer: 2 to 4 m – 80 to 90% PFC. Dominant species included: *Allocasuarina nana* (Dwarf Sheoak), *Pomaderris ledifolia* (Sydney Pomaderris), *Acacia obtusifolia*, *Comesperma ericinum* (Pyramid Flower), *Isopogon anemonifolius* (Flat-leaved Drumsticks), *Leptospermum arachnoides*, *Petrophile pulchella* (Conesticks), *Banksia spinulosa* var. *collina* (Hairpin Banksia), *Platysace linearifolia* (Narrow-leaved Platysace), *Acacia terminalis*, and *Podolobium ilicifolium* (Prickly Shaggy Pea).

Ground Layer: 0.1 to 1 m – 23% average PFC. *Caustis flexuosa*, *Epacris reclinata*, *Entolasia stricta* (Wiry Panic), *Lomandra confertifolia* (Mat-rush), *Dampiera stricta* (Blue Dampiera) and *Lomandra glauca* (Pale Mat-rush).

Classification: Not commensurate with any TSC Act or EPBC Act listed EEC.

MU 53 – Mountain Hollow Grassy Fen

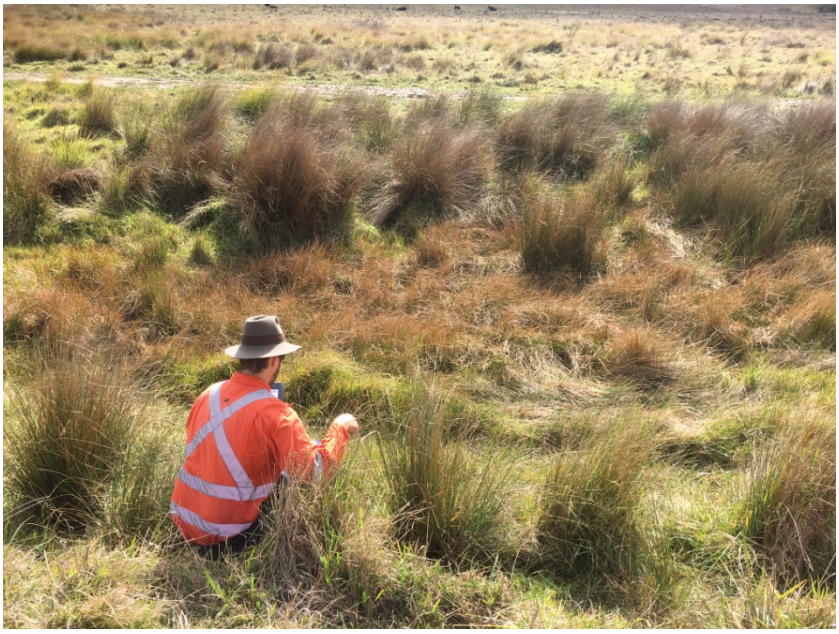


Plate 11 Mountain Hollow Grassy Fen

Description: This community consists primarily of ground covers, existing as a tussock grassy swamp. It is strongly dominated by *Poa labillardierei* (tussock grass) and *Carex gaudichaudiana*. Other wetland species include *Juncus usitatus* (Common Rush), *Juncus sarophorus*, *Isachne globosa* (Swamp Millet), *Myriophyllum pedunculatum* (Water-milfoil) and *Panicum effusum* (Hairy Panic). A range of exotic species have also infiltrated this community including *Juncus acutiflorus, Cyperus Eragrostis* (Umbrella Sedge), *Cirsium vulgare* (Spear Thistle) and *Conyza sumatrensis* (Tall Fleabane).

Classification: This vegetation is commensurate with the TSC Act listed EEC *Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions.*

MU 58 – Acacia Thickets

Plate 12 Acacia Thickets

Description: This vegetation community generally occurs as a result of recovery from past disturbance. This MU may also be considered as a component of severely disturbed native vegetation (MU 62). Wattle thickets are usually composed of a single dominant canopy species with occasional emergent eucalypts.

Canopy Layer: 4 to 16 m – 10 to 60 PFC. Canopy species are typically absent, with the tallest layer being emergent Acacia species.

Shrub Layer: 0.6 to 6 m – 70 PFC. Dominant shrub species included; *Acacia buxifolia* (Box-leaf Wattle), *A. dealbata* (Silver Wattle), *A. longifolia* (Sydney Golden Wattle), *Cassinia arcuata* (Sifton bush), *Verbena bonariensis* (Purpletop), and *Rubus fruiticosus* (Blackberry).

Ground Layer: 0 to 0.5 m – 20 to 40 PFC. Dominant species included; *Austrostipa scabra*, *Cynodon dactylon* (Couch), *Plantago lanceolata* (Lamb's Tongue), *Panicum effusum* (African Lovegrass), *Senecio madagascariensis* (Fireweed), *Pennisetum clandestinum* (Kikuyu), *Paspalum dilatatum*, *Oxalis perrenans*, and *Juncus* sp..

Classification: Not commensurate with any TSC Act or EPBC Act listed EEC.

MU 62 – Cleared and Severely Disturbed lands

Plate 13 Cleared and Severely Disturbed Lands

Description: This vegetation community occurs along the more western portions of the Study Area, including farming lands, power-line easements, tracks and mine sites. The canopy layer has been removed along with all or most of the shrub layer. These areas are mostly void of native vegetation, and are largely affected by weed invasion due to previous or repeated disturbance.

Canopy Layer: Generally absent.

Shrub Layer: Highly variable 0.5 – 2 m in height with 5 to 60% PFC. Species include those species growing in native vegetation in proximity such as *Cassinia arcuata* (Sifton Bush) with weeds such as *Conyza bonariensis* (Fleabane).

Ground Layer: Highly variable 0 –1.5 m tall with 10 to 90% PFC. Dominant species include species similar to those found in adjacent native vegetation communities such as *Rytidosperma tenuius*, *Panicum effusum* (Hairy Panic), *Eragrostis leptostachya* (Paddock Lovegrass), *Cynodon dactylon* (Couch). There is also a high likelihood of increased exotic species due to the previous disturbance including *Plantago lanceolata* (Lamb's Tongue), *Eragrostis curvula* (African Lovegrass) and *Hypochaeris radicata* (Catsear).

Classification: Not commensurate with any TSC Act or EPBC Act listed EEC.

3.5 Northern Study Area Fauna Survey

This section details results from the Northern Study Area only. A total of 89 fauna species were detected during surveys, including 64 bird species, 22 mammal species, one reptile species and two amphibian species. Of these, eight species are listed as Vulnerable under the TSC Act, including the Scarlet Robin (*Petroica boodang*), Little Eagle (*Hieraaetus morphnoides*) Gang-gang Cockatoo (*Callocephalon fimbriatum*), Glossy Black-Cockatoo (*Calyptorhynchus lathami*), Powerful Owl (*Ninox strenua*), Brown Treecreeper (eastern subsp.) (*Climacteris picumnus victoriae*), Large-eared Pied Bat (*Chalinolobus dwyeri*) and Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*). Additionally, two species, namely the Greater Glider (*Petauroides volans*) and Large-eared Pied Bat (*Chalinolobus dwyeri)* are listed as Vulnerable under the EPBC Act. Locations of all threatened fauna species are displayed on **Figure 10**. A list of all recorded fauna is contained in **Appendix 3**.

Threatened fauna records from previous RPS surveys (RPS 2016) have been displayed on **Figure 10** and have aided the likelihood of occurrence table in **Appendix 1**.

3.5.1 Terrestrial Mammals

During terrestrial trapping the Common Dunnart (*Sminthopsis murina*) (refer to **Plate 14**), Brown Antechinus (*Antechinus stuartii*), Bush Rat (*Rattus fuscipes*) and Swamp Rat (*Rattus lutreolus*) were caught and released. No hair samples were recovered from the Hair Tubes.

Plate 14 Common Dunnart

Three common macropod species were observed during surveys, namely the Eastern Grey Kangaroo (*Macropus giganteus*), Red-necked Wallaby (*Macropus rufogriseus*) and Swamp Wallaby (*Wallabia bicolor*), with numerous macropod scats also found within the Study Area. In addition, one Common Wombat

(*Vombatus ursinus*) was observed. Two introduced species, the European Red Fox (*Vulpes Vulpes*) and European Rabbit (*Oryctolagus cuniculus*) were observed within the Study Area. A full list of mammals detected within the Study Area is provided in **Appendix 3**.

3.5.2 Arboreal Mammals

A total of four arboreal mammal species were detected within the Study Area during spotlighting or arboreal trapping, specifically the Common Brushtail Possum (*Trichosurus vulpecula*), Greater Glider (*Petauroides volans*), Common Ringtail Possum (*Pseudocheirus peregrinus*) and the Sugar Glider (*Petaurus breviceps*). The Greater Glider is listed as Vulnerable under the EPBC Act.

3.5.3 Bats

A total of eight species were confidently identified from the Anabat recordings including:

- Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*);
- Large-eared Pied Bat (*Chalinolbus dwyeri*);
- Gould's wattled bat (*Chalinolobus gouldii*);
- Chocolate wattled bat (*Chalinolobus morio*);
- Eastern horseshoe bat (*Rhinolophus megaphyllus*);
- White-striped free-tailed bat (*Tadarida australis*);
- *Nyctophilus* sp; and
- Large forest bat (*Vespadelus darlingtoni*).

A further seven species were identified as possible or within a species group including:

- Eastern falsistrelle (Falsistrellus tasmaniensis);
- Eastern bentwing bat (Miniopterus schreibersii oceanensis);
- Eastern Freetail Bat (Mormopterus ridei);
- Greater broad-nosed bat (Scoteanax rueppellii);
- Eastern broad-nosed bat (Scotorepens orion);
- Southern forest bat (Vespadelus regulus); and
- Little forest bat (Vespadelus vulturnus).

Of these species, two are listed as Vulnerable under the TSC Act, namely Yellow-bellied Sheathtail Bat and Large-eared Pied Bat. The Large-eared Pied Bat is also listed as Vulnerable under the EPBC Act. The Anabat Report is contained in **Appendix 4**.

3.5.4 Avifauna Survey

A total of 64 bird species were detected within the Study Area during the survey period. The most commonly detected species included: Eastern Yellow Robin (*Eopsaltria australis*), White-throated Treecreeper (*Cormobates leucophaea*), Pied Currawong (*Strepera graculina*) and Striated Pardalote (*Pardalotus striatus*). A full list of bird species detected during surveys is provided in **Appendix 3.**

During the survey periods six species listed as vulnerable under the TSC Act 1995 were detected, including the Scarlet Robin (*Petroica boodang*), Little Eagle (*Hieraaetus morphnoides*) Gang-gang Cockatoo (*Callocephalon fimbriatum*), Glossy Black-Cockatoo (*Calyptorhynchus lathami*) (refer to **Plate 15**), Powerful

Owl (*Ninox strenua*) (refer to **Plate 16**) and Brown Treecreeper (eastern subsp.) (*Climacteris picumnus victoriae*).

Plate 15 Glossy-black Cockatoo

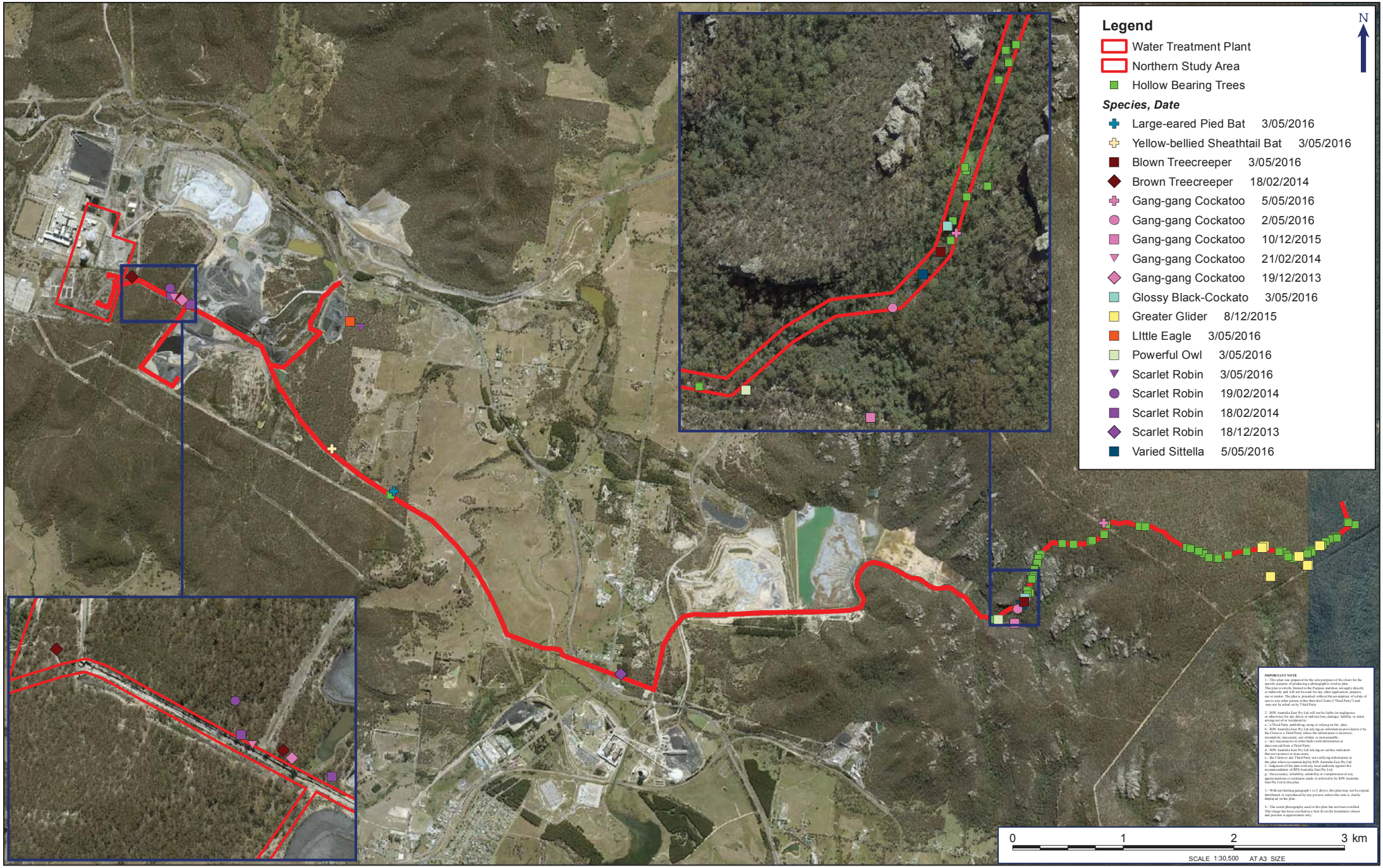
Plate 16 Powerful Owl

3.5.5 Reptiles

Targeted and opportunistic surveys were conducted for reptiles within the Study Area. The only reptile detected within the Study Area was the Red-bellied Black Snake (*Pseudechis porphyriacus*).

3.5.6 Amphibians

A total of two common amphibian species were detected, including the Common Eastern Froglet (*Crinia signifera*) and Peron's Tree Frog (*Litoria peronii*). These species were either seen or heard calling within riparian vegetation or damp, low-lying areas.



TITLE : **FIGURE 10: NORTHERN STUDY AREA THREATENED FAUNA AND HABITAT FEATURES**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **17/08/2016**

PURPOSE: **ECOLOGY**

VERSION (PLAN BY): B A3 (Natalie.Wood)

PATH: J:\JOBS\Centennial\All Jobs\131758 JV Energy Australia Springvale\10 - Drafting\Arcgis Map Documents\Eco\Report Figures\131758 Figure 10 NTFAU B A3 20160812.mxd

CLIENT: **CENTENNIAL COAL**

JOB REF: **PR131758**

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3.5.7 Koala Survey

Schedule 2 of State Environmental Planning Policy (SEPP) No. 44 – 'Koala Habitat Protection' lists 10 tree species that are considered indicators of 'Potential Koala Habitat'. The presence of any of the species listed on a site proposed for development triggers the requirement for an assessment for 'Potential Koala Habitat'. SEPP 44 defines potential Koala Habitat as:

> *"areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15% of the total number of* trees in the upper or lower strata of the tree component".

One species, specifically *Eucalyptus viminalis* (Ribbon Gum) was detected in MU 11 within the Study Area, however its total cover did not exceed 15%. Therefore, habitat within the Study Area does not constitute Potential Koala Habitat as defined by the SEPP.

3.6 Southern Study Area Fauna Survey

This section details results from the Southern Study Area only. A total of 93 fauna species were detected during surveys, including 67 bird species, 21 mammal species, three reptile species and two amphibian species. Of these, nine species are listed as Vulnerable under the TSC Act, including the Scarlet Robin (*Petroica boodang*), Little Eagle (*Hieraaetus morphnoides*) Gang-gang Cockatoo (*Callocephalon fimbriatum*), Glossy Black-Cockatoo (*Calyptorhynchus lathami*), Little Lorikeet (*Glossopsitta pusilla*), Brown Treecreeper (eastern subsp.) (*Climacteris picumnus victoriae*), Speckled Warbler (*Chthonicola sagittata*), Large-eared Pied Bat (*Chalinolobus dwyeri*) and Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*). Additionally, two species, namely the Greater Glider (*Petauroides volans*) and Large-eared Pied Bat (*Chalinolobus dwyeri*) are listed as Vulnerable under the EPBC Act.

Locations of all threatened fauna species are displayed on **Figure 11** including records from previous RPS surveys (RPS 2016). A list of all recorded fauna is contained in **Appendix 3**.

3.6.1 Terrestrial Mammals

During terrestrial trapping the Brown Antechinus (*Antechinus stuartii*) and Bush Rat (*Rattus fuscipes*) (refer to **Plate 17**) were caught and released. No hair samples were recovered from the Hair Tubes.

Plate 17 Bush Rat in an Elliot B trap

Three common macropod species were observed during surveys, namely the Eastern Grey Kangaroo (*Macropus giganteus*), Red-necked Wallaby (*Macropus rufogriseus*) and Swamp Wallaby (*Wallabia bicolor*), with numerous macropod scats also found within the Study Area. In addition, one Common Wombat (V*ombatus ursinus*) was observed. Three introduced species, the European Red Fox (*Vulpes Vulpes*), European Rabbit (*Oryctolagus cuniculus*) and Wild Dog (*Canis lupus familiaris*) were observed within the Study Area. A full list of mammals detected within the Study Area is provided in **Appendix 3**.

3.6.2 Arboreal Mammals

A total of four arboreal mammal species were detected within the Study Area during spotlighting or arboreal trapping, specifically the Common Brushtail Possum (*Trichosurus vulpecula*), Greater Glider (*Petauroides volans*), Common Ringtail Possum (*Pseudocheirus peregrinus*) and the Sugar Glider (*Petaurus breviceps*). The Greater Glider is listed as Vulnerable under the EPBC Act.

3.6.3 Bats

A total of seven species were confidently identified from the Anabat recordings including:

- Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*);
- Large-eared Pied Bat (*Chalinolobus dwyeri*);
- Gould's wattled bat (*Chalinolobus gouldii*);
- Chocolate wattled bat (*Chalinolobus morio*);
- Eastern horseshoe bat (*Rhinolophus megaphyllus*);
- White-striped free-tailed bat (*Tadarida australis*); and
- Large forest bat (*Vespadelus darlingtoni*).

A further eight species were identified as possible or within a species group including:

- *Nyctophilus* sp
- Eastern falsistrelle (*Falsistrellus tasmaniensis*);
- Eastern bentwing bat (*Miniopterus schreibersii oceanensis*);
- Eastern Freetail Bat (*Mormopterus ridei*);
- Greater broad-nosed bat (*Scoteanax rueppellii*);
- Eastern broad-nosed bat (*Scotorepens orion*);
- Southern forest bat (*Vespadelus regulus*); and
- Little forest bat (*Vespadelus vulturnus*).

Of these species, two are listed as Vulnerable under the TSC Act, namely Yellow-bellied Sheathtail Bat and Large-eared Pied Bat. The Large-eared Pied Bat is also listed as Vulnerable under the EPBC Act. The Anabat Report is contained in **Appendix 4**.

3.6.4 Avifauna Survey

A total of 67 bird species were detected within the Study Area during the survey period. The most commonly detected species included: Eastern Yellow Robin (*Eopsaltria australis*), White-throated Treecreeper (*Cormobates leucophaea*), Pied Currawong (*Strepera graculina*) and Striated Pardalote (*Pardalotus striatus*). A full list of bird species detected during surveys is provided in **Appendix 3.**

Eight species listed as vulnerable under the TSC Act were detected, including Scarlet Robin (*Petroica boodang*), Little Eagle (*Hieraaetus morphnoides*) Gang-gang Cockatoo (*Callocephalon fimbriatum*), Glossy Black-Cockatoo (*Calyptorhynchus lathami*), Little Lorikeet (*Glossopsitta pusilla*), Brown Treecreeper (eastern subsp.) (*Climacteris picumnus victoriae*) and Speckled Warbler (*Chthonicola sagittata*).

3.6.5 Reptiles

Targeted and opportunistic surveys were conducted for reptiles within the Study Area. The Red-bellied Black Snake (*Pseudechis porphyriacus*), White's Skink (*Liopholis whitii*) and Dark-flecked Garden Sunskink (*Lampropholis delicata*) were detected during the survey period.

3.6.6 Amphibians

A total of two common amphibian species were detected, including the Common Eastern Froglet (*Crinia signifera*) and Peron's Tree Frog (*Litoria peronii*). These species were either seen or heard calling within riparian vegetation or damp, low-lying areas.

3.6.7 Koala Survey

Schedule 2 of State Environmental Planning Policy (SEPP) No. 44 – 'Koala Habitat Protection' lists 10 tree species that are considered indicators of 'Potential Koala Habitat'. The presence of any of the species listed on a site proposed for development triggers the requirement for an assessment for 'Potential Koala Habitat'. SEPP 44 defines potential Koala Habitat as:

> *"areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15% of the total number of* trees in the upper or lower strata of the tree component".

One species, specifically *Eucalyptus viminalis* (Ribbon Gum) was detected in MU 11 within the Study Area, however its total cover did not exceed 15%. Therefore, habitat within the Study Area does not constitute Potential Koala Habitat as defined by the SEPP.

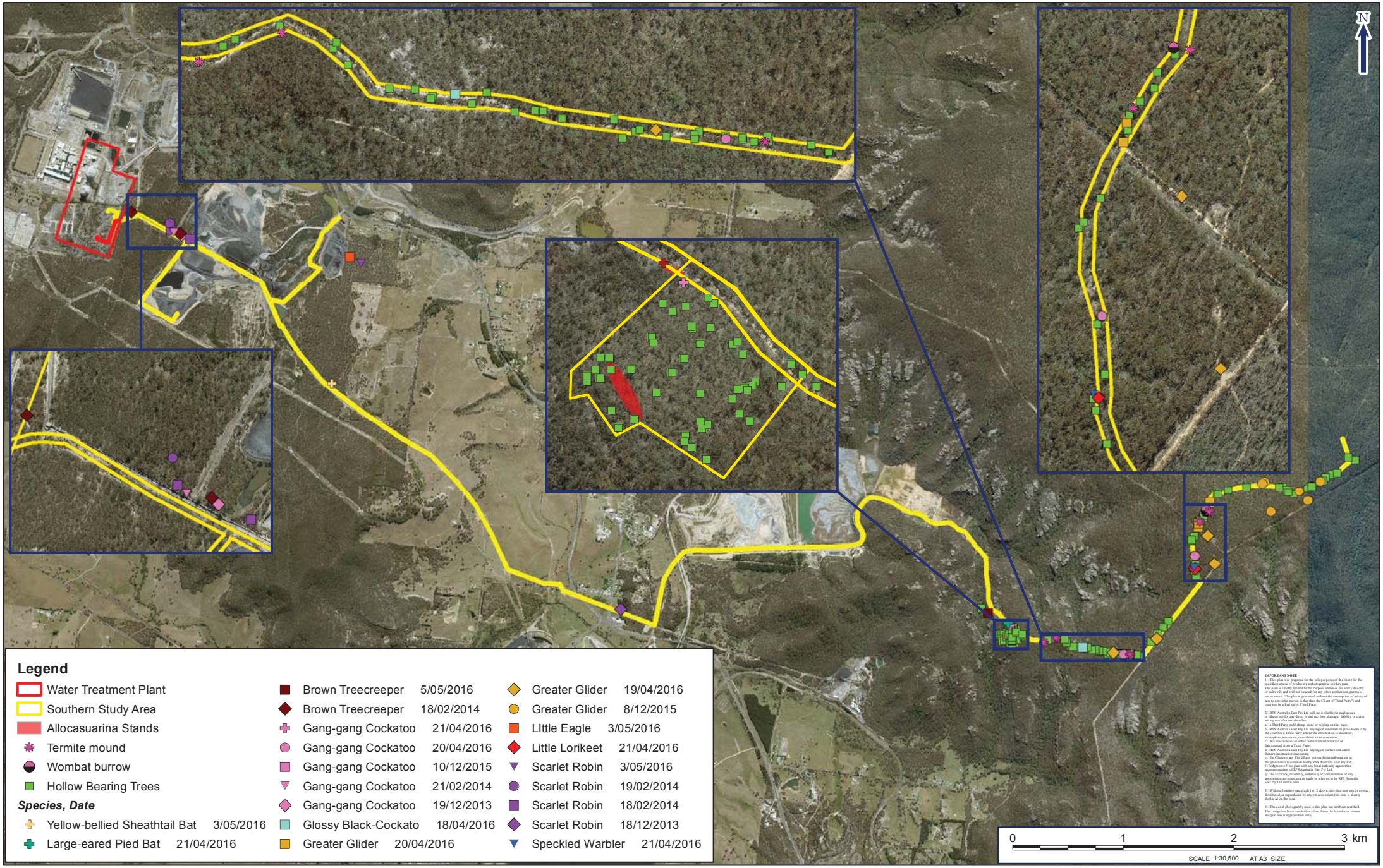
3.7 Habitat Survey

3.7.1 Terrestrial Habitats

Habitats within both the Northern and Southern Study Area were assessed for their potential to support native fauna species including threatened fauna for which records occur within the wider locality. Broad habitat types detected within both Study Areas included open forest/woodland areas, wet sclerophyll areas and cleared/disturbed areas.

Forest habitats cover under half of the area within the Study Area being portions of lands within the northern and southern pipeline alignment routes on Newnes Plateau. A varied understorey layer of native shrubs provides ground cover for small mammals and reptiles as well as foraging opportunities for woodland birds. Ground cover is further enhanced by woody debris and leaf litter, which is most abundant in gullies, low depressions, and recently logged areas. Small mammals utilise hollows and fissures in fallen logs, while reptiles shelter underneath logs and dense leaf litter.

A total of 67 hollow-bearing trees were identified in the Northern Study Area as shown in **Figure 10**. A total of 149 hollow bearing trees were identified within the Southern Study Area with 47 occurring in the laydown area (refer to **Figure 11**). The number of hollows observed is likely to support in an abundance of arboreal mammal species as evidenced by the survey results, which encourages the presence of large predatory birds such as the Powerful Owl (refer to **Plate 18**).



TITLE : **FIGURE 11: SOUTHERN STUDY AREA THREATENED FAUNA AND HABITAT FEATURES**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **17/08/2016**

PURPOSE: **ECOLOGY**

VERSION (PLAN BY): B A3 (Natalie.Wood)

PATH: J:\JOBS\Centennial\All Jobs\131758 JV Energy Australia Springvale\10 - Drafting\Arcgis Map Documents\Eco\Report Figures\131758 Figure 11 STFAU B A3 20160812.mxd

CLIENT: **CENTENNIAL COAL**

JOB REF: **PR131758**

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

Plate 18 Large hollow in MU 8 of the Northern Study Area

Grasses comprise a significant portion of the ground vegetation in many areas and support grazing macropods and wombats. Open woodlands with sparse understoreys, particularly in close proximity to tracks and disturbed areas are suitable habitats for the threatened plant *P. hindii* and *C. parviflora* var. *minor*, which has been detected across both the Study Areas.

Ridgetops often feature rock piles and exposed sandstone where terrestrial fauna can shelter in cracks and under loose slabs. Sandstone outcrops provide ideal conditions for many reptiles which shelter under slabs and bask on exposed rock. The dense heath covering the skeletal soils that surround exposed rocky areas provides additional cover and foraging opportunities for reptiles, birds and small mammals. Macropods often shelter beneath overhangs amongst larger rock formations.

The Cleared/Disturbed areas occurring within the Study Area are of low value in terms of providing habitat for native fauna species aside from providing foraging habitat along the ecotone between cleared and forested areas (such as foraging by microchiropteran bat species and owls).

3.7.2 Vegetation Corridors and Remnant Vegetation Linkages

The Study Area are partially situated within the Newnes State Forest, extending from the east on Newnes Plateau to west into lower lying vegetated and disturbed lands. In these portions of the Study Area connected vegetation occurs for a distance of greater than 2km to the north, east and south-east of both Study Areas. Being a State Forest in these portions of land, the native vegetation is periodically selectively logged but there are no areas of clear-felling of native vegetation. This creates small and temporary disconnectedness between vegetation communities within the Newnes State Forest, however, overall connectedness currently remains intact.

The Newnes State Forest is connected to the Gardens of Stone National Park and Wollemi National Park to the north, Blue Mountains National Park to the east and Ben Bullen State Forest to the north-west. As a result of the almost complete vegetative cover within and external to the Study Area, the habitat linkages both throughout and surrounding are sufficient for faunal movement and are of high quality.

The western half of both Study Areas is situated on largely disturbed lands due to existing farming lands, roads, easements and mining lands. Remnant vegetation exists to the south of the pipeline which tentatively connects to the northern side. Castlereagh Highway creates a wide disconnection between vegetation tracts further north, and that situated to the north these western portions of the Study Area.

4.0 Impact Analysis

4.1 Direct Impacts

The Project would result in the removal of native vegetation and habitat suitable for threatened flora and fauna species. The specific impacts of the proposed vegetation removal are discussed below.

4.1.1 Vegetation

Native vegetation loss in the Northern and Southern Study Areas is quantified in **Table 14**. The net difference in native vegetation loss is 3.60 ha with the least impact occurring within the Northern Study Area. The impact footprint (as defined in Section 1.5) of the Project will be defined by the alignment (northern versus southern) that will selected for the installation of the pipeline on Newnes Plateau.

Table 14 Native Vegetation Loss within the Northern and Southern Study Area.

Vegetation Community	Northern (ha)	Southern (ha)
MU 7 Newnes Plateau Narrow-leaved Peppermint - Mountain Gum - Brown Stringybark Layered Forest	1.11	1.24
MU 8 Newnes Sheltered Peppermint – Brown Barrel Shrubby Forest	0.73	0.19
MU 11 Tableland Gully Snow Gum - Ribbon Gum Montane Grassy Forest	0.63	0.61
MU 26 Newnes Plateau Narrow-leaved Peppermint - Silver-top Ash Layered Open Forest	1.56	1.50
MU 28 Sandstone Plateau and Ridge Scribbly Gum – Silvertop Ash Shrubby Woodland	0.00	3.58
MU 29 Sandstone Slopes Sydney Peppermint Shrubby Forest	0.10	0.49
MU 33 Tableland Broad-leaved Peppermint - Brittle Gum - Red Stringybark Grassy Open Forest	0.47	0.47
MU 35 Tableland Gully Mountain Gum – Broad-leaved Peppermint Grassy Forest	0.05	0.00
MU 37 Coxs Permian Red Stringybark - Brittle Gum Woodland	1.49	1.49
MU 43 Pagoda Rock Sparse Shrubland	0.00	0.06
MU 44 Sandstone Plateaux Tea Tree - Dwarf Sheoak - Banksia Rocky Heath	0.00	0.11
MU 53 Mountain Hollow Grassy Fen	0.02	0.02
MU 58 Acacia Thickets	21.22	21.22
MU XX *Phragmites australis* wetland	0.46	0.46
Total	**27.84**	**31.44**

4.1.2 Flora

Three threatened flora species (*Caesia parviflora* var. *minor*, *Persoonia hindii* and *Veronica blakelyi*) were recorded within the Northern and Southern Study Areas. *Persoonia hindii* and *Veronica blakelyi* are both easily detected throughout the year and as such it is considered that survey results would produce an accurate impact estimate for these species. Impact avoidance measures are proposed for *Persoonia hindii* or *Veronica blakelyi* specimens.

The endangered herb *Caesia parviflora* var. *minor* was also identified within both the Northern and Southern Study Area (n=3), with two specimens observed in the eastern 'in common' section. Notwithstanding, it should be noted that survey timing for this species along the Southern Study Area was outside the flowering period and as such is likely to have underestimated impacts along this part of the Study Area.

Potential habitat is present for *Lastreopsis hispida* within the moist sheltered gully habitat of MU 8 Newnes Sheltered Peppermint - Brown Barrel Shrubby Forest. This vegetation community was recorded along both

the Northern and Southern Study Areas. The groundcover of this vegetation community was dominated by ferns including *Pteridium esculentum* and *Blechnum nudum*. However, this species was not detected despite the undertaking of appropriately timed targeted surveys. Impacts on this species and its habitat are expected to be negligible.

Suitable habitat for *Acacia bynoeana* occurs throughout the Newnes Plateau. If present it is likely that a local population would extend throughout the heaths and woodlands that occur on sandy soils. No specimens of this species were observed despite the performing of appropriately timed targeted surveys. Impacts on this species and its habitat are expected to be negligible.

Genoplesium superbum has been recorded within one location within 10 km of the Study Area. The habitat of the local occurrence of this species can be generally described as shrubby woodland on a slope. Habitats within the Study Area therefore have potential to support this species. If present, there is a high likelihood that a local population would extend outside the Study Area, given the large areas of commensurate habitat in the surrounding landscape. No specimens of this species were observed despite the performing of appropriately timed targeted surveys. Impacts on this species and its habitat are expected to be negligible.

4.1.3 Fauna

The Study Area does not include expansive areas of particularly rocky habitats, such as large rock platforms or cliffs, however it will pass through some areas considered suitable for the Broad-headed Snake. Caves or similar structures that may be used by cave dwelling microbats were recorded in close proximity to the Study Area. Loss of caves or similar structures is not expected as a consequence of the Project.

The loss of mid-storey and canopy trees would remove nesting and foraging habitat for threatened bird species, as well as foraging habitats for threatened arboreal mammals, microbats and hunting habitat for the Broad-headed Snake. Specific foraging habitat niches within the proposed surface infrastructure footprint include Banksia species used by the Eastern Pygmy Possum, *Allocasuarina* species used by Glossy Black-Cockatoos and nectar producing trees and shrubs used by nectivorous birds and mammals. A primary Koala feed tree (*Eucalyptus viminalis*) only occurs within a small section of the alignment. This feed tree is a component of MU 11 only and is thus not abundant within the Northern Study Area. Therefore, the Koala is unlikely to be significantly impacted upon.

Hollow sizes recorded included some capable of supporting roosting large forest owls and cockatoo species. The Project will therefore constitute a loss to potential roosting or nesting trees for the Gang-Gang Cockatoo, Glossy Black-Cockatoo and threatened owls. It is noted, however, that the threatened Barking Owl, Powerful Owl and Masked Owl have specific preferences regarding hollow types, which involve hollows developing from the main stem of the tree. These hollows are less prevalent; however one suitable hollow was detected in MU 8 of the Northern Study Area. The Sooty Owl prefers moist tall forests and therefore a small amount of preferred habitat for this species.

Habitat for the Regent Honeyeater and Swift Parrot occurs within the region, with areas of high importance located within Capertee Valley to the north. Both species are periodically observed within the locality with the most recent Regent Honeyeater observation in October 2015 along the Coxs River at Little Hartley. Habitat critical to the survival of these species within the locality is generally associated with various box species, particularly White Box (*Eucalyptus albens*) and Yellow Box (*Eucalyptus melliodora*). Neither of these species was observed within the Study Area. In addition, there were few mistletoe occurrences; another indicator of habitat suitability. While the Study Area is located nearby important Regent Honeyeater and Swift Parrot habitat areas (i.e. Capertee Valley), it is considered that the absence of important habitat values such as box species substantially limits the Study Area's value for these species.

No potential breeding habitat would be removed for the Giant Burrowing Frog, Red-crowned Toadlet or Littlejohn's Tree Frog; however, the Project will run alongside an ephemeral drainage line for approximately 1 km. The proposed clearing may therefore cause a loss of potential foraging habitat for these species.

The eastern portion of the Northern Study Area on Newnes Plateau is surrounded by large areas containing contiguous forest, woodland, heath, swamp and rocky habitats. These habitats continue throughout the Newnes State Forest and into the Gardens of Stone National Park, Blue Mountains National Park and Wollemi National Park. For those more mobile species, including the threatened birds, bats, arboreal mammals and terrestrial mammals, which are likely to be impacted upon by the Project, local populations of these species would extend into these adjacent protected habitats.

4.1.4 Groundwater Dependent Ecosystems

As discussed in **Section 3.1.2**, MU 53 may have some degree of dependence on groundwater for its ecological function and therefore may constitute a GDE. The Project would result in the removal of 0.02 ha of this vegetation with the post developed landscape allowing the potential rehabilitation of this vegetation. Limited potential exists for this impact to adversely affect adjoining areas of this vegetation over the medium to long term, although it is recognised that short term impacts may occur.

4.1.5 Project Application Area

This report provides survey results and impact assessments for both the Northern and Southern Study areas. A comparison of potential impacts for the two study areas is included in **Section 4.1**. The comparison concluded the Southern Study Area would likely have a greater impact on biodiversity. The vegetation clearing within the Northern Study Area is less than the vegetation clearing (31.44 ha) required for the Southern Study Area.

The Northern Study Area, as shown in **Figure 2**, has been selected as the preferred route and is hereafter referred to as the Project Application Area as shown in **Figure 13**. Consequently, the Southern Study Area is not discussed any further in this report.

The Project Application Area corresponds to the area surveyed and assessed within the Northern Study Area described in **Section 3.5**, and includes the northern pipeline route on Newnes Plateau. This option has been selected based on the BAR (RPS (2016) in conjunction with geomorphological assessments undertaken for the two study areas. Vegetation clearing within the Project Application Area will be 27.84 ha and corresponds to the disturbance footprint noted in **Section 4.1** for the Northern Study Area.

4.2 Indirect Impacts

Indirect impacts associated with the Project may include:

- Fragmentation;
- Introduction of exotic flora and fauna species;
- An increase in runoff from disturbed areas of land; and
- Hydrocarbons pollution from construction activities (e.g. oil spills).

The following sections discuss the potential indirect impacts associated with the Project.

4.2.1 Edge Effects

The 'edge effect' describes a collection of factors and processes that influence the presence and abundance of species at a boundary, whether they are natural boundaries (e.g. ecotones) or a disturbance of some kind

(e.g. cleared lands). Edges can occur naturally within ecosystems and include situations such as the common boundary between two ecological communities (i.e. ecotones) or the boundary between burnt and unburnt vegetation.

Bali (2005) identifies the following main factors and processes that operate at a disturbed edge of an ecological community: □

- Microclimate (e.g. localised changes in temperature, wind, light, humidity). □
- Hydrology (i.e. localised changes in surface and subsurface water flows). □
- Altered fire frequency and intensity. □
- Invasion by exotic plant and animal species. □
- Alteration of soil conditions (e.g. increased sedimentation and nutrient availability). □
- Alteration of vegetation structure (e.g. tree death and increased shrub densities).

While biodiversity, as a collective, can adapt to the effects of an edge, some species are partially or wholly reliant on edge effects; thus resulting in 'winners' and 'losers' in such circumstances. Species that benefit from edges are generally characterised as pioneer species, a category that often includes many exotic/ weed species. Native plant species of this classification include wattles and many grasses.

On average, edge effects have been estimated to occur up to 50 metres from a road edge (Bali 2005), although much greater distances have been recorded in some road studies (Forman et al. 2003). Edge effects are particularly pronounced in patches where a large edge to area ratio exists (i.e. small vegetation patches with a proportionally large perimeter). Such conditions often result in the simplification of biodiversity values in favour of generalists or edge specialist species. These impacts already exist in the smaller more isolated vegetation patches of the study area. The Project is unlikely to have any substantial incremental edge effects on these smaller isolated patches over and above existing conditions.

Edge effects can influence ecological process by altering the flows of energy, moisture, temperature, materials or organisms and by providing access to spatially separated resources (Fletcher et al. 2007). In turn, this indirectly leads to changes in population structure, species interaction and community structure near edges (Fletcher et al. 2007).

The greatest potential for indirect impacts on native vegetation and habitat is in areas where the Project traverses through large stands of vegetation. Such impacts are either new (i.e. Northern Study Area) or associated with the shifting of edge effects into vegetation previously unaffected by these impacts (i.e. Southern Study Area). Potential edge effects in these areas may include: □

- Establishment of weeds along boundaries between native vegetation and cleared lands and potential for weed incursions into adjacent native vegetation; □
- Modification of habitat attributes, through increased light and noise levels, and changes to vegetation structure, soil nutrient levels and plant species diversity; □
- Changes to fauna assemblages, including alteration of woodland and forest bird assemblages by edge specialists; □
- Increased predation of birds, small mammals, reptiles and frogs by species that use forest edges for foraging; and □
- Increased nest predation of small insectivorous birds at forest edges.

Although the area to be cleared within Newnes Plateau is not likely to fragment two or more patches of vegetation, it will increase the available edges for ecological changes to occur. "New road works through

bushland will increase sunlight and air temperature, which raises soil temperature and decreases soil moisture. This may prevent seeds of shade-tolerant species from germinating and favour other place species (i.e. those that thrive on increased light)" (Rowley et al. 1999:1). Additionally, vehicles utilising this road network have the potential to spread exotic flora species that will have an increased surface area in which to establish themselves.

4.2.2 Fragmentation

Fragmentation is the process of reducing what was once a continuous area of vegetation or habitat into smaller divided and discrete patches of vegetation in isolation. Fragmentation of landscapes reduces a species' ability to adapt to climatic conditions (NWCPAG 2012). Many fauna species are implicated by the process of fragmentation, including experiencing severe population declines (Robertson and Radford 2009). The overall ecology of fragmented patches may be detrimentally altered which influences flora and fauna assemblages (Lindenmayer et al. 1999).

Indirectly, fragmentation can put stress on native flora and fauna by increasing the amount of competition for resources and space of remaining fragments (Fischer and Lindenmayer 2007). Direct clearing can impact immobile organisms such as plants (and also mobile organisms that do not escape efficiently) leaving mobile animals to traverse to other surrounding environments that could be smaller remnants. This can result in overcrowding of an already overpopulated patch, interbreeding, and increased competition (Fischer and Lindenmayer 2007).

Seed dispersal for flora is also not expected to be hindered by the areas of clearing. Although the area of direct occupancy will be reduced marginally for a select few species that exist within the surface infrastructure footprint, they are not expected to be restricted in their ability to disperse naturally within the immediate surrounding environments.

4.2.3 Exotic Flora

There is the potential for the introduction of weeds where the Project traverses intact stands of native vegetation across the entire Study Area. Further, without the use of appropriate weed management protocols, the Project has the potential to facilitate the spread of weeds into adjoining native vegetation. Mitigation measures to be implemented during the construction and operational phases of the Project are recommended to manage and control the incidence and effect of noxious and environmental weeds on the receiving environment. Matters at greatest risk of being impacted by this factor are EECs and threatened flora species.

4.2.4 Noise

Vehicle, plant and construction equipment used for the construction activities of the Project would temporarily increase noise pollution within the Study Area and the surrounds. This can cause disruption to normal fauna activity and often lead to the departure of species from an area. Minor operational noise is expected to occur at the Gravity Tank which will involve the installation and operation of pumping equipment as well as minor noise pollution at the water treatment plant at MPPS. Short term non-permanent impacts through the construction period and minor impacts through operations of the Gravity Tank and treatment water plant at MPPS are expected with minor impacts limited to highly mobile species such as woodland birds (e.g. Regent Honeyeater, Scarlet Robin and Varied Sittella).

4.2.5 Storm-water Runoff

The removal of vegetation, including both trees and grasses will increase the risk of storm-water run-off. Operational activities also increase pollution risk within the environment, specifically the spillage of mine

water. Matters at greatest risk of being impacted by this indirect impact are threatened plant species and EECs.

4.2.6 Vehicle Strike

The Project would, in places, establish a temporary trafficable surface for vehicles thus increasing the exposure of fauna to a vehicle hazard. As a consequence, it is considered that the risk of fauna being struck by vehicles would increase. Vehicle movements would be during the day and would be controlled by speed limits imposed by a construction management plan and actual conditions. Fauna species considered most at risk of this impact are slow moving species such as reptiles and amphibians. Nocturnal species are unlikely to be impacted by the construction traffic.

4.3 Key Threatening Processes

Key Threatening Processes (KTPs) are listed under Schedule 3 of the TSC Act. There are five KTPs that have the potential to affect the study area as a consequence of the Project, being:

- Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners (*Manorina melanocephala*);
- Loss of hollow-bearing trees;
- Removal of dead wood and dead trees;
- Clearing of native vegetation;
- Anthropogenic climate change;
- Degradation of native riparian vegetation along NSW watercourses; and
- Invasion of native plant communities by exotic perennial grasses.

"Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners *(Manorina melanocephala)"*

The removal of 27.84 ha of native vegetation for the Project may contribute to the increased dispersal of Noisy Miners into the surrounding vegetation. Although the Project may increase their dispersal, it is likely, given the heavy vegetated condition of surrounding areas, that Noisy Miners would not exhibit nigh abundance hence aggressive behaviour within the Project Application Area (PAA) or locality.

"Loss of hollow-bearing trees"

The Project will require the removal of 67 hollow-bearing trees and as such will contribute to the KTP "Removal of Hollow-bearing Trees". The avoidance of hollow-bearing trees during construction is recommended to minimise impacts on this habitats feature.

"Removal of dead wood and dead trees"

The Project will require the removal of 27.84 ha of native vegetation which includes dead trees or ground debris and as such will contribute to the KTP "Removal of Dead Wood and Dead Trees". The avoidance/ relocation of dead wood and trees during construction are recommended to minimise impacts on this habitats feature.

"Clearing of Native Vegetation"

The Project will require the removal of 27.84 ha native vegetation and as such will contribute to the KTP "Clearing of Native Vegetation".

"Anthropogenic Climate Change"

The Project will contribute to the KTP "Human Caused Climate Change". The Project will involve the removal of 27.84 ha of native vegetation which is known to be a cause of increase heating of the earth (DECCW 2010b). Notwithstanding, the contribution and impact from the Project is considered to be insignificant.

"Degradation of native riparian vegetation along NSW watercourses"

Vegetation adjacent to riparian environments is proposed for removal and as such the Project may incrementally contribute to the KTP 'Degradation of native riparian vegetation along NSW watercourses'. It is considered that the Project is unlikely to result in a large impact in accordance with this KTP; however, it is prudent to consider impact minimisation and mitigation where possible to limit the effects of this KTP.

Invasion of native plant communities by exotic perennial grasses

The Project is unlikely to directly contribute to the KTP "Invasion of native plant communities by exotic perennial grasses" due to the retention of a majority of the native grass layer and only a small area of surface vegetation to be removed for the Project. However, some disturbed areas within the Project Application Area already contain exotic perennial grasses. The Project will provide an opportunity to enact a weed control program to ameliorate this KTP.

5.0 Avoidance, Minimisation and Mitigation

It is recommended that the Project incorporate impact avoidance and minimisation strategies, where possible, in recognition of the Project's propensity to directly/ indirectly biodiversity values (e.g. presence of threatened species and TECs) and activation of KTPs (**Section 4.3**). Suggested impact avoidance and minimisation strategies are outlined in the following sections.

5.1 Impact Avoidance

Impact avoidance aims to minimise impacts on threatened species and ecological communities primarily through Project design. Avoidance of potential impacts has also been considered by the utilisation of existing disturbance areas such as pipelines and tracks. Relevant impact avoidance criteria are discussed in **Table 15**.

Table 15 Impact Avoidance Criteria

Biodiversity Value	Project Application Area versus Southern Study Area
Native vegetation	The clearing of native vegetation within the PAA would result in at least 3.60 ha being avoided by comparison to the Southern Study Area.
Hollow-bearing trees	A total of 67 hollow-bearing trees were identified in the PAA compared with 149 hollow-bearing trees within the Southern Study Area. The loss of hollow-bearing trees is a KTP. The greater loss of hollow-bearing trees would have a greater impact on the Glossy-black Cockatoo, Powerful Owl, Varied Sittella, Brown Tree-creeper and microchiropteran bats.
Threatened species	The PAA would result in a greater impact on threatened species than the Southern Study Area. Additional *Caesia parviflora* ssp. *minor* and *Veronica blakelyi* would be impacted within the Northern Study Area. A large, pure stand of *Allocasuarina littoralis* utilised by the Glossy-black Cockatoo occurs in the Southern Study Area. No impacts of this nature would occur within the PAA. No areas of *Bursaria spinosa* subsp. *lasiophylla* (Bathurst Copper butterfly habitat) were observed, however, potential exists for this plant species to occur as individual plants along the western portion of the Study Area. Sandstone escarpment suitable for the Large-eared Pied Bat exists in the Southern Study Area. No such sandstone escarpment occurs within the PAA, although occurs in close proximity to the alignment. Foraging habitat for this species occurs within both the PAA and the Southern Study Area. Potential Powerful Owl roost trees occur on both the PAA and the Southern Study Area, with the Powerful Owl observed in the PAA.
Threatened Ecological Communities (including both MU 11 and MU 53)	The PAA would result in the loss of 0.65 ha of EEC compared with a 0.63 ha loss of EEC in the Southern Study Area.
Groundwater Dependant Ecosystems	Neither Study Area has a greater impact on GDEs.
Patch integrity	The Southern Study Area is expected to have a lower impact on patch integrity as the pipeline is proposed to align with existing areas of disturbance (i.e. existing pipeline/ tracks). Impacts within the Southern Study Area would require the establishment of new disturbance areas due to the layover area and growth of vegetation on existing pipeline areas.

As indicated in **Table 15** and **Section 4.3** (KTPs), it is evident that the Southern Study Area would likely have a greater impact on biodiversity despite the PAA having a greater impact on TECs and additional edge effects. With regards to threatened species and habitat it is recommended that impact avoidance outcomes be achieved through pre-clearance surveys and careful construction techniques for *P. hindii*, *C. parviflora* var. *minor, E. cannonii*, hollow-bearing trees and patches of *Bursaria spinosa* subsp. *lasiophylla* (Bathurst Copper butterfly habitat).

5.2 Impact minimisation

Both the PAA and the Southern Study Area would result in the removal of threatened plant species and hollow-bearing trees. However, by observing careful Project construction techniques (i.e. use of pre-clearance surveys and minor route adjustment); opportunity exists to avoid impacts on individual threatened plants and hollow-bearing trees.

The extent of impact avoidance is not currently known as site specific construction constraints may limit an absolute avoidance outcome. As such, it is not possible to conclusively say that all threatened species and hollow-bearing trees would be avoided. Thus, impact assumptions have been established to aid impact assessment for both the PAA and the Southern Study Area, as outlined below:

- Zero loss of *Persoonia hindii* (averting the loss of seven observed individuals);
- Three individuals of *Caesia parviflora* var. *minor*; and
- Three individuals of *Eucalyptus cannonii*.

The above impact assumptions would be confirmed prior to construction to validate offsetting requirements.

5.3 Mitigation

It is recommended that mitigation measures be outlined in a Construction Environmental Management Plan (CEMP). The following mitigation measures are recommended for inclusion in the CEMP to reduce the impacts of clearing, construction and operation of the proposed development:

- The clearing of native vegetation should be minimised as far as is practicable. Unnecessary vegetation clearing should be minimised by fencing the clearing limit;
- All contractors will be specifically advised of the designated work area. The following activities are not to occur outside of designated work areas to minimise impacts on native vegetation:
  - Vehicle movements;
  - Storage and mixing of materials;
  - Vehicle parking;
  - Liquid disposal;
  - Machinery repairs and/or refueling;
  - Combustion of any material;
  - Inappropriate stockpiling of soil, rubble or debris; and/or
  - Any filling or excavation including trenching, topsoil skimming and/or surface excavation.
- All construction and operational vehicles/machinery will use designated access tracks. Speeds will be limited to 20 kilometres per hour to reduce the potential of fauna strike and to reduce dust generation;
- Plant and machinery will be cleaned of any foreign soil and propagative material prior to being transported to the construction areas to prevent the spread of weeds and potential importation of Phytophthora;
- If machinery is transported from an area of confirmed infection of Phytophthora or Chytrid fungus to the construction areas, stringent wash down will be completed before leaving the area, removing all soil and vegetative material from cabins, trays, and under carriages;
- To minimise potential impacts on adjacent conservation lands and wetland habitats all liquids (fuel, oil, cleaning agents, drilling liquids etc.) will be stored appropriately and disposed of at suitably licensed facilities. Spill management procedures will be implemented as required. Rubbish will be collected and

removed from the PAA;

- Appropriate erosion and sediment control measures will be managed via the implementation of an erosion and sediment control plan, in accordance with best management practices, such as the:
  - » Best Practice Erosion and Sediment Control Guidelines (IECA, 2008); and
  - » Managing Urban Stormwater: Soils and Construction 4th Ed. 'The Blue Book' (Landcom 2004).

It is imperative that the plan ensures that any offsite discharge of stormwater (freshwater) does not significantly impact upon the adjoining aquatic environments;

- Construction personnel will be trained adequately in pest management and hygiene procedures;
- Weed management procedures will be implemented to prevent the spread of weeds both inside the Project Application Area and outside. Ongoing weed monitoring to be implemented and potential weed infestations appropriately managed to minimise the spread of weeds in the PAA. Management of noxious weeds are to be undertaken in accordance with the *Noxious Weeds Act* 1993. Weed monitoring should occur throughout the construction and operation phase and weed removal will be carried out as necessary;
- Where possible, clearing activities should be timed to avoid removal of hollow-bearing trees during breeding season of threatened species (avoiding winter and spring);
- A qualified ecologist is to perform pre-clearance surveys with the construction manager to identify key areas of impact avoidance including threatened;
- A qualified ecologist is to be present to supervise hollow-bearing tree clearing within the PAA and that vegetation clearing is undertaken in the following manner:
  - » Hollow-bearing trees are to be clearly marked (spray paint or flagging tape) by a qualified ecologist within the impact area prior to any vegetation clearing commencing;
  - » Non habitat vegetation should be removed at least one day prior to felling of hollow-bearing trees to encourage resident fauna to self relocate before felling of remaining habitat trees;
  - » Immediately prior to the felling of hollow-bearing trees, trees should be given two sharp taps with the machinery arm/bucket to encourage fauna to escape. After waiting 1–2 minutes after tapping the tree, the hollow-bearing tree should be felled as gently as possible;
  - » An ecologist is to inspect each felled hollow-bearing tree (once safe) to recover any injured fauna and seek appropriate treatment, and relocate uninjured fauna into vegetation to be retained within the PAA; and
  - » Felled timber is to be left in place for one night after all other vegetation is removed to allow any remaining fauna to vacate hollows.

6.0 EPBC Act Matters of National Environmental Significance

6.1 World Heritage Properties and National Heritage Properties

The western boundary of the NSW Greater Blue Mountains Area (GBMA) is located approximately 15 km to the east of the PAA and approximately 20 km to the north. The GBMA is a World Heritage Property and National Heritage Place DoE (2013a) provides significant impact assessment criteria for World Heritage Properties and National Heritage Places. Those assessment criteria relevant to biodiversity are considered below.

As per DoE (2013a), 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.

Activities required for the Project are limited to surface works within the proposed PAA. Given that the area to be impacted is outside the GBMA, no impacts are expected to occur on the GBMA.

6.2 Wetlands of International Importance (declared Ramsar wetlands)

The closest Ramsar listed wetland is approximately 300-400 km upstream of the PAA, namely The Macquarie Marshes. Given the distance from the PPA, it is unlikely that the project will impact upon this Ramsar Wetland.

6.3 The Great Barrier Reef Marine Park

The Great Barrier Reef Marine Park does not occur within or adjacent to the PAA, therefore, the Project will not impact upon any areas of the Great Barrier Reef Marine Park.

6.4 Commonwealth Marine Area

The PAA is not a Commonwealth Marine Area, and is not in close proximity to any such area. Therefore, the Project will not impact upon any Commonwealth Marine Area.

6.5 Listed threatened Ecological Communities

No listed threatened Ecological Communities exist within or adjacent to the PAA.

6.6 Nationally Listed Threatened and Migratory Species

Nationally listed threatened species and ecological communities that are considered to have potential to be impacted upon by the Project are assessed in **Appendix 5**. These are listed below:

Threatened Flora

- Eucalyptus aggregata (Black Gum);
- Eucalyptus pulverulenta (Silver-leaved Gum);
- Prostanthera cryptandroides subsp. cryptandroides (Wollemi Mintbush);
- Persoonia acerosa (Needle Geebung);
- Persoonia marginata; and
- Thesium australe (Austral Toadflax).

Threatened Fauna

- Bathurst Copper Butterfly (*Paralucia spinifera*);
- Giant Burrowing Frog (*Heleioporus australiacus*);
- Littlejohn's Tree Frog (*Litoria littlejohni*);
- Broad-headed Snake (*Hoplocephalus bungaroides*);
- Regent Honeyeater (*Anthochaera phrygia*);
- Spotted-tailed Quoll (*Dasyurus maculatus maculatus*);
- Southern Brown Bandicoot (*Isoodon obesulus obesulus*);
- Koala (*Phascolarctos cinereus*);
- Greater Glider (*Petauroides volans*);
- Brush-tailed Rock-wallaby (*Petrogale penicillata*);
- New Holland Mouse (*Pseudomys novaehollandiae*); and
- Large-eared Pied Bat (*Chalinolobus dwyeri*).

The assessment conclusions presented in Appendix 5 indicate that hte Projecy is not likely to have a significant impact on matters listed under Section 18 and 18A of the EPBC Act.

Table 9 lists the migratory species identified from database searches. Due to the high mobility of these migratory species, in relation to the low level impacts predicted to potential habitats, the impact upon these migratory species are unlikely to be significant.

6.7 All Nuclear Actions

No type of nuclear activity is proposed for the PAA.

6.8 Water resource, in Relation to Coal Seam Gas Development and Large Coal Mining Development

Not assessed in this report.

7.0 Conclusion

This Ecological Assessment has detailed the methods and results of ecological surveys conducted for the Springvale Water Treatment Project. Surveys were conducted in accordance with the FBA and considered species populations and EECs listed under the NSW TSC Act and Commonwealth EPBC Act.

Flora surveys detected three threatened flora species, including:

- *Caesia parviflora* var. *minor* (Small Pale Grass Lily) (Northern and Southern Study Areas);
- *Persoonia hindii* (Northern and Southern Study Area); and
- *Veronica blakelyi* (Northern Study Area).

Additionally, two threatened flora species were detected immediately adjacent both Study Areas, including:

- Eucalyptus aggregata (Black Gum); and
- Eucalyptus cannonii (Capertee Stringybark).

Two EECs were detected including:

- MU 11 corresponds to Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions EEC listed under the TSC Act; and
- MU 53 corresponds to Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions EEC listed under the TSC Act.

Eleven threatened fauna species listed under the TSC Act and/or EPBC Act were detected during RPS surveys across both the Northern and Southern Study Areas:

- Scarlet Robin (*Petroica boodang*);
- Little Eagle (*Hieraaetus morphnoides*);
- Gang-gang Cockatoo (*Callocephalon fimbriatum*);
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*);
- Powerful Owl (*Ninox strenua*) (Northern Study Area only);
- Brown Treecreeper (eastern subsp.) (*Climacteris picumnus victoriae*);
- Large-eared Pied Bat (*Chalinolobus dwyeri*);
- Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*);
- Greater Glider (*Petauroides volans*);
- Speckled Warbler (*Chthonicola sagittata*) (Southern Study Area only); and
- Little Lorikeet (*Glossopsitta pusilla*) (Southern Study Area only).

The impacts outlined in this report have been assessed in relation to the important ecological matters detected during surveys conducted for the Project, in the overarching BAR. Refer to the BAR in which this report is appended for impact assessment outcomes.

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Appendix 1

Likelihood of Occurrence Table

Threatened flora and fauna species (listed under the TSC Act 1995 and/or EPBC Act 1999) that have been gazetted and recorded within a 10 km radius of the Study Areas 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. Each species / community is considered for its potential to occur within the Study Areas.

This assessment deals with the following heads of consideration in tabulated form (refer to **Table 1** overleaf):

'Species / Community'/ Population' – Lists each threatened species / population / EEC known from the vicinity. The status of each threatened species under the TSC Act 1995 and EPBC Act 1999 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 Study Areas' – Assesses the likelihood of each species / community to occur along or within the immediate vicinity of the Northern and Southern Study Areas 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 Study Areas for EPBC Act listed species only. The associated BAR will assess potential impacts for those species listed under the TSC Act.

Table 1 Assessment of Likelihood of Occurrence of Threatened Species and Communities and Assessment of Potential Impacts

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Flora			
Boronia deanei Deane's Boronia (V, V*)	Occurs in wet heath appearing to prefer the margins of open forest where it adjoins swamps and streams. It is known to occur in the Blue Mountains in the upper Kangaroo River near Carrington falls, the Endrick River near Nerriga and on the Nalbaugh Plateau.	A high number of records occur within a 10km radius of the Study Areas for this species, however no MU 50 or MU 51 in which this species inhabits, occurs within the area to be impacted upon. It is considered **unlikely** to occur.	This species is unlikely to occur within the Study Areas or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted.
Caesia parviflora var. *minor* (E)	Occurs in damp places in open forest on sandstone. This variety may be more common than currently known, as Pale Grass-lilies are often not identified to variety level (OEH 2013). Two other larger varieties of *C. parviflora* have been described and are more common and widespread. A small or stunted *C. parviflora* of another variety may potentially be mistaken for *C. parviflora var. minor.*	This species was **recorded** within the Study Areas.	The species is known to occur within the Study Area. Therefore, it has the **potential** to be impacted.
Veronica blakelyi (V)	This species occurs in moist areas of eucalypt forest. It is known to occur in the Western Blue Mountains near Clarence, near Mt Horrible, Nullo Mountain and in the Coricudgy Range.	This species has been **recorded** within the Northern Study Area in previous studies (RPS 2014).	The species is known to occur within the Northern Study Area. Therefore, it has the **potential** to be impacted.
Dillwynia tenuifolia (V)	Occurs in scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays and less commonly on sandy loam over sandstone, or on Wiannamatta shale or laterite (DoE 2016). May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland (OEH 2016).	The species was not detected during the surveys in the Study Area. There are 2 existing records within 10 km of the Study Area. One of the records is located within a kilometre of the proposed works. There are some dry/scrubby heath and transitional areas on sandstone in and adjacent to the Study Area. Therefore this species **may** occur.	Habitat for this species is absent from the Study Area. This species is unlikely to occur within the Study Areas or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Eucalyptus aggregata Black Gum (V, V*)	Occurs on the central and southern tablelands of NSW. Grows in grassy woodlands on alluvial soils in moist sites along creeks, flats and hollows. Associated plants include *Eucalyptus rubida* (Candlebark), *E. viminalis* (Ribbon Gum) and *E. pauciflora* (Snow Gum) and *Poa labillardierei* (River Tussock) as an understorey grass.	This species was **recorded** within the Study Area.	The species is known to occur within the Study Area. Therefore, it has the **potential** to be impacted.
Eucalyptus cannonii Capertee Stringybark (V)	The altitude range of *Eucalyptus cannonii* is from about 460 m to 1040 m. Within the range, the species appears to tolerate most situations except the valley floors. Recorded from Tablelands Grassy Woodland Complex communities and Talus Slope Woodland, and in Winburndale Nature Reserve within woodland dominated by Red Stringybark.	This species was **recorded** within the Study Area.	The species is known to occur within the Study Area. Therefore, it has the **potential** to be impacted.
Eucalyptus pulverulenta Silver-leaved Gum (V, V*)	This species occur on the crests or upper slopes of moderately steep hillsides or mountains. Locally, it can be found in shallow soils as an understorey plant in open forest, typically dominated by Brittle Gum (*Eucalyptus mannifera*), Red Stringybark (*E. macrorhyncha*), Broad-leaved Peppermint (*E. dives*), Silvertop Ash (*E. sieberi*) and Apple Box (*E. bridgesiana*).	As this species can occur on steep terrain, there is potential that individuals could occur within the Study Area. However such areas could not be accessed to be recorded. This species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted. An Assessment of Significance (AoS (EPBC Act)) has been prepared in **Appendix 5**.
Eucalyptus robertsonii subsp. *Hemisphaerica* Robertson's Peppermint (V, V*)	A 30m tall tree with grey to grey-brown shortly fibrous bark which is persistent along the trunk. Found east and south-east of Orange in NSW. Known to occur north and north-east of Mullion Creek, Glengowan, Upper Meroo, west of Bocoble Mountain and Burraga. Locally common with a limited extent of occurrence. Found in closed grassy woodland in locally sheltered sites. Associated species include *Eucalyptus macrorhyncha* (Red Stringy Bark), *E. rossii* (Scribbly Gum), *E. dives* (Broad-leaved Peppermint), *E. mannifera* (Brittle Gum) and *E. dalrympleana* (Mountain Gum).	This species was not detected during surveys and no records occur within 10km of the Study Area. Although some associated species do occur within the Study Area, the Study Area is outside the current known distribution of this species. It is **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.
Genoplesium superbum (E)	*Genoplesium superbum* has been recorded from 2 locations near Nerriga, c. 20 km apart, and north of Wallerawang. *Genoplesium superbum* occurs predominantly in wet heathland on shallow soils above a sandstone cap but has also been found in open woodland interspersed with heath. This species can only be seen when in flower (December - March). Further details were sought from OEH with regard to the local habitat preferences of this species. OEH confirmed that the record was made in a woodland environment on a slope.	This species was note detected during surveys; however 13 records occur within 10km of the Study Area. Given the diversity of habitats it has been found in, some habitats within the Study Area may be suitable. This species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Lastreopsis hispida Bristly Shield Fern (E)	This species ranges from Victoria to NSW within moist humus-rich soils in wet forest and rainforest gullies of the Blue Mountains, where it grows on rotting logs.	Records in the locality are typically restricted to the Mt Wilson area. However, this species can be difficult to differentiate between similar *Lastreopsis* species and its distribution may therefore extend further. Potentially suitable wet forest habitats occur at the western end of the proposed works in gullies of the Study Area. This species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
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 (OEH 2016). The species is thought to respond slowly to fire.	The species was not detected during surveys in the Study Area. Seven records exist within a 10km radius of the Study Area. Suitable habitat occurs within the Study Area. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Leucochrysum albicans var. *tricolor* (E*)	Occurs in a wide variety of woodland and forest habitats, generally on relatively heavy soils. In NSW and ACT, *Leucochrysum albicans var. Tricolor* (Hoary Sunray occurs in grasslands, grassy areas in woodlands and dry open forests, and modified habitats, on a variety of soil types including clays, clay loams, stony and gravely soil (DoE 2016).	The species was not detected during surveys and the right soil types were absent in the Study Area, which mostly consists of sandy soils. However the species has a notably wide range of potential habitat, including open woodlands similar to the Study Area. Therefore this 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 5**.
Acacia bynoeana Bynoe's Wattle (V, V*)	This species has been recorded in the Blue Mountains NP, Royal NP, Marramarra NP and Tarlo River NP, among other conservation areas. Grows in heath and dry sclerophyll forest, commonly in open woodland with a heath understorey or open woodland with a sparse shrub cover and a grass/sedge ground cover. Can be found in disturbed locations such as trail margins and road sides. Associated overstorey species include *Eucalyptus gummifera, E. haemastoma*, *E. parramattensis, E. sclerophylla, Banksia serrata* and *Angophora bakeri*. Associated shrubs include *Banksia spinulosa, Acacia oxycedrus, A. myrtifolia* and *Kunzea* spp.	This species was not detected during surveys and no records occur within 10km of the Study Area. It is generally a more coastal species. It is considered **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.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Acacia meiantha (V)	This species is endemic to NSW. Three disjunct populations occur within the Central Tablelands within 100km of each other. The Clarence population covers approximately 1 ha between Lithgow and Bell on Crown and Railway Corridor land. Populations occur on different geologies and in different plant communities with dissimilar species associations. The Clarence population occurs in open eucalypt forest in association with *E. dives* and *E. sieberi* and in an adjacent area of mostly shrubs where the overstorey was cleared for power lines.	This species was not detected during surveys and no records occur within 10km of the Study Area. Records are known from Clarence Colliery and suitable habitat occurs onsite. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. There is **potential** for the habitat of this species to be impacted.
Pultenaea glabra Smooth Bush-pea (V, V*)	Grows in swamp margins, hillslopes, gullies and creek banks and occurs within dry sclerophyll forest and tall damp heath on sandstone. In NSW it is confined to the higher Blue Mountains (Katoomba-Hazelbrook and Mount Victoria).	This species has a restricted distribution within the higher Blue Mountains. The distribution does not incorporate the Study Area. This species is **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.
Pelargonium sp. Striatellum (G.W. Carr 10345) (E*)	Occupies a narrow habitat that is usually just above the high-water level of irregularly inundated or ephemeral lakes, in the transition zone between surrounding grasslands or pasture and the wetland or aquatic communities. Extent possibly driven by inundation regimes and topography of lakes.	The species habitat does not occur within the Study Area. There are no Atlas records of the plant within 10 km of the Study Area. This species is **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.
Prostanthera cryptandroides subsp. *cryptandroides* Wollemi Mintbush (V, V*)	Known from Glen Davis to Capertee and extending to the Goulburn River Valley in NSW. Occurs within the Hawkesbury-Nepean, Central West, Hunter-Central Rivers and Lachlan Natural Resource Management Regions. Found in dry sclerophyll forested slopes and gullies in rocky areas, particularly at the base of scree slopes and sandstone boulders, and in shallow sandy loam.	Scree slopes and forested gullies in MU 43 and MU 44 may provide potential habitat for this species within the Southern Study Area. There is one Atlas record within 10 km of the Study Area. Therefore this species **may** occur.	Potential habitat for this species occurs within the Southern Study Area. There is **potential** for the habitat of this species to be impacted. An AoS (EPBC Act) has been applied to this species in **Appendix 5**.
Cryptostylis hunteriana Leafless Tongue-orchid (E, V*)	Occupies swamp heath, but also in sclerophyll forest and woodland, often on sandy soils. Typically found in communities containing *Eucalyptus haemastoma*, *E. capitellata* and *Corymbia gummifera*. Its distribution in NSW is primarily coastal.	The Study Area is outside its known distribution of *Cryptostylis hunteriana*. This species is **unlikely** to occur.	This species is unlikely to occur within the Study Areas or within any habitats that may be directly or indirectly affected and is therefore **unlikely** to be impacted.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Microtis angusii Angus's Onion Orchid (E, E*)	*M. angusii* is endemic to NSW and is currently only known from its type locality at Ingleside in the north of the Sydney metropolitan area. Known habitats have not been described as this species was discovered in a highly disturbed location. The dominant species at this disturbed site were Coolatai Grass (*Hyparrhenia hirta*) and *Acacia saligna*.	This species is extremely rare, being known only from one location, and these records are not within 10km of the Study Area. Suitable habitat is also not found onsite. This species is **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.
Prasophyllum petilum Tarengo Leek Orchid (E, E*)	Endemic to NSW and known to occur on relatively fertile soils in grassy woodland or natural grassland in open eucalypt woodland and grassland. It also occurs on flat or gently sloping sites on plains and rolling hills. Soils are usually loams, clay loams or sandy clays.	The Study Area is outside of the known distribution of this species. It is **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.
Prasophyllum sp. Wybong (C. Phelps ORG 5269) a leek-orchid (CE*)	Now included in *Prasophyllum petilum* from DoE SPRAT profile (accessed 20 January 2016).	The Study Area is outside of the known distribution of this species. It is **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.
Euphrasia arguta (CE, CE*)	This species is known from Nundle State Forest and adjacent private land in NSW in an area estimated to be 26 km^2 (NSW DPI 2008). Previously known from Bathurst to Sydney and north to Walcha. Occurs in eucalypt forest with a mixed grass understorey within Nundle State Forest. Historic records describe the habitat as grassy areas near rivers at elevations up to 700 m above sea level.	This species is extremely rare and potentially locally extinct, historic records indicate a habitat that is not represented within the Study Area. This species is **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*)	A spreading shrub 1-1.5m high. Occurs between Dubbo and Denman on the western slopes and central tablelands of New South Wales. Occurs in various woodland habitats with shrubby understoreys, usually in gravely sandy soils. Recorded growing on flat sunny ridge tops with shrubby woodland, sloping ridges, gentle south-facing slopes and a slight depression on a roadside with loamy sand. Associated species include Black Cypress-pine (*Callitris endlicheri*), Narrow-leaved Ironbark (*E. crebra*), Red Ironbark (*E. fibrosa*), Brown Bloodwood (*E. trachyphloia*), Scribbly Gum (*E. rossii*), Broom Honey-myrtle (*Melaleuca uncinata*), Fringe Myrtle (*Calytrix tetragona*) and *Allocasuarina* spp.	This species was not detected within the Study Area, and no records occur within 10km of the Study Area. Additionally, the associated species composition does not occur within the Study Area. It is **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.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Persoonia acerosa Needle Geebung (V, V*)	Known from the Blue Mountains in the Newnes Plateau south through Kings Tableland to Hilltop and east to the lower Mountains. Occurs in dry sclerophyll forest, scrubby low-woodland and heath, generally on clayey sandstone and laterites of the Narrabeen Group (NPWS 2000). This species is strongly associated with disturbance margins such as road and trail verges.	Only one record occurs within a 10km radius of the Study Area, however this specie is known from the Newnes Plateau region. Suitable habitat does occur. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. There is **potential** for the habitat of this species to be impacted. An AoS (EPBC Act) has been applied to this species in **Appendix 5**.
Persoonia hindii (E)	Distribution is limited to the Newnes plateau in the Upper Blue Mountains where it occurs in dry forest habitats.	This species was not detected within the Study Area; however previous surveys have recorded it in very close proximity to the eastern portion of the Study Area. Approximately 3560 records occur within 10km of the Study Area, and suitable habitat also occurs. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. There is **potential** for the habitat of this species to be impacted.
Persoonia marginata Clandulla Geebung (V, V*)	Distributed in the Capertee district in the Rylstone LGA (Harden 1991). Known from 11 different locations with the majority occurring in the Clandulla State Forest, west of Kandos. Also known from Ben Bullen State Forest. Found in dry woodland communities associated with Shoalhaven Group sediments.	Although this species was not detected during surveys, suitable habitat exists for *Persoonia marginata* within the Study Area. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, There is **potential** for the habitat of this species to be impacted. An AoS (EPBC Act) has been applied to this species in **Appendix 5**.
Asterolasia elegans (E, E*)	This species is endemic to, and has a disjunct distribution within, the hills of north Sydney (OEH 2011b). The species current known distribution equates to a linear range of less than 37 km and an extent of occurrence of approximately 22 km^2. All populations exist within the Hawkesbury/Nepean Catchment Management Authority boundary (OEH 2011b). Occurs on Hawkesbury sandstone amongst rocky outcrops and boulders (OEH 2011b). Grows in wet sheltered sclerophyll forests from 2 to 40 m above the creek line (OEH 2011b).	The Study Area is outside its known distribution of *Asterolasia elegans*. This species is **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.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Wollemia nobilis Wollemi Pine (CE, E*)	This species is a relict species confined to remota canyons in Wollemi National Park west of Sydney NSW. Known stands occur in deep gorge composed of Narrabeen Group Triassic sandstone. The Wollemi Pine is known from one population of fewer than 100 adult trees in several stands and about 200-300 juvenile/seedlings within the Wollemi NP and the Greater Blue Mountains World Heritage Area. Occurs in warm temperate rainforest and rainforest margins in a Eucalypt forest/woodland. Associated vegetation includes Coachwood (*Ceratopetalum apetalum*), Sassafras (*Doryphora sassafras*), *Acmena smithii*, *Backhousia 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*.	This species is known only from a single population which does not occur within the Study Area. It is considered **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*)	This species occurs in grassland or grassy woodland and is often found in damp sites in association with kangaroo grass (*Themeda australis*). This species is a root parasite that takes water and some nutrient from other plants, especially kangaroo grass.	There is limited potential for this species to occur within low-lying areas in the west of the Study Area. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. There is **potential** for the habitat of this species to be impacted. An AoS (EPBC Act) has been applied to this species in **Appendix 5**.
Invertebrates			
Paralucia spinifera Bathurst Copperwing Butterfly (E, V*)	Restricted to an area within the Central Tablelands of NSW between Oberon, Hartley and Bathurst. Found in open woodland or open forest with a sparse understorey that is dominated by *Bursaria spinosa* subsp. *lasiophylla* (Blackthorn), which is used as the larval food plant. Found above 850 m, where direct sunlight reaches the habitat, with a south-west to north-west aspect. These areas come with extreme cold cycles such as frost or winter snowfalls. In 2011, this species was found at 29 sites throughout the Blue Mountains (CSIRO 2002 in DoE 2014).	A total of 1,892 records occur within 10km of the Study Area for this species. Suitable habitat occurs on the flats where *B. spinosa* subsp. *lasiophylla* has been recorded. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. There is **potential** for the habitat of this species to be impacted. An AoS (EPBC Act) has been applied to this species in **Appendix 5**.
Petalura gigantea Giant Dragonfly (E)	*Petalura gigantea* can be found along the east coast of NSW, from the Victorian border to northern NSW. There are only a handful of known locations in NSW. They occur in permanent swamps and bogs with some water and open vegetation.	No suitable swamp habitat occurs within the Study Area for this species. It is considered **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.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Amphibians			
Heleioporus australiacus Giant Burrowing Frog (V, V*)	Confined to the eastern slopes of the Great Divide in south-east coastal NSW and into Victoria (Tyler and Knight 2011). Occurs in Hawkesbury sandstone areas where it burrows near water (Tyler and Knight 2011). Appears to be dependent on areas with native vegetation. Has been recorded in hanging swamps, sandstone ridges supporting heath vegetation and dry sclerophyll forests that support wet habitats.	This species was not detected during surveys, and no records occur within 10km of the Study Area. Records are known from the Newnes Plateau and suitable habitat does occur in the eastern parts of the Study Area. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. There is **potential** for the habitat of this species to be impacted. An AoS (EPBC Act) has been applied to this species in **Appendix 5**.
Mixophyes balbus Stuttering Frog (E, V*)	Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range, at elevations of 20 to 1100 m (Tyler and Knight 2011). Breeds in streams during summer after heavy rain, outside the breeding season adults live in deep leaf litter and thick understorey vegetation on the forest floor. Eggs are laid on rock shelves or shallow riffles in small, flowing streams.	This species was not detected during surveys, and only a single record exists within 10km of the Study Area. Suitable rainforest vegetation surrounding permanent streams does not occur within the Study Area. Therefore this 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.
Litoria booroolongensis Booroolong Frog (E, E*)	This species has drastically declined in NSW and is now restricted to two or three isolated areas (Tyler and Knight 2011). Areas of occupancy are closely related to permanent rocky streams and cobble bank habitats with fringing vegetation such as ferns, sedges and grasses (Tyler and Knight 2011). Previously known occurrences in the Blue Mountains are no longer able to be located.	Although streamside habitat occurs near the Study Area, the specific requirements for this species such as rocky or cobble bank habitats do not occur within the Study Area. This species is **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.
Litoria littlejohni Littlejohn's Tree Frog (V, V*)	The distribution of this species extends from Newcastle along the NSW coast to eastern Victoria occurring in patchy fragments (Tyler and Knight 2011). Habitats include forest, coastal woodland and heath; occurs at low altitudes on hills and mountains: with rocky streams, and semi-permanent dams being required for breeding periods (Tyler and Knight 2011).	Whilst surveys and ongoing monitoring have not detected this species, it is regarded as being one of the least known and least frequently encountered frogs in New South Wales. One record exists for this species within 10 km of the Study Area. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. There is **potential** for the habitat of this species to be impacted. An AoS (EPBC Act) has been applied to this species in **Appendix 5**.
Pseudophryne australis Red-crowned Toadlet (V)	The distribution of this species extends from Newcastle along the NSW coast to eastern Victoria occurring in patchy fragments (Tyler and Knight 2011). Habitats include forest, coastal woodland and heath, with rocky streams, and semi-permanent dams being required for breeding periods (Tyler and Knight 2011).	This species was not detected during surveys; however numerous individuals have been recorded during previous RPS surveys across the Newnes Plateau in Sandstone habitats. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. There is **potential** for the habitat of this species to be impacted.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Reptiles			
Hoplocephalus bungaroides Broad-headed Snake (E, V*)	Largely confined to Triassic sandstones, including the Hawkesbury, Narellan and Shoalhaven formations, within the coast and ranges. Occurs in the Sydney basin within a 200 km radius of Sydney (Cogger et al. 1993). Occurs on rocky outcrops and adjacent sclerophyll forest and woodland (Cogger et al. 1993). The most suitable habitats occur on sandstone ridgetops. Nocturnal, sheltering by day in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Broad-headed Snakes select refuge based on seasonal temperature differences, preferring cooler tree hollows on top of plateaus and below cliffs during summer and warmer sun-exposed sandstone slabs and exfoliations during winter.	Targeted searches did not detect this species within the Study Area. One record for this species exists within a 10 km radius of the Study Area. Suitable habitat in the form of sandstone outcrops with adjacent forest vegetation does occur within the Study Area. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. There is **potential** for the habitat of this species to be impacted. An AoS (EPBC Act) has been applied to this species in **Appendix 5**.
Aprasia parapulchella Pink-tailed Worm-lizard (V, V*)	This species has a patchy distribution along the foothills of the western slopes of the Great Divide. Habitats are described as primary and secondary grassland, grassy woodland and woodland communities including mallee, and box-ironbark forest. They shelter under small rocks, with the recorded rock geology being Silurian acid volcanics, pophyritic granite, granite, metasedimentary and laterite.	This species has a more western distribution than the Study Area. Additionally the grassy habitats and the rock types typically associated with this spices is not present. This species is **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*)	This species is restricted to the Blue Mountains and Newnes Plateau in NSW (Wilson and Swan 2010). Occurs in high elevated habitats generally in shrub or hanging swamps but can also occur in open forest, open scrub or heath. Larger, wetter swamps in close proximity to other inhabited swamps are more likely to be occupied by this species.	Although a high number of records occur for this species within 10km of the Study Area (n=276), no suitable swamp habitats occur within the Study Area. It is considered **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.
Varanus rosenbergi Rosenberg's Goanna (V)	In NSW this species occurs on the Sydney Sandstone in Wollemi NP to the north-west of Sydney, in the Goulburn and ACT regions and near Cooma in the south. Habitats include heath, open forest and woodlands that contain termite mounds for which this species requires to lay eggs inside.	One record for this species exists within a 10 km radius of the Study Area and is therefore unlikely to occur commonly in the area. Suitable habitat does however exist. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. There is **potential** for the habitat of this species to be impacted.
Birds			
Oxyura australis Blue-billed Duck (V)	Endemic to Australia occurring in temperate wetlands and large deep, open freshwater dams and lakes. Seldom seen on land.	No suitable bodies of water exist within the Study Area for this species. There are only 10 records within 10 km of the Study Area. It is considered **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.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Rostratula australis Australian Painted Snipe (E, E*)	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.	No suitable aquatic habitats occur within the Study Area for this species and no records occur within 10km of the Study Area. It is considered **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)	Widespread over mainland Australia, including NSW, but not near the coast (Marchant and Higgins 2007). Most resident birds occupy inland Australia (Marchant and Higgins 2007). Habitats include wooded and forested lands and open country particularly timbered areas such as wooded farmland, gallery forest and wooded floodplains along watercourses (Marchant and Higgins 2007). Requires mature living trees in open woodland for nesting purposes.	This species has been **recorded** within the Study Area.	Known habitat for this species occurs within the Study Area. There is **potential** for the habitat of this species to be impacted.
Lophoictinia isura Square-tailed Kite (V)	Widespread across Australia along coastal and sub-coastal areas. Scattered through NSW except inland treeless parts and the highest alpine areas, as a single population (NSW Scientific Committee 2009). Found in a variety of timbered habitats including dry woodlands and open forests; showing a preference for timbered watercourses (OEH 2014).	The various habitats of the Study Area are not consistent with the particular habitat preference of wooded watercourses. However there has been one record within 10 km of the Study Area. Therefore this species **may** occur.	Whilst this species has potential to occur, the Study Area provides little if any areas of preferred habitat for this species. It is **unlikely** that this species would be impacted upon.
Callocephalon fimbriatum Gang-Gang Cockatoo (V)	Gang-gang Cockatoos are restricted to the south-eastern coast and highlands, from the lower Hunter and northern Blue Mountains to the South-western Slopes (NSW Scientific Committee 2008a). Found in the summer months in tall mountain forests and woodlands, and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open Eucalypt forests and woodlands, and often found in urban areas in some districts.	This species has been **recorded** within the Study Area.	Known habitat for this species occurs within the Study Area. There is **potential** for the habitat of this species to be impacted.
Calyptorhynchus lathami Glossy Black-Cockatoo (V)	Glossy-black Cockatoos are distributed in eastern NSW from the coast to the tablelands with populations in the western slopes and plains (NSW Scientific Committee 2008b). The species is known from the following local government areas: Cobar, Carrathool, Narrandera, Leeton, Griffith, Bland, Lockhart, Wagga Wagga and Lachlan (NSW Scientific Committee 2008b). Occurs in forests and woodlands where it forages predominantly on Allocasuarina cones, particularly those of *A. littoralis*, *A. torulosa* and at time *A. distyla* (NSW Scientific Committee 2008b). Requires large Eucalypt tree hollows for nesting.	This species has been **recorded** within the Study Area.	Known habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Glossopsitta pusilla Little Lorikeet (V)	The distribution of the Little Lorikeet ranges from Cairns in QLD to Adelaide along the east coast of Australia (NSW Scientific Committee 2011). Commonly found in dry, open eucalypt forests and woodlands and can be found in roadside vegetation to woodland remnants (NSW Scientific Committee 2011). In the western parts of its range, Yellow Box (*Eucalyptus melliodora*) and White Box (*E. albens*) form important food sources for Little Lorikeets (Courtney & Debus 2006).	This species has been **recorded** within the Study Area.	Known habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Lathamus discolor Swift Parrot (E, CE*)	Swift Parrots Breed only in Tasmania during Summer and migrate north to mainland Australia during Winter (Saunders and Tzaros 2011). In NSW occupied habitat includes dry forests and woodlands of the box-ironbark type on the inland slopes of the Great Dividing Range (Saunders and Tzaros 2011). Coastal regions tend to be more favourable during drought periods in the west (Saunders and Tzaros 2011).	This species predominantly prefers coastal woodlands and forests of New South Wales, preferring eucalypt species typically not found on the Newnes Plateau or the lower lying lands in which the Study Area occurs. This species is **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.
Ninox connivens Barking Owl (V)	In Australia Barking Owls occur in WA, NT QLD, NSW and Victoria (NPWS 2003). Throughout NSW, it is widespread on the coastal plain and foothills and the inland slopes and plains (NPWS 2003). Habitats include forests and woodlands of tropical, temperate and semi-arid zones, typically dominated by eucalypts, often red gum species and in the tropics, paperbarks *Melaleuca* species (NPWS 2003). Roosts in dense foliage in large trees including rainforest species of streamside gallery forests.	This species was not detected during surveys; however six records occur within 10km of the Study Area. Suitable foraging and roosting habitat occurs throughout the Study Area. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Ninox strenua Powerful Owl (V)	Occurs in coastal and adjacent ranges of eastern Australia, in the eastern quarter of NSW (NSW Scientific Committee 2008c). Occurs in sclerophyll forests and woodlands, gallery rainforest and inland riverine woodland (NSW Scientific Committee 2008c). Often roosts and nests in dense gully eucalypt forest. Occurs throughout the Blue Mountains and Gardens of Stone National Park (OEH Atlas of NSW Wildlife Data 2013).	This species has been recorded in very close proximity to the Study Area, and known habitat occurs in the form of various eucalypt woodlands and forests throughout the Study Area. It is considered **likely** to occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Tyto novaehollandiae Masked Owl (V)	In NSW, Masked Owls are distributed throughout the length of the Great Dividing Range and extends from the coast to the western slopes (Kavanagh 2002). Occupies a range of environments from tall, wet Eucalypt forest to dry woodland, and often, but not always, at the ecotone with cleared land.	This species was not detected during surveys; however it has been recorded in the surrounding areas of the Newnes Plateau. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Tyto tenebricosa Sooty owl (V)	Occupies the easternmost one-eighth of NSW, occurring patchily on the coast, coastal escarpment and eastern tablelands. There is no seasonal variation in its distribution. Often occurs in tall old-growth montane forests, including temperate and subtropical rainforest (Higgins 1999). Occurring mostly in uplands. Can occur in rainforest in moist sheltered gullies surrounded by sclerophyll forests, or in tall open wet sclerophyll forests (Higgins 1999).	This species was not detected during surveys; however it has been recorded in the surrounding areas of the Newnes Plateau. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Climacteris picumnus victoriae Brown Treecreeper (eastern subsp.) (V)	Brown Treecreepers are endemic to eastern Australia (OEH 2012b). They frequent drier eucalypt forests and woodlands, particularly open woodland lacking a dense understorey, in the inland plans and slopes of the Great Dividing Range (OEH 2012b). The eastern subspecies lives in eastern NSW in eucalypt woodlands through central NSW and in coastal areas with drier open woodlands such as the Snowy River Valley, Cumberland Plains, Hunter Valley and parts of the Richmond and Clarence Valleys (OEH 2012b). Can be found in grasslands in proximity to wooded areas where there are sufficient logs, stumps and dead trees nearby.	This species has been recorded in very close proximity to the Study Area, and known habitat occurs in the form of various eucalypt woodlands and forests throughout the Study Area. It is considered **likely** to occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Chthonicola sagittata Speckled Warbler (V)	This species has a patchy distribution from south-east Queensland to the eastern half of NSW and into Victoria (OEH 2012). Occupies Eucalypt and Cypress woodlands in drier areas and on the western/eastern slopes of the Great Dividing Range. More commonly found on the western slopes, mainly due to habitat. Lives in a wide range of Eucalypt dominated vegetation that has a grassy and shrubby understorey often on rocky ridges or gullies (Garnett et al. 2000). Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy (OEH 2012).	This species has been **recorded** within the Study Area.	Known habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Anthochaera phrygia Regent Honeyeater (CE, CE*)	Regent Honeyeaters are endemic to South-east Australia, extending from south-east Queensland to central Victoria. This distribution is, however, extremely segmented (SEWPAC 2013a). Preferred habitat includes Box-Ironbark eucalypt woodland and dry sclerophyll forest (SEWPAC 2013a). Seasonal movements appear to be dictated by the flowering of various species of Eucalyptus sp. that are characteristic of the dry forests and woodlands of South-Eastern Australia.	Occurs in the Capertee area with recent records on the Coxs River individuals are recorded in more easterly habitat, particularly in areas characterised by winter flowering *Eucalyptus* ssp. when westerly habitats are experiencing extended dry periods. As such this species may occur in Newnes Plateau forests on an intermittent basis. Therefore this 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 supplied in **Appendix 5**.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Grantiella picta Painted Honeyeater (V)	This species occurs in scattered locations through eastern and mid NSW north to QLD and south to central Victoria (Higgins et. al 2001). In NSW this species is widespread on and west of the Great Dividing Range scattered from Tenterfield, Glen Alice, Canberra and Kosciusko NP (Higgins et al. 2001). Generally occurs on dry open woodlands and forest that are strongly associated with mistletoes (Higgins et al. 2001). Woodlands including species such as Red Ironbark, Mugga, Yellow Box, Broad-leaved Peppermint with drooping *Amyema pendulum* and *A. miquelii* mistletoes are preferred (Higgins et al. 2001).	This species was not detected within the Study Area and only one record exists within a 10 km radius of the Study Area (OEH Atlas of NSW Wildlife 2015). There is an abundance of mistletoe within the Study Area amongst suitable habitat for this species. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Melithreptus gularis gularis Black-chinned Honeyeater (V)	This species extends from central Queensland, south through NSW and into Victoria to south-eastern South Australia (OEH 2015). Widespread in NSW with records from the tablelands and western slopes of the Great Dividing Range to the north-west and central-west plains and the Riverina (OEH 2015). Occurs in dry open forests or woodlands dominated by box and ironbark eucalypts where it spends its time in the upper canopies (OEH 2015). Habitat species include Mugga Ironbark (*E. sideroxylon*), White Box (*E. albens*), Inland Grey Box (*E. microcarpa*), Yellow Box (*E. melliodora*), Blakely's Red Gum (*E. blakelyi*) and Forest Red Gum (*E. tereticornis*).	This species was not detected during surveys, however two records occur within 10km and it is known from the Newnes Plateau. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Pomatostomus temporalis temporalis Grey-crowned Babbler (V)	In NSW, this species is widespread west of the Great Divide. East of the Great Divide they are widespread also but scattered to the Hunter Region including coastal areas (Higgins and Peter 2002). Occupies open forests and woodlands especially on inland plains (Higgins and Peter 2002). Requires an open shrub layer with sparse ground cover and fallen timber and leaf-litter.	This species was not detected during surveys, however four records occur within 10km and it is known from the Newnes Plateau. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Daphoenositta chrysoptera Varied Sittella (V)	This species occurs across most of the Australian Mainland, with nearly a continuous distribution in NSW from the coast to the far west (OEH 2012c). This species inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland (Pizzey and Knight 2007).	This species was not detected within the Study Area; however it has been recorded in very close proximity during recent surveys. It is considered **likely** to occur.	Known habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Melanodryas cucullata Hooded Robin (V)	Hooded Robins occur widely across Australia aside from driest deserts and wetter coastal areas. (OEH 2014b). In NSW it occurs across the entire state aside from the far north and south-western corners (OEH 2014b). Favoured habitats include lightly wooded country, usually open eucalypt woodland, acacia shrub and mallee near clearings and open areas (OEH 2014b). This species does require structurally diverse habitats that feature mature eucalypts, saplings, small shrubs and diverse tall grasses (OEH 2014b).	This species was not detected during surveys, however nine records occur within 10km and it is known from the Newnes Plateau. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Petroica boodang Scarlet Robin (V)	Scarlet Robins are located in south-eastern Australia and south-west western Australia (Higgins and Peter 2002). In NSW, it occupies open forests and woodlands from the coast to the inland slopes and it breeds in drier eucalypt forests and temperate woodlands (Higgins and Peter 2002).	This species has been **recorded** within the Study Area.	Known habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Petroica phoenicea Flame Robin (V)	Flame Robins are found in south-eastern Australia from the QLD border to Tasmania. In NSW they are sparsely scattered from east of the Great Divide in coastal areas from Northern Rivers to the South Coast, but are more widely spread west of the Great Divide (Higgins and Peter 2002). During Spring-Summer (breeding season) they are found mainly upland, wet to moist eucalypt forests and woodlands, usually on slopes and ridges and with an open understorey or in clearings (Higgins and Peter 2002). During Autumn-Winter, they occur more often in open areas at lower altitudes in drier more open habitats particularly native and introduced grasslands and farmlands and in dry sclerophyll forests and woodlands (Higgins and Peter 2002).	This species has been **recorded** within the Study Area.	Known habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Stagonopleura guttata Diamond Firetail (V)	Endemic to South-eastern Australia, extending from central QLD to the Eyre Peninsula in South Australia (OEH 2015b). Widespread in NSW with most records occurring on the inland slopes of the Great Divide (Garnett et al. 2000). Not commonly found in coastal districts, though there are records from near Sydney, the Hunter Valley and the Bega Valley (OEH 2015b). Habitats include grassy eucalypt woodland, including box-gum woodlands and Snow Gum (*E. pauciflora*) woodlands (OEH 2015b). Can also be found in mallee, natural temperate grassland, riparian areas and lightly wooded farmland (OEH 2015b).	This species was not recorded within the Study Area during fieldwork and only one record for this species exists within a 10 km radius of the Study Area. Some suitable habitat does occur within the Study Area, in the more western areas where open woodlands with grassy understorey occurs. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Mammals			
Dasyurus maculatus maculatus Spotted-tailed Quoll (V, E*)	In NSW, this species is largely confined to within 200 km of the coast and ranges from the QLD border to Kosciuszko NP including areas such as the Hunter Valley, Taree, Port Macquarie, and coastal national parks. Disjunct populations have been recorded between the Border Ranges and the Blue Mountains area. Has a preference for mature wet forest habitat, particularly in areas with rainfall approximate to 600 mm/year. Known habitats include temperate and subtropical rainforests, wet sclerophyll forest, lowland forest, open and closed eucalypt woodlands, inland riparian and River Red Gum, dry 'rainshadow' woodland, sub-alpine woodlands and coastal heathlands.	Suitable habitat for this species does occur within the Study Area. Therefore this 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 applied to this species in **Appendix 5**.
Isoodon obesulus obesulus Southern Brown Bandicoot (E, E*)	In NSW, this species is distributed along the coastal fringe of the state from the southern side of the Hawkesbury River in the north, to the Victorian border in the south. Two main populations are from Ku-ring-gai Chase NP north of Sydney and in the far south-east corner of the state in Ben Boyd NP, East Boyd NP and multiple state forests. This species has been recorded in small numbers in the Blue Mountains NP (NSW DEC 2006). Occurs in a variety of habitats including heathland, shrubland, dry sclerophyll forest with heathy understorey, sedgeland and woodland (NSW DEC 2006). A dense understorey is a general feature that this species prefers.	This species was not detected during current or previous surveys, and no records exist within a 10 km radius of the Study Area. However, this species is known to occur within the Blue Mountains National Park. Suitable habitat for this species does occur within the Study Area. Therefore this 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 applied to this species in **Appendix 5**.
Phascolarctos cinereus Koala (V, V*)	Occurs along the east coast of Australia and extends into Woodland, Mulga and River Red Gum forests west of the Great Dividing Range (DECC 2008b). The range of the Koala covers all such suitable areas of NSW. Populations in NSW now exist in fragmented and isolated habitats (DECC 2008b). In drier forested areas, Koalas are generally observed as individuals in low densities. Two individual Koalas were recorded in the lower Blue Mountains at Glenbrook in 1998 and 1999. However, continuous surveys have failed to record more Koalas in the lower Blue Mountains since (DECC 2008b). Koalas inhabit a variety of eucalypt woodlands and forests including coastal forests, the woodlands of the tablelands and western slopes, and the riparian communities of the western plains (DECC 2008b). They have also been known to frequent isolated paddock trees and roadside remnant vegetation (DECC 2008b).	This species was not detected during surveys, and only a single feed tree listed under Schedule 2 of SEPP 44 occurs within the Study Area. Five records occur within a 10km radius of the Study Area. Therefore this 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 applied to this species in **Appendix 5**.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Cercartetus nanus Eastern Pygmy Possum (V)	Found in south-eastern Australia, from southern Queensland to eastern Australia, from southern QLD to eastern SA and in Tasmania (OEH 2014c). In NSW, it extends from the coast inland as far as the Pillaga, Dubbo, Parkes and Wagga Wagga on the western slopes (OEH 2014c). Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas, woodlands and heath appear to be preferred — except in north-eastern NSW, where they are most frequently encountered in rainforest (OEH 2014c).	This species was not detected during surveys, however records are known from the Newnes Plateau. Suitable habitat occurs throughout the Study Area. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Petaurus australis Yellow-bellied Glider (V)	Has a patchy distribution across a wide range of eastern and south-eastern Australia (NPWS 2003a). It is generally a coastal species in NSW extending inland to adjacent ranges (NPWS 2003a). Occurs in a range of habitat types but generally is associated with tall, mature eucalypt forest in regions of high rainfall.	This species was not recorded within the Study Area during fieldwork. Two records exist for this species within a 10 km radius of the Study Area. Chance of occurrence is low, but cannot be entirely discounted. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Petaurus norfolcensis Squirrel Glider (V)	The Squirrel Glider is sparsely distributed along the east coast and immediate inland districts from western Victoria to north Queensland (NPWS 1999). Individuals have been recorded in a diverse range of vegetation communities, including Blackbutt Forest, Red Gum and Red Bloodwood Forests, Coastal Banksia heathland and Grey Gum / Spotted Gum / Grey Ironbark dry hardwood forests of the Central NSW Coast (Quin, 1995). Important habitat includes areas where one or more Eucalypt species occur that flower heavily in winter, or the presence of good stands of winter-flowering Banksias (Quin 1995).	This species was not recorded within the Study Area during fieldwork. Six records exist for this species within a 10 km radius of the Study Area. Chance of occurrence is low, but cannot be entirely discounted. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Petauroides volans Greater Glider (V*)	The Greater Glider is Australia's largest gliding species. Their distribution extends from coastal Queensland through NSW and into Victoria along the east coast. It has adapted to feed almost exclusively on eucalypt leaves, but will consume eucalypt flowers and buds also. Occurs in a range of habitats including tall open woodland, eucalypt forests and low woodlands. Their home range extends between 0.7-3 hectares.	This species was **recorded** within the Study Area.	Known habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Petrogale penicillata Brush-tailed Rock-wallaby (E,V*)	Historically, this species was spread over much of NSW aside from the arid west. It is now absent west of the Great Divide aside from one population in the Warrumbungle Ranges. The largest population exists in the north-eastern part of its range (ACT Government 1999). This species inhabits cliffs and other steep rocky areas that have an association with shelters, overhangs and/or caves (ACT Government 1999).	This species was not recorded during fieldwork and only one record for this species exists within a 10 km radius of the Study Area. Steep rocky areas do occur within the Study Area, offering potential habitat for this species. Therefore this 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 applied to this species in **Appendix 5**.
Pseudomys novaehollandiae New Holland Mouse (V*)	Distributed across Tasmania, Victoria, NSW and QLD, with records in NSW being from Royal NP, the Kangaroo Valley, Ku-ring-gai Chase NP and Port Stephens to Evans Head. The New Holland Mouse has been found from coastal areas and up to 100 km inland on sandstone country. Inhabits communities such as open heathland, open woodland with heathland understorey and vegetated sand dunes.	This species was not recorded within the Study Area during fieldwork. There is one record of this species within 10 km of the Study Area. Suitable habitat exists for this species within the Study Area. Therefore this 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 applied to this species in **Appendix 5**.
Pteropus poliocephalus Grey-headed Flying-fox (V, V*)	The Grey-headed Flying Fox is endemic to Australia and presently occurs along the east coast from Bundaberg in Queensland to Melbourne, Victoria. Regular movements have been recorded over the Great Dividing Range to the western slopes of NSW and QLD. A blossom-eater, frugivore and nectarivore of habitats such as rainforests, open forests, woodlands, Melaleuca swamps and Banksia woodlands. Also known to feed on commercial fruit crops.	This species was not detected within the Study Area during current or previous surveys, and no records exist within a 10 km radius of the Study Area. This species is unlikely to inhabit areas of high-altitudes such as those within the Study Area. This species is **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.
Saccolaimus flaviventris Yellow-bellied Sheathtail Bat (V)	Wide-ranging across Australia, covering the whole state of NSW (Churchill 2009). Occurs in almost all habitat types from wet and dry sclerophyll forest, open woodland, acacia shrubland, mallee, grasslands and desert (Churchill 2009). In NSW requires small hollows in trees to roost.	This species was **recorded** in the Study Area.	Known habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Mormopterus norfolkensis Eastern Freetail-bat (V)	This species is distributed south of Sydney extending north into south-eastern Queensland. There are no records west of the Great Dividing Range. Most records of this species have been reported from dry Eucalypt forest and woodland. It is expected that open forested areas and the cleared land adjacent to bushland, constitutes important habitat for this species, It is a predominantly tree-dwelling species, roosting in hollows or behind loose bark in mature Eucalypts. Widely distributed across the Lower Hunter Region.	This species was not detected confidently within the Study Area; however there was a potential call that could represent this species. Suitable habitat occurs within the Study Area, and known records occur in the surrounding area. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Chalinolobus dwyeri Large-eared Pied Bat (V, V*)	Distributed from south-east QLD to NSW, from the coast to the western slopes of the Great Divide (Churchill 2009). In NSW, the known distribution occurs in Coolah Tops, Mt Kaputar and Warrumbungle National Parks, the Sydney Basin and the western slopes and plains including Pilliga Nature Reserve (DERM 2011). This species is dependent on the presence of diurnal roosts for shelter which include disused mine shafts, caves, overhangs and abandoned fairy martin (*Hirundo ariel*) nests (DERM 2011). These roosts are generally in close proximity to fertile woodland valley habitats in which this species forages (DERM 2011). Foraging habitats include dry and wet sclerophyll forest, grassy woodland, *Callitris* dominated forest, tall open eucalypt forest with rainforest understorey, sub-alpine woodland and sandstone outcrop country (DERM 2011).	This species was **recorded** within the Study Area.	Known habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted. An AoS (EPBC Act) has been applied to this species in **Appendix 5**.
Falsistrellus tasmaniensis Eastern False Pipistrelle (V)	This species is distributed from south-east QLD south along the NSW coast into Victoria and Tasmania (Churchill 2009). This species is found in a variety of forest types such as open forests, woodlands and wetter sclerophyll forests (usually with trees >20m) (OEH 2014d). Generally they roost in hollow trunks of eucalypt species in colonies (Churchill 2009).	This species was not detected confidently within the Study Area, however there was a potential call that could represent this species. Suitable habitat occurs within the Study Area, and known records occur in the surrounding area. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Miniopterus schreibersii subsp. *oceanensis* Eastern Bentwing Bat (V)	Occurs along the east and north coasts of Australia. This species utilises a range of habitats for foraging, including rainforest, wet and dry sclerophyll forests, woodlands and open grasslands. Requires caves or similar structures for roosting habitat such as derelict mines, disused buildings and storm-water tunnels (Churchill 2009).	This species was not detected confidently within the Study Area, however there was a potential call that could represent this species. Suitable habitat occurs within the Study Area, and known records occur in the surrounding area. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Nyctophilus corbeni South-eastern Long-eared Bat (V, V*)	The South-eastern Long-eared Bat has a limited distribution that is restricted around the Murray-Darling Basin in south-eastern Australia (SEWPAC 2013c). It is distributed throughout inland NSW except in the north-west area which is dominated by treeless plains. They can occur in a range of habitat types including but not limited to Box, Ironbark, Bulloak, Brigalow, Belah, Smooth-barked Apple and Cypress Pine woodlands (SEWPAC 2013c).	This species was not detected within the Study Area during current or previous surveys, and no records exist within a 10 km radius of the Study Area. This species is typically a more western species. This species is **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.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Scoteanax rueppellii Greater Broad-nosed Bat (V)	Occurs only along the eastern coastal strip of Queensland and NSW, where it is restricted to the coast and adjacent areas of the Great Dividing Range. In NSW, it extends as far south as the Bega Plain. Forages in moister gullies and wet sclerophyll forests as well as in lightly wooded areas and open spaces/ecotones, most commonly found in tall wet forest (Churchill 2009). Open woodland and habitat and dry open forest suits the direct flight of this species as it searches for beetles and other larvae. This species roosts in tree hollows, although has been recorded in buildings.	This species was not detected confidently within the Study Area, however there was a potential call that could represent this species. Suitable habitat occurs within the Study Area, and known records occur in the surrounding area. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Vespadelus troughtoni Eastern Cave Bat (V)	A cave dweller, known from wet sclerophyll forest and tropical woodlands from the coast and Dividing Range to the drier forests of the semi-arid zone. It has been found roosting in small groups in sandstone overhangs, in mine tunnels and occasionally in buildings. In all situations, the roost sites are frequently in reasonably well-lit areas. The distribution of this species is largely to the north of the Hunter Region (Strahan 1995).	This species was not detected confidently within the Study Area, however there was a potential call that could represent this species. Suitable habitat occurs within the Study Area, and known records occur in the surrounding area. Therefore this species **may** occur.	Potential habitat for this species occurs within the Study Area. Therefore, it has the **potential** to be impacted.
Threatened Ecological Communities			
Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion (EEC)	This community occurs in the headwaters of water courses draining the Newnes Plateau. It occurs where low slope gradients and vegetation impede water flow in headwater valleys and is dominated by sedges and shrubs that favour poorly drained sites. The community occurs at higher elevations than Blue Mountains sedge swamps and in the Bell and Clarence area the transition between these communities occurs at approximately 850-950 m. Newnes Plateau Shrub Swamp has a greater dominance of shrubs when compared to Blue Mountains Sedge Swamps.	This community does not occur within the Study Area.	This community is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and therefore **unlikely** to be impacted.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Natural Temperate Grassland of the South Eastern Highlands (CEEC*)	This community is primarily found within the South Eastern Highlands bioregion with some patches occurring in areas immediately adjacent. It occurs in the following LGA Bathurst, Bega Valley, Blayney, Bombala, Boorowa, Cabonne, Cooma-Monaro, Cowra, Eurobodalla, Goulburn Mulwarree, Gundagai, Lithgow, Oberon, Orange, Palerang, Queanbeyan, Shoalhaven, Snowy River, Tumbarumba, Tumut, Upper Lachlan and Yass Valley. Occurs at altitude up to around 1200m in some areas, but as low as 250m in others. It is a naturally treeless or sparsely treed community characterised by a dominance of native perennial tussock grasses, the tallest of which is typically up to 0.1m in height. Dominant species include *Themeda triandra, Poa sieberiana, Poa labillardierei, Austrostipa bigeniculata, Austrostipa scabra* var. *falcata, Bothriochloa macra*, and *Pennisetum alopecuroides*.	This community does not occur within the Study Area.	This community is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and therefore **unlikely** to be impacted.
Temperate Highland Peat Swamps on Sandstone (EEC*)	The Temperate Highland Peat Swamps on Sandstone ecological community comprises temporary or permanent swamps with a substrate of peat over sandstone, and vegetation characterised by the presence of sedges, graminoids (grass-like plants) and forbs (herbaceous non-grass or grass-like plants) with or without shrubs (TSSC 2005). The swamps generally occur at altitudes from around 600 to 1200 m above sea level and are restricted to the South Eastern Highlands and Sydney Basin Interim Biogeographic Regionalisation of Australia (IBRA) (see Environment Australia 2000) regions in New South Wales.	This community does not occur within the Study Area.	This community is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and therefore **unlikely** to be impacted.
Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions (EEC)	Occurs as an open-forest, woodland or open woodland. This community may also occur as a secondary grassland where the trees have been removed, but the groundlayer remains. The main tree species are *Eucalyptus pauciflora* (Snow Gum), *E. rubida* (Candlebark), *E. stellulata* (Back Sallee) and *E. viminalis* (Ribbon Gum), either alone or in various combinations. The trees may occur as pure stands, mixtures of the four species or in mixtures with other trees, including wattles. The community commonly occurs on valley floors, margins of frost hollows and on foot slopes and undulating hills. It occurs between approximately 600 and 1400 m in altitude on a variety of substrates, including basalt, sediments, granite, colluvium and alluvium.	This community has been **recorded** within the Study Area.	A small area of this community occurs within the Study Area. Therefore, it has the **potential** to be impacted.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions (EEC)	Montane Peatlands and Swamps comprises a dense, open or sparse layer of shrubs with soft-leaved sedges, grasses and forbs. It is the only type of wetland that may contain more than trace amounts of *Sphagnum* spp., the hummock peat-forming mosses. Small trees may be present as scattered emergents or absent. The community typically has an open to very sparse layer of shrubs, 1-5 m tall, (eg. *Baeckea gunniana, B. utilis, Callistemon pityoides, Leptospermum juniperinum, L. lanigerum, L. myrtifolium, L. obovatum, L. polygalifolium*). Species of *Epacris* (eg. *E. breviflora, E. microphylla, E. paludosa*) and *Hakea microcarpa* are also common shrubs. In some peatlands and swamps, particularly those with a history of disturbance to vegetation, soils or hydrology, the shrub layer comprises dense thickets of *Leptospermum* species. In other peatlands and swamps with a history of grazing by domestic livestock, the shrub layer may be very sparse or absent. Montane Peatlands typically have a dense groundcover of sedges, grasses and forbs, except where a dense cover of tall shrubs casts deep shade. Soft-leaved species of *Carex* (eg. *C. appressa, C. fascicularis, C. gaudichaudiana*) and *Poa* (eg. *P. costiniana, P. labillardierei*) typically make up most of the groundcover biomass, while other common sedges include *Baloskion* spp., *Baumea rubiginosa, Empodisma minus, Juncus* spp. and *Schoenus apogon*.	This community has been **recorded** within the Study Area. *It should be noted that although this vegetation community can coincide with numerous EPBC Act listed vegetation communities, the floristics and soil substrates do not align with any EPBC Act listed community.	A small area of this community occurs within the Study Area. Therefore, it has the **potential** to be impacted.

Species / Community	Habitat Description	Likelihood of Occurrence	Potential Impact
Tableland Basalt Forest in the Sydney Basin and South Eastern Highland Bioregions (EEC) Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion (EEC*)	Occurs in areas of high rainfall ranging from 950 to 1600 mm/year on igneous rock, in or adjacent to, the Sydney Basin Bioregion. Generally occurs at elevations between 650 and 1050 m above sea level. A tall open forest with a sparse dense layer of shrubs and vines, and a diverse understorey of native grasses, forbs, twiners and ferns (Keith 2004). Dominant eucalypt sp include *E. fastigata* (Brown Barrel), *E. viminalis* (Ribbon Gum) and *E. radiata* subsp. *radiata* (Narrow-leaved Peppermint). *E. oreades* (Blue Mountains Ash) and *E. blaxlandii* (Blaxland's stringybark) are prevalent in the Blue Mountains forms. Common shrub species include *Polyscias sambucifolia* (Elderberry Panax), *Coprosma quadrifida* (Prickly Currant Bush), *Senecio linearifolius* (Fireweed Groundsel) *Daviesia ulicifolia* (Gorse Bitter Pea) and *Leucopogon lanceolatus* (Lance Beard Heath). Vines and Scramblers include *Tylophora barbata* (Bearded Tylophora), *Eustrephus latifolius* (Wombat Berry), *Smilax australis* (Lawyer Vine) and *Clematis* spp. The ground layer generally comprises native grasses, forbs and ferns including *Dichondra repens* (Kidney Weed), *Viola* spp, *Geranium spp*, *Lomandra longifolia* (Spiny-headed Mat-rush), *Dianella* spp, *Blechnum cartilagineum* (Gristle Fern), *Pteridium esculentum* (Bracken) and *Poa* spp.	This community does not occur within the Study Area.	This community is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and therefore **unlikely** to be impacted.
White Box – Yellow-box – Blakely's Red Gum Grassy Woodland and Derived native Grassland (EEC, CEEC*)	This woodland is found on fertile soils on the tablelands and western slopes of NSW. The distribution of the community spreads between NSW North Coast, New England Tableland, Nandewar, Brigalow Belt, South, Sydney Basin, South Eastern Highlands and NSW South Western Slopes Bioregions. The characteristic species for this woodland are *Eucalyptus albens*, *Eucalyptus melliodora* or *Eucalyptus blakelyi*. Grass and herbaceous species generally characterise the ground layer. In some locations canopy species may be entirely absent due to clearing. Shrubs are generally sparse or absent.	This community does not occur within the Study Area.	This community is unlikely to occur within the Study Area or within any habitats that may be directly or indirectly affected and therefore **unlikely** to be impacted.

Notes:
(V) = Vulnerable Species listed under the NSW TSC Act
(E) = Endangered Species listed under the NSW TSC Act
(CE) = Critically Endangered Species listed under the NSW TSC Act
(V*) = Vulnerable Species listed under the Commonwealth EPBC Act
(E*) = Endangered Species listed under the Commonwealth EPBC Act
(CE*) = Critically Endangered Species listed under the Commonwealth EPBC Act

Appendix 2

Flora Species List

Flora Species List

Appendix Key:

*** =** Introduced species

(E) = Species listed under NSW TSC Act 1995 as Endangered.

(V) = Species listed under NSW TSC Act 1995 as Vulnerable.

(V*) = Species listed under the Commonwealth EPBC Act 1999 as Vulnerable

(E*) = Species listed under the Commonwealth EPBC Act 1999 as Endangered

Family	Scientific Name	Common Name
Fabaceae/faboideae/Mimosoideae	*Acacia buxifolia*	Box-leaf Wattle
Fabaceae (Mimosoideae)	*Acacia caesiella*	Tablelands Wattle
Fabaceae (Mimosoideae)	*Acacia dealbata*	Silver Wattle
Fabaceae (Mimosoideae)	*Acacia dorothea*	Dorothy's Wattle
Fabaceae/faboideae/Mimosoideae	*Acacia elongata*	Swamp Wattle
Fabaceae/faboideae/Mimosoideae	*Acacia falcata*	-
Fabaceae (Mimosoideae)	*Acacia longifolia*	
Fabaceae/faboideae/Mimosoideae	*Acacia obtusifolia*	Blunt-leaf Wattle
Fabaceae/faboideae/Mimosoideae	*Acacia terminalis*	Sunshine Wattle
Rosaceae	*Acaena novae-zelandiae*	Biddy Biddy
Rosaceae	*Acaena ovina*	Acaena
Casuarinaceae	*Allocasuarina littoralis*	Black She-oak
Casuarinaceae	*Allocasuarina nana*	Dwarf She-oak
Euphorbiaceae	*Amperea xiphoclada*	
Poaceae	*Aristida ramosa*	Purple Wiregrass
Poaceae	*Aristida vagans*	Three-awn Speargrass
Asteraceae	*Arrhenechthites mixta*	Purple Fireweed
Epacridaceae	*Astroloma humifusum*	Native Cranberry
Poaceae	*Austrostipa pubescens*	Tall Speargrass
Poaceae	*Austrostipa scabra*	Speargrass
Proteaceae	*Banksia spinulosa* var. *collina*	Hairpin Banksia
Pittosporaceae	*Billardiera scandens*	Hairy Appleberry
Rutaceae	*Boronia microphylla*	Small-leaved Boronia
Asteraceae	*Brachyscome* spp.	
Poaceae	*Briza minor**	Shivery Grass
Anthericaceae	***Caesia parviflora* var. *minor***	**Small Pale Grass Lily (E)**
Myrtaceae	*Calytrix tetragona*	Common Fringe-Myrtle
Asteraceae	*Cassinia aculeata*	Dolly Bush
Asteraceae	*Cassinia arcuata*	Sifton Bush

Family	Scientific Name	Common Name
Cyperaceae	*Caustis flexuosa*	Curly Wig
Adiantaceae	*Cheilanthes sieberi*	Rock Fern
Asteraceae	*Cirsium vulgare**	Spear Thistle
Polygalaceae	*Comesperma ericinum*	Pyramid Flower
Asteraceae	*Conyza* spp.*	A Fleabane
Asteraceae	*Conyza sumatrensis**	Tall Fleabane
Asteraceae	*Coronidium scorpioides*	Button Everlasting
Poaceae	*Cynodon dactylon*	Common Couch
Cyperaceae	*Cyperus* spp.	
Goodeniaceae	*Dampiera stricta*	Blue Dampiera
Fabaceae/faboideae	*Daviesia latifolia*	-
Fabaceae/faboideae	*Daviesia squarrosa*	-
Phormiaceae	*Dianella caerulea*	Blue Flax-lily
Phormiaceae	*Dianella revoluta*	Blueberry Lily
Phormiaceae	*Dianella* spp.	
Poaceae	*Dichelachne micrantha*	Short-hair Plume Grass
Fabaceae - Faboideae	*Dillwynia* sp. *trichopoda* (Maiden & Boorman s.n. NSW 40290)	
Sapindaceae	*Dodonaea multijuga*	
Poaceae	*Echinopogon caespitosus*	Bushy Hedgehog-grass
Poaceae	*Eleusine tristachya**	Goose Grass
Poaceae	*Entolasia stricta*	Wiry Panic
Ericaceae	*Epacris reclinata*	Fuchsia Heath
Ericaceae	*Epacris rigida*	
Poaceae	*Eragrostis curvula**	African Lovegrass
Poaceae	*Eragrostis leptostachya*	Paddock Lovegrass
Poaceae	*Eragrostis tenuifolia**	Elastic Grass
Myrtaceae	***Eucalyptus aggregata***	**Black Gum (V, V*)**
Myrtaceae	*Eucalyptus blaxlandii*	Blaxland's Stringybark
Myrtaceae	***Eucalyptus cannonii***	**Capertee Stringybark, Cannons Stringybark (V)**
Myrtaceae	*Eucalyptus dalrympleana*	Mountain Gum
Myrtaceae	*Eucalyptus dives*	Broad-leaved Peppermint
Myrtaceae	*Eucalyptus mannifera*	Brittle Gum
Myrtaceae	*Eucalyptus oreades*	Blue Mountains Ash
Myrtaceae	*Eucalyptus pauciflora*	Snow Gum
Myrtaceae	*Eucalyptus piperita*	Sydney Peppermint
Myrtaceae	*Eucalyptus radiata*	Narrow-leaved Peppermint
Myrtaceae	*Eucalyptus rossii*	Scribbly Gum, Inland Scribbly Gum
Myrtaceae	*Eucalyptus sclerophylla*	Scribbly Gum
Myrtaceae	*Eucalyptus sieberi*	Silvertop Ash
Myrtaceae	*Eucalyptus viminalis*	Ribbon Gum
Asteraceae	*Euchiton sphaericus*	-

Family	Scientific Name	Common Name
Asteraceae	*Euchiton* spp.	A Cudweed
Cunoniaceae	*Eucryphia* spp.	
Santalaceae	*Exocarpos cupressiformis*	Native Cherry
Cyperaceae	*Gahnia aspera*	Saw Sedge
Rubiaceae	*Galium proquinquum*	Bedstraw
Geraniaceae	*Geranium homeanum*	Northern Cranesbill
Fabaceae (Faboideae)	*Gompholobium* spp.	
Haloragaceae	*Gonocarpus tetragynus*	Poverty Raspwort
Haloragaceae	*Gonocarpus teucroides*	Raspwort
Goodeniaceae	*Goodenia bellidifolia*	Daisy-leaved Goodenia
Proteaceae	*Grevillea laurifolia*	Laurel-leaf Grevillea
Proteaceae	*Hakea dactyloides*	Broad-leaved Hakea
Fabaceae/faboideae	*Hardenbergia violacea*	False Sarsparilla
Dilleniaceae	*Hibbertia obtusifolia*	Grey Guinea Flower
Poaceae	*Holcus lanatus**	Yorkshire Fog
Fabaceae (Faboideae)	*Hovea heterophylla*	
Fabaceae/faboideae	*Hovea linearis*	-
Apiaceae	*Hydrocotyle laxiflora*	Stinking Pennywort
Clusiaceae	*Hypericum gramineum*	Small St Johns Wort
Clusiaceae	*Hypericum perforatum**	St Johns Wort
Asteraceae	*Hypochaeris radicata**	Flatweed
Proteaceae	*Isopogon anemonifolius*	Flat-leaved Drumsticks
Poaceae	*Joycea pallida*	Silvertop Wallaby Grass
Juncaceae	*Juncus* sp.	-
Cyperaceae	*Lepidosperma laterale*	Variable Sword-sedge
Cyperaceae	*Lepidosperma* spp.	
Cyperaceae	*Lepidosperma viscidum*	-
Santalaceae	*Leptomeria acida*	Native Currant
Myrtaceae	*Leptospermum arachnoides*	-
Myrtaceae	*Leptospermum continentale*	Prickly Tea-tree
Myrtaceae	*Leptospermum parvifolium*	Small-leaved Tea-tree
Myrtaceae	*Leptospermum polygalifolium*	Tantoon
Epacridaceae	*Leucopogon lanceolatus*	Lance-leaf Beard-heath
Epacridaceae	*Leucopogon muticus*	Blunt Beard-heath
Ericaceae	*Leucopogon* spp.	A Beard-heath
Epacridaceae	*Lissanthe strigosa*	Peach Heath
Lomandraceae	*Lomandra confertifolia*	Mat-rush
Lomandraceae	*Lomandra filiformis*	Wattle Matt-rush
Lomandraceae	*Lomandra glauca*	Pale Mat-rush
Lomandraceae	*Lomandra longifolia*	Spiky-headed Mat-rush
Lomandraceae	*Lomandra multiflora* subsp. *multiflora*	Many-flowered Mat-rush
Proteaceae	*Lomatia silaifolia*	Crinkle Bush

Family	Scientific Name	Common Name
Malvaceae	*Malva parviflora**	Small-flowered Mallow
Celastraceae	*Maytenus silvestris*	Orange Bush
Poaceae	*Microlaena stipoides*	Weeping Grass
Fabaceae/faboideae	*Mirbelia platylobioides*	-
Epacridaceae	*Monotoca elliptica*	Tree Broom-heath
Epacridaceae	*Monotoca scoparia*	Prickly Broom-heath
Onagraceae	*Oenothera biennis**	Evening Primrose
Asteraceae	*Olearia myrsinoides*	Blush Daisy Bush
Rubiaceae	*Opercularia diphylla*	-
Oxalidaceae	*Oxalis perrenans*	Yellow-flowered Wood Sorrel
Poaceae	*Panicum effusum*	Hairy Panic
Poaceae	*Paspalum dilatatum**	Paspalum
Iridaceae	*Patersonia sericea*	Wild Iris
Iridaceae	*Patersonia* sp.	-
Poaceae	*Pennisetum clandestinum**	Kikuyu, Kikuyu Grass
Polygonaceae	*Persicaria decipiens*	Slender Knotweed
Proteaceae	***Persoonia hindii***	**(E)**
Proteaceae	*Persoonia lanceolata*	Lance-leaved Geebung
Proteaceae	*Persoonia laurina*	Laurel Geebung
Proteaceae	*Persoonia levis*	Broad-leaved Geebung
Proteaceae	*Persoonia myrtilloides*	-
Proteaceae	*Persoonia* spp.	-
Proteaceae	*Petrophile pulchella*	Conesticks
Poaceae	*Phalaris aquatica**	Phalaris
Fabaceae/faboideae/Faboideae	*Phyllota squarrosa*	Dense Phyllota
Plantaginaceae	*Plantago lanceolata**	Ribwort
Apiaceae	*Platysace lanceolata*	Lance-leaf Platysace
Apiaceae	*Platysace linearifolia*	Narrow-leafed Platysace
Apiaceae	*Platysace spp.*	-
Poaceae	*Poa labillardierei* var. *labillardierei*	Tussock Grass
Poaceae	*Poa seiberiana*	Tussock Grass
Poaceae	*Poa seiberiana* var. *cyanophylla*	-
Fabaceae/faboideae	*Podolobium ilicifolium*	Prickly Shaggy Pea
Rhamnaceae	*Pomaderris ledifolia*	Sydney Pomaderris
Rubiaceae	*Pomax umbellata*	Pomax
Euphorbiaceae	*Poranthera microphylla*	Small Poranthera
Dennstaedtiaceae	*Pteridium esculentum*	Bracken
Fabaceae/faboideae	*Pultenaea microphylla*	-
Rosaceae	*Rubus fruticosus* sp. *agg.**	Blackberry complex
Polygonaceae	*Rumex brownii*	Swamp Dock
Poaceae	*Rytidosperma pallidum*	-

Family	Scientific Name	Common Name
Poaceae	*Rytidosperma tenuius*	-
Asteraceae	*Senecio madagascariensis**	Fireweed
Asteraceae	*Senecio quadridentatus*	Cotton Fireweed
Brassicaceae	*Sisymbrium officinale**	Hedge Mustard
Orchidaceae	*Spiranthes sinensis*	Austral Ladies Tresses
Caryophyllaceae	*Stellaria pungens*	Prickly Starwort
Epacridaceae	*Stypandra glauca*	Nodding Blue Lily
Asteraceae	*Taraxacum officinale**	Dandelion
Poaceae	*Themeda triandra*	Kangaroo Grass
Anthericaceae	*Thysanotus juncifolius*	-
Verbenaceae	*Verbena bonariensis**	Purpletop
Scrophulariaceae	***Veronica blakelyi***	**(V)**
Scrophulariaceae	*Veronica calycina*	Hairy Speedwell
Plantaginaceae	*Veronica perfoliata*	-
Scrophulariaceae	*Veronica plebeia*	Creeping Speedwell
Violaceae	*Viola betonicifolia*	Native Violet
Violaceae	*Viola hederacea*	Ivy-leaved Violet
Asteraceae	*Vittadinia cuneata*	A Fuzzweed
Campanulaceae	*Wahlenbergia luteola*	Bluebell
Campanulaceae	*Wahlenbergia* spp.	Bluebell
Campanulaceae	*Wahlenbergia stricta* subsp. *stricta*	Austral Bluebell

Appendix 3

Fauna Species List

Below is a list of fauna species that were recorded within the Study Area during RPS surveys. Family sequencing and taxonomy follow for each fauna class:

- Birds – Simpson and Day (2010);
- Herpetofauna – Wilson and Swan (2011); and
- Strahan (ed) (2009).

Appendix Key:

*** =** Introduced species

(E) = Species listed under NSW TSC Act 1995 as Endangered.

(V) = Species listed under NSW TSC Act 1995 as Vulnerable.

(V*) = Species listed under the Commonwealth EPBC Act 1999 as Vulnerable

(E*) = Species listed under the Commonwealth EPBC Act 1999 as Endangered

(M*) = Species listed under the Commonwealth EPBC Act 1999 as Migratory

(C) = Species listed under CAMBA

(J) = Species listed under JAMBA

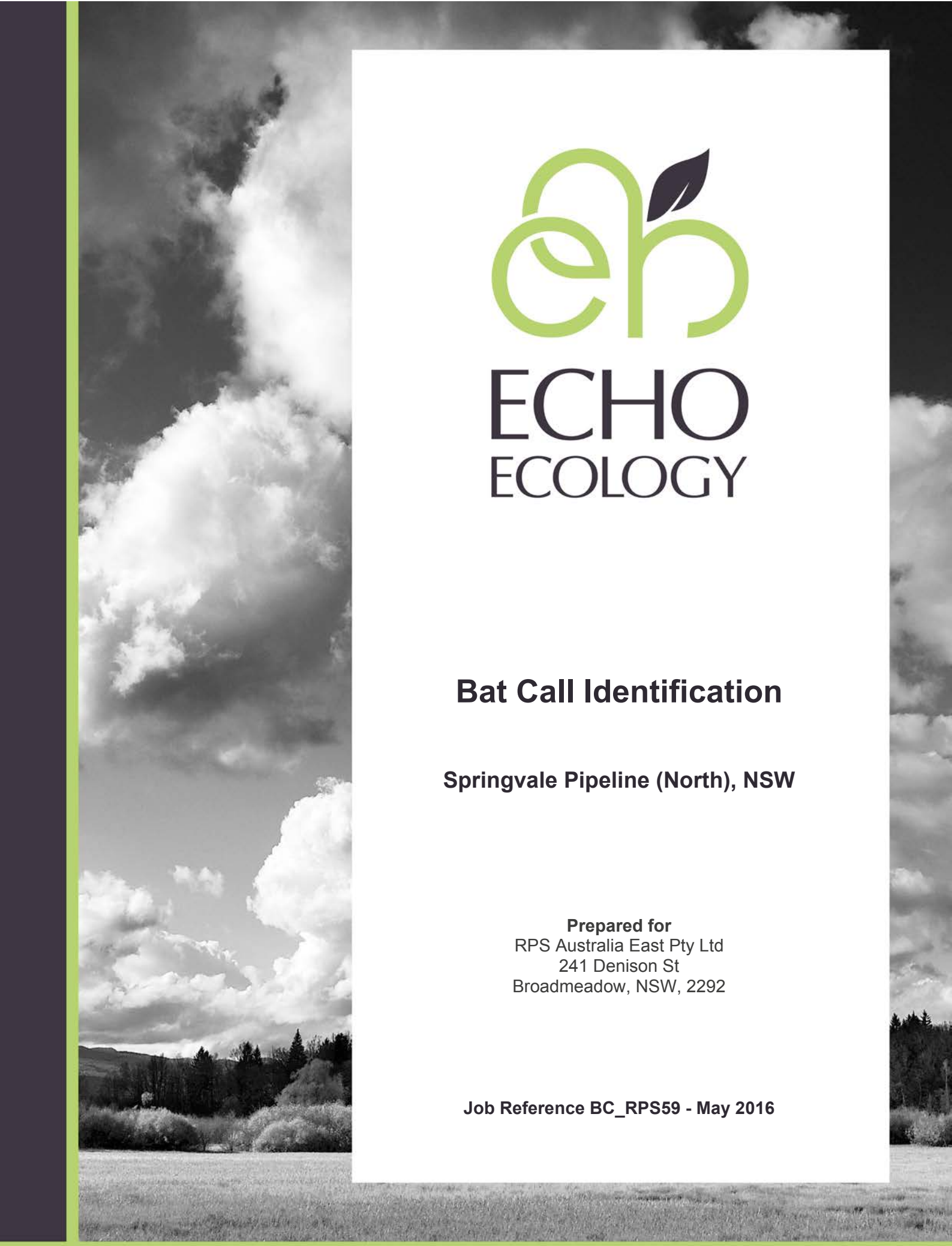
Family	Scientific Name	Common Name
Birds		
Columbidae	*Leucosarcia picata*	Wonga Pigeon
Podargidae	*Podargus strigoides*	Tawny Frogmouth
Accipitridae	***Hieraaetus morphnoides***	**Little Eagle (V)**
	Milvus migrans	Black Kite
Falconidae	*Falco berigora*	Brown Falcon
Rallidae	*Porphyrio porphyrio*	Purple Swamphen
Cacatuidae	*Cacatua sanguinea*	Little Corella
	Callocephalon fimbriatum	**Gang-gang Cockatoo (V)**
	Calyptorhynchus funereus	Yellow-tailed Black-Cockatoo
	Calyptorhynchus lathami	**Glossy Black-Cockatoo (V)**
Psittacidae	***Glossopsitta pusilla***	**Little Lorikeet (V)**
	Platycercus elegans	Crimson Rosella
	Platycercus eximius	Eastern Rosella
Cuculidae	*Cacomantis flabelliformis*	Fan-tailed Cuckoo
	Scythrops novaehollandiae	Channel-billed Cuckoo
Strigidae	*Ninox novaeseelandiae*	Southern Boobook
	Ninox strenua	**Powerful Owl (V)**
Alcedinidae	*Dacelo novaeguineae*	Laughing Kookaburra
	Todiramphus sanctus	Sacred Kingfisher
Meropidae	*Merops ornatus*	Rainbow Bee-eater
Menuridae	*Menura novaehollandiae*	Superb Lyrebird
Climacteridae	*Climacteris affinis*	White-browed Treecreeper
	Climacteris erythrops	Red-browed Treecreeper

	Climacteris picumnus victoriae	**Brown Treecreeper (eastern subspecies) (V)**
	Cormobates leucophaea	White-throated Treecreeper
Ptilonorhynchidae	*Ptilonorhynchus violaceus*	Satin Bowerbird
Maluridae	*Malurus cyaneus*	Superb Fairy-wren
Acanthizidae	*Acanthiza lineata*	Striated Thornbill
	Acanthiza pusilla	Brown Thornbill
	Acanthiza reguloides	Buff-rumped Thornbill
	Chthonicola sagittata	**Speckled Warbler (V)**
	Sericornis frontalis	White-browed Scrubwren
	Smicrornis brevirostris	Weebill
Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote
	Pardalotus striatus	Striated Pardalote
Meliphagidae	*Acanthorhynchus tenuirostris*	Eastern Spinebill
	Anthochaera carunculata	Red Wattlebird
	Lichenostomus chrysops	Yellow-faced Honeyeater
	Lichenostomus leucotis	White-eared Honeyeater
	Manorina melanophrys	Bell Miner
	Meliphaga lewinii	Lewin's Honeyeater
	Philemon corniculatus	Noisy Friarbird
	Phylidonyris novaehollandiae	New Holland Honeyeater
Psophodidae	*Psophodes olivaceus*	Eastern Whipbird
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush
	Falcunculus frontatus frontatus	Eastern Shrike-tit
	Pachycephala pectoralis	Golden Whistler
	Pachycephala rufiventris	Rufous Whistler
Artamidae	*Cracticus nigrogularis*	Pied Butcherbird
	Cracticus tibicen	Australian Magpie
	Strepera graculina	Pied Currawong
	Strepera versicolor	Grey Currawong
Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail
	Rhipidura leucophrys	Willie Wagtail
	Rhipidura rufifrons	Rufous Fantail
Corvidae	*Corvus bennetti*	Little Crow
	Corvus coronoides	Australian Raven
Monarchidae	*Grallina cyanoleuca*	Magpie-lark
	Myiagra inquieta	Restless Flycatcher
Corcoracidae	*Corcorax melanorhamphos*	White-winged Chough
Petroicidae	*Eopsaltria australis*	Eastern Yellow Robin
	Microeca fascinans	Jacky Winter
	Petroica boodang	Scarlet Robin
	Petroica rosea	Rose Robin
Alaudidae	*Alauda arvensis**	Eurasian Skylark
Timaliidae	*Zosterops lateralis*	Silvereye

Hirundinidae	*Hirundo neoxena*	Welcome Swallow
Sturnidae	*Sturnus vulgaris**	Common Starling
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird
Estrildidae	*Neochmia temporalis*	Red-browed Finch
Mammals		
Dasyuridae	*Antechinus stuartii*	Brown Antechinus
	Sminthopsis murina	Common Dunnart
Vombatidae	*Vombatus ursinus*	Common Wombat
Petauridae	*Petaurus breviceps*	Sugar Glider
Pseudocheiridae	***Petauroides volans***	**Greater Glider (V*)**
	Pseudocheirus peregrinus	Common Ringtail Possum
Phalangeridae	*Trichosurus vulpecula*	Common Brushtail Possum
Macropodidae	*Macropus giganteus*	Eastern Grey Kangaroo
	Macropus rufogriseus	Red-necked Wallaby
	Wallabia bicolor	Swamp Wallaby
Rhinolophidae	*Rhinolophus megaphyllus*	Eastern Horseshoe-bat
Emballonuridae	***Saccolaimus flaviventris***	**Yellow-bellied Sheathtail-bat (V)**
Molossidae	*Tadarida australis*	White-striped Freetail-bat
Vespertilionidae	***Chalinolobus dwyeri***	**Large-eared Pied Bat (V, V*)**
	Chalinolobus gouldii	Gould's Wattled Bat
	Chalinolobus morio	Chocolate Wattled Bat
	Nyctophilus sp.	Long-eared bat
	Vespadelus darlingtoni	Large Forest Bat
Muridae	*Rattus fuscipes*	Bush Rat
	Rattus lutreolus	Swamp Rat
Canidae	*Canis lupus familiaris**	Dog
	*Vulpes vulpes**	Fox
Leporidae	*Oryctolagus cuniculus**	Rabbit
Amphibians		
Myobatrachidae	*Crinia signifera*	Common Eastern Froglet
Hylidae	*Litoria peronii*	Peron's Tree Frog
Reptiles		
Scincidae	*Liopholis whitii*	White's Skink
	Lampropholis delicata	Dark-flecked Garden Sunskink
Elapidae	*Pseudechis porphyriacus*	Red-bellied Black Snake

Appendix 4

Anabat Analysis



ECHO ECOLOGY

Bat Call Identification

Springvale Pipeline (North), NSW

Prepared for
RPS Australia East Pty Ltd
241 Denison St
Broadmeadow, NSW, 2292

Job Reference BC_RPS59 - May 2016

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This report has been prepared to document the analysis of digital ultrasonic bat echolocation calls received from a third party. The data was not collected by the author and as such no responsibility is taken for the quality of data collection or for the suitability of its subsequent use.

This report was authored by

Dr Anna McConville
PhD, B.Env.Sc.

Contents

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1.0 INTRODUCTION

This report has been commissioned by RPS Australia East Pty Ltd to analyse bat echolocation call data (Anabat, Titley Electronics) collected from Springvale, NSW. Data was provided electronically to the author. This report documents the methods involved in analysing bat call data and the results obtained only.

2.0 METHODS

The identification of bat echolocation calls recorded during surveys was undertaken using AnalookW (Version 4.1z) software. The identification of calls was undertaken with reference to Pennay *et al*. (2004) and through the comparison of recorded reference calls from the Sydney Basin. Reference calls were obtained from the NSW database and from the authors personal collection.

Each call sequence ('pass') was assigned to one of five categories, according to the confidence with which an identification could be made, being:

- Definite - Pass identified to species level and could not be confused with another species
- Probable - Pass identified to species level and there is a low chance of confusion with another species
- Possible - Pass identified to species level but short duration or poor quality of the pass increases the chance of confusion with another species
- Species group - Pass could not be identified to species level and could belong to one of two or more species. Occurs more frequently when passes are short or of poor quality
- Unknown - Either background 'noise' files or passes by bats which are too short and/or of poor quality to confidently identify.

Call sequences that were less than three pulses in length were not analysed and were assigned to 'Unknown' and only search phase calls were analysed. Furthermore, some species are difficult to differentiate using bat call analysis due to overlapping call frequencies and similar shape of plotted calls and in these cases calls were assigned to species groups.

The total number of passes (call sequences) per unit per night was tallied to give an index of activity.

It should be noted that the activity levels recorded at different sites may not be readily able to be compared. Such comparisons are dependent on many variables which need to be carefully controlled during data collection and statistically analysed. Influential variables include wind, rain, temperature, duration of recording, season, detector and microphone sensitivity, detector placement, weather protection devices etc.

2.1 Characteristics Used to Differentiate Species

Miniopterus schreibersii oceanensis was differentiated by *Vespadelus* sp. by a combination of uneven consecutive pulses and the presence of a down-sweeping tail. Long, high quality call sequences with regularly-spaced consecutive pulses, few down-sweeping tails and higher or lower characteristic frequencies were assigned to *Vespadelus darlingtoni* or *Vespadelus regulus*.

Chalinolobus gouldii was differentiated from other species by the presence of curved, alternating call pulses.

Scotorepens orion, *Scoteanax rueppellii* and *Falsistrellus tasmaniensis* were unable to be differentiated from one another.

Nyctophilus sp. calls were identified from *Myotis macropus* by pulse intervals > 95 ms and an initial slope of < 300 OPS. *Nyctophilus geoffroyi* and *Nyctophilus gouldi* were unable to be differentiated.

Chalinolobus morio calls were differentiated from those of *Vespadelus* sp. by the presence of a down-sweeping tail on the majority of pulses.

Chalinolobus dwyeri, *Rhinolophus megaphyllus*, *Saccolaimus flaviventris* and *Tadarida australis* were differentiated from other bat species on the basis of characteristic frequency.

3.0 RESULTS

A total of 763 call sequences were recorded, of which 612 call sequences were able to be analysed (ie were not 'noise' files or bat calls of short length). Of the bat calls, 419 call sequences (69 %) were able to be confidently identified (those classified as either definite or probable identifications) to species level (Table 3-1). Species recorded confidently within the site include:

- *Chalinolobus dwyeri* (Large-eared pied bat)

- *Chalinolobus gouldii* (Gould's wattled bat)
- *Chalinolobus morio* (Chocolate wattled bat)
- *Nyctophilus* species (*Nyctophilus gouldi* or *Nyctophilus geoffroyi*)
- *Rhinolophus megaphyllus* (Eastern horseshoe bat)
- *Saccolaimus flaviventris* (Yellow-bellied sheathtail bat)
- *Tadarida australis* (White-striped free-tailed bat)
- *Vespadelus darlingtoni* (Large forest bat)

Additionally, the following bat species potentially occurred within the site, but could not be confidently identified (those calls classified as possible or as a species group):

- *Falsistrellus tasmaniensis* (Eastern falsistrelle)
- *Miniopterus schreibersii oceanensis* (Eastern bentwing bat)
- *Mormopterus (Ozimops) ridei* (Eastern free-tailed bat)
- *Scoteanax rueppellii* (Greater broad-nosed bat)
- *Scotorepens orion* (Eastern broad-nosed bat)
- *Vespadelus regulus* (Southern forest bat)
- *Vespadelus vulturnus* (Little forest bat)

It should be noted that additional bat species may be present within the site but were not recorded by the detectors and habitat assessment should be used in conjunction with these results to determine the likelihood of occurrence of other bat species.

Table 3-1 below summarises the results of the bat call analysis.

Table 3-1: Results of bat call analysis (number of passes per site per night)

IDENTIFICATION	Anabat EXP1 2/05/2016	Anabat EXP1 3/05/2016	Anabat EXP1 4/05/2016	Anabat EXP1 5/05/2016	Anabat EXP2 2/05/2016	Anabat EXP2 3/05/2016	Anabat EXP2 4/05/2016	Anabat EXP2 5/05/2016	SD2 - MU8 2/05/2016	SD2 - MU8 3/05/2016
DEFINITE										
Chalinolobus dwyeri	-	-	-	-	-	1	1	1	-	-
Chalinolobus gouldii	-	6	-	-	2	50	-	2	-	-
Chalinolobus morio	-	1	-	-	4	33	3	4	-	-
Rhinolophus megaphyllus	1	2	1	-	1	-	-	1	1	-
Saccolaimus flaviventris	-	3	3	4	-	-	-	-	-	-
Tadarida australis	12	13	20	14	-	-	5	1	-	-
Vespadelus darlingtoni	1	-	-	-	16	12	31	28	-	-
PROBABLE										
Chalinolobus gouldii	-	50	1	-	2	34	1	5	-	2
Chalinolobus morio	-	2	-	-	4	9	1	-	-	-
Rhinolophus megaphyllus	-	-	-	1	-	-	-	-	-	-
Saccolaimus flaviventris	-	5	-	2	-	-	-	1	-	-

IDENTIFICATION	Anabat EXP1 2/05/2016	Anabat EXP1 3/05/2016	Anabat EXP1 4/05/2016	Anabat EXP1 5/05/2016	Anabat EXP2 2/05/2016	Anabat EXP2 3/05/2016	Anabat EXP2 4/05/2016	Anabat EXP2 5/05/2016	SD2 - MU8 2/05/2016	SD2 - MU8 3/05/2016
Tadarida australis	-	3	2	-	-	-	-	-	-	-
Vespadelus darlingtoni	-	-	3	-	2	2	8	1	-	-
POSSIBLE										
Chalinolobus morio	-	1	-	-	-	-	-	-	-	-
Tadarida australis	-	1	-	-	-	-	-	-	-	-
SPECIES GROUPS										
Chalinolobus gouldii / Mormopterus (Ozimops) ridei	1	9	1	1	-	5	4	3	1	3
Chalinolobus gouldii / Scoteanax rueppellii	1	2	-	-	-	-	-	-	-	-
Chalinolobus morio / Vespadelus vulturnus	-	1	-	-	-	1	5	3	-	2
Falsistrellus tasmaniensis / Scotorepens orion	-	1	-	-	1	65	2	-	-	-
Miniopterus schreibersii oceanensis / Vespadelus regulus	-	13	-	1	9	12	4	5	7	3
Miniopterus schreibersii oceanensis / Vespadelus vulturnus	-	-	-	-	-	-	3	-	-	-
Nyctophilus geoffroyi / Nyctophilus gouldi	-	-	-	-	1	-	-	-	-	-
Vespadelus darlingtoni / Vespadelus regulus	1	-	11	2	2	2	1	1	-	1

IDENTIFICATION	Anabat EXP1 2/05/2016	Anabat EXP1 3/05/2016	Anabat EXP1 4/05/2016	Anabat EXP1 5/05/2016	Anabat EXP2 2/05/2016	Anabat EXP2 3/05/2016	Anabat EXP2 4/05/2016	Anabat EXP2 5/05/2016	SD2 - MU8 2/05/2016	SD2 - MU8 3/05/2016
UNKNOWN										
'Noise' files	14	2	-	4	7	4	-	2	34	5
Unknown	10	40	7	11	19	29	8	14	3	6
TOTAL	**41**	**155**	**49**	**40**	**70**	**259**	**77**	**72**	**46**	**22**

4.0 SAMPLE CALLS

A sample of the calls actually identified from the site for each species is given below.

Figure 4-1: *Chalinolobus dwyeri* definite call

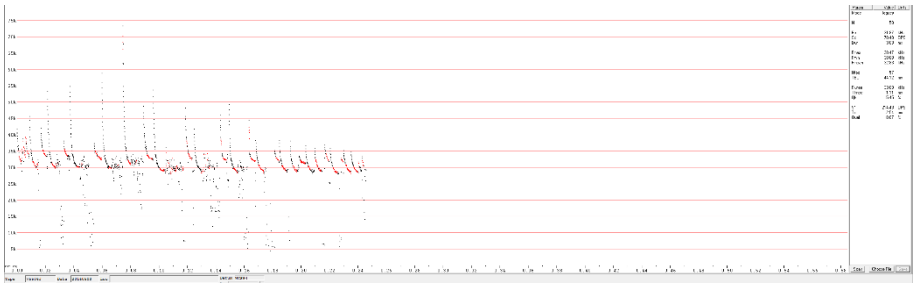

Figure 4-2: *Chalinolobus gouldii* definite call

Figure 4-3: *Chalinolobus morio* definite call

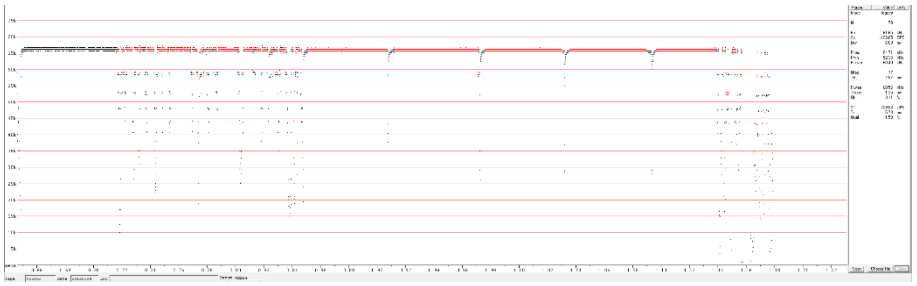

Figure 4-4: *Rhinolophus megaphyllus* definite call

Figure 4-5: *Saccolaimus flaviventris* definite call

Figure 4-6: *Tadarida australis* definite call

Figure 4-7: *Vespadelus darlingtoni* definite call

5.0 REFERENCES

Adams, M., Reardon, T.R., Baverstock, P.R. and Watts, C.H.S. (1988). Electrophoretic resolution of species boundaries in Australian Microchiroptera. IV. The Molossidae (Chiroptera). *Australian Journal of Biological Sciences* 41: 315-326.

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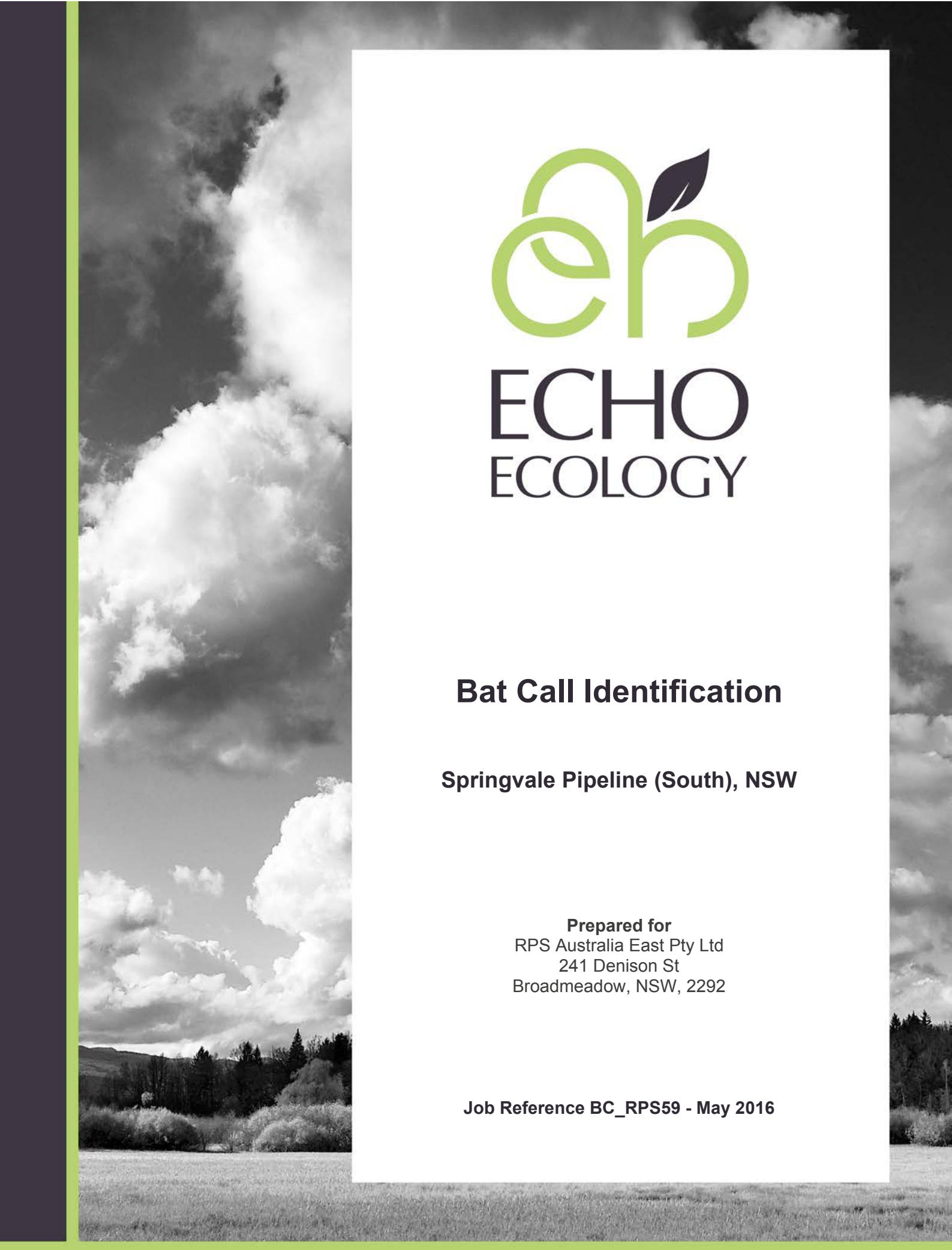

ECHO ECOLOGY

Bat Call Identification

Springvale Pipeline (South), NSW

Prepared for
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241 Denison St
Broadmeadow, NSW, 2292

Job Reference BC_RPS59 - May 2016

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Each call sequence ('pass') was assigned to one of five categories, according to the confidence with which an identification could be made, being:

- Definite - Pass identified to species level and could not be confused with another species
- Probable - Pass identified to species level and there is a low chance of confusion with another species
- Possible - Pass identified to species level but short duration or poor quality of the pass increases the chance of confusion with another species
- Species group - Pass could not be identified to species level and could belong to one of two or more species. Occurs more frequently when passes are short or of poor quality
- Unknown - Either background 'noise' files or passes by bats which are too short and/or of poor quality to confidently identify.

Call sequences that were less than three pulses in length were not analysed and were assigned to 'Unknown' and only search phase calls were analysed. Furthermore, some species are difficult to differentiate using bat call analysis due to overlapping call frequencies and similar shape of plotted calls and in these cases calls were assigned to species groups.

The total number of passes (call sequences) per unit per night was tallied to give an index of activity.

It should be noted that the activity levels recorded at different sites may not be readily able to be compared. Such comparisons are dependent on many variables which need to be carefully controlled during data collection and statistically analysed. Influential variables include wind, rain, temperature, duration of recording, season, detector and microphone sensitivity, detector placement, weather protection devices etc.

2.1 Characteristics Used to Differentiate Species

Miniopterus schreibersii oceanensis was differentiated by *Vespadelus* sp. by a combination of uneven consecutive pulses and the presence of a down-sweeping tail. Long, high quality call sequences with regularly-spaced consecutive pulses, few down-sweeping tails and higher or lower characteristic frequencies were assigned to *Vespadelus darlingtoni* or *Vespadelus regulus*.

Chalinolobus gouldii was differentiated from other species by the presence of curved, alternating call pulses.

Scotorepens orion, *Scoteanax rueppellii* and *Falsistrellus tasmaniensis* were unable to be differentiated from one another.

Nyctophilus sp. calls were identified from *Myotis macropus* by pulse intervals > 95 ms and an initial slope of < 300 OPS. *Nyctophilus geoffroyi* and *Nyctophilus gouldi* were unable to be differentiated.

Chalinolobus morio calls were differentiated from those of *Vespadelus* sp. by the presence of a down-sweeping tail on the majority of pulses.

Chalinolobus dwyeri, *Rhinolophus megaphyllus*, *Saccolaimus flaviventris* and *Tadarida australis* were differentiated from other bat species on the basis of characteristic frequency.

3.0 RESULTS

A total of 1,031 call sequences were recorded, of which 364 call sequences were able to be analysed (ie were not 'noise' files or bat calls of short length). Of the bat calls, 197 call sequences (54 %) were able to be confidently identified (those classified as either definite or probable identifications) to species level (Table 3-1). Species recorded confidently within the site include:

- *Chalinolobus dwyeri* (Large-eared pied bat)

- *Chalinolobus gouldii* (Gould's wattled bat)
- *Chalinolobus morio* (Chocolate wattled bat)
- *Nyctophilus* species (*Nyctophilus gouldi* or *Nyctophilus geoffroyi*)
- *Rhinolophus megaphyllus* (Eastern horseshoe bat)
- *Tadarida australis* (White-striped free-tailed bat)
- *Vespadelus darlingtoni* (Large forest bat)

Additionally, the following bat species potentially occurred within the site, but could not be confidently identified (those calls classified as possible or as a species group):

- *Falsistrellus tasmaniensis* (Eastern falsistrelle)
- *Miniopterus schreibersii oceanensis* (Eastern bentwing bat)
- *Mormopterus (Ozimops) ridei* (Eastern free-tailed bat)
- *Scoteanax rueppellii* (Greater broad-nosed bat)
- *Scotorepens orion* (Eastern broad-nosed bat)
- *Vespadelus regulus* (Southern forest bat)
- *Vespadelus vulturnus* (Little forest bat)

It should be noted that additional bat species may be present within the site but were not recorded by the detectors and habitat assessment should be used in conjunction with these results to determine the likelihood of occurrence of other bat species.

Table 3-1 below summarises the results of the bat call analysis.

Table 3-1: Results of bat call analysis (number of passes per site per night)

IDENTIFICATION	Anabat Express 1 18/04/2016	Anabat Express 1 20/04/2016	Anabat Express 1 21/04/2016	Anabat Express 2 18/04/2016	Anabat Express 2 19/04/2016	Anabat Express 2 20/04/2016	Anabat Express 2 21/04/2016
DEFINITE							
Chalinolobus dwyeri	-	-	1	-	-	-	-
Chalinolobus gouldii	-	-	8	1	1	19	19
Chalinolobus morio	-	1	-	-	3	1	1
Rhinolophus megaphyllus	-	-	-	1	1	4	4
Tadarida australis	-	2	1	3	-	1	-
Vespadelus darlingtoni	1	1	5	5	21	7	9
PROBABLE							
Chalinolobus gouldii	1	16	13	3	1	10	11
Tadarida australis	-	-	-	-	1	-	-
Vespadelus darlingtoni	-	1	-	3	5	4	7
POSSIBLE							
Chalinolobus dwyeri	-	1	-	-	-	-	-
Scoteanax rueppellii	-	-	1	-	-	-	-
SPECIES GROUPS							
Chalinolobus gouldii / Mormopterus (Ozimops) ridei	-	36	6	1	-	2	-
Chalinolobus gouldii / Scoteanax rueppellii	-	3	-	-	-	-	-
Chalinolobus morio / Vespadelus vulturnus	-	-	-	-	2	-	-
Falsistrellus tasmaniensis / Scotorepens orion	-	-	-	12	1	-	-
Falsistrellus tasmaniensis / Scotorepens orion / Scoteanax rueppellii	-	-	-	-	-	2	2
Miniopterus schreibersii oceanensis / Vespadelus regulus	-	1	1	2	9	4	6

IDENTIFICATION	Anabat Express 1 18/04/2016	Anabat Express 1 20/04/2016	Anabat Express 1 21/04/2016	Anabat Express 2 18/04/2016	Anabat Express 2 19/04/2016	Anabat Express 2 20/04/2016	Anabat Express 2 21/04/2016
Nyctophilus geoffroyi / Nyctophilus gouldi	-	-	-	1	-	-	-
Vespadelus darlingtoni / Vespadelus regulus	3	3	6	35	4	5	18
UNKNOWN							
'Noise' files	13	12	-	512	72	8	1
Unknown	1	8	9	7	6	7	11
TOTAL	**19**	**85**	**51**	**586**	**127**	**74**	**89**

4.0 SAMPLE CALLS

A sample of the calls actually identified from the site for each species is given below.

Figure 4-1: *Chalinolobus dwyeri* definite call

Figure 4-2: *Chalinolobus gouldii* definite call

Figure 4-3: *Chalinolobus morio* definite call

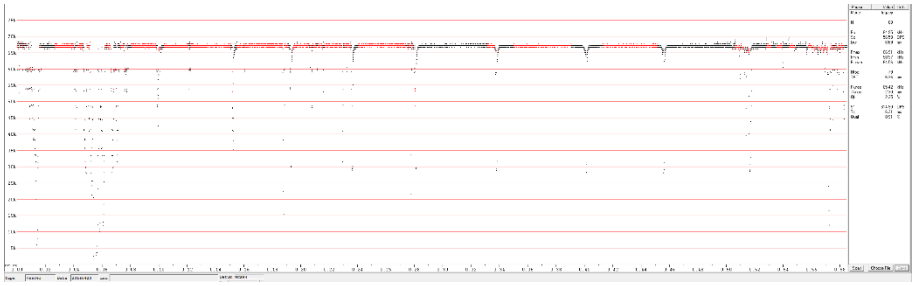

Figure 4-4: *Rhinolophus megaphyllus* definite call

Figure 4-5: *Tadarida australis* definite call

Figure 4-6: *Vespadelus darlingtoni* definite call

5.0 REFERENCES

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Appendix 5

EPBC Act: Assessments of Significance

It has been determined that, based on habitats present, six nationally threatened flora species and 12 nationally threatened fauna species occur or have potential to occur within the Study Area. These species are:

Threatened Flora

- *Eucalyptus aggregata* (Black Gum);
- *Eucalyptus pulverulenta* (Silver-leaved Gum);
- *Prostanthera cryptandroides* subsp. c*ryptandroides* (Wollemi Mintbush) (Southern Study Area only);
- *Persoonia acerosa* (Needle Geebung);
- *Persoonia marginata;* and
- *Thesium australe* (Austral Toadflax).

Threatened Fauna

- Bathurst Copper Butterfly (*Paralucia spinifera*);
- Giant Burrowing Frog (*Heleioporus australiacus*);
- Littlejohn's Tree Frog (*Litoria littlejohni*);
- Broad-headed Snake (*Hoplocephalus bungaroides*);
- Regent Honeyeater (*Anthochaera phrygia*);
- Spotted-tailed Quoll (*Dasyurus maculatus maculatus*);
- Southern Brown Bandicoot (*Isoodon obesulus obesulus*);
- Koala (*Phascolarctos cinereus*);
- Greater Glider (*Petauroides volans*);
- Brush-tailed Rock-wallaby (*Petrogale penicillata*);
- New Holland Mouse (*Pseudomys novaehollandiae*); and
- Large-eared Pied Bat (*Chalinolobus dwyeri*).

Vulnerable species are assessed on the basis of an 'important population', which is defined as a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- key source populations either for breeding or dispersal;
- populations that are necessary for maintaining genetic diversity; and/or
- populations that are near the limit of the species range.

Whilst it is likely that a number of the vulnerable species listed above would not be considered an 'important population', a precautionary approach has been undertaken in this instance. Therefore, all species have been afforded an Assessment of Significance, in line with the EPBC Act below in the table below. The potential for impact upon the endangered species listed above are assessed individually in the second table below.

These assessments determine if the proposed action will have any significant impact on any MNES. If it is determined that there is a significant impact to any MNES then a referral of the matter to DoE would be recommended.

Northern Study Area - Assessment of Significance for Vulnerable Species

Flora

Eucalyptus aggregata (Black Gum)

Eucalyptus aggregata is a small to medium sized woodland tree with dark greyish-black deeply fibrous bark. It is found in the NSW Central and Southern Tablelands, with small isolated populations in Victoria and the Act. In NSW it occurs in the South Eastern Highlands Bioregion and on the western fringe of the Sydney Basin Bioregion. Black Gum has a moderately narrow distribution, occurring mainly in the wetter, cooler and higher parts of the tablelands.

Often grows in association with other cold-adapted eucalypts such as *Eucalyptus pauciflora*, *E. viminalis*, *E. rubida*, *E. stellulata* and *E. ovata*. This species was detected in MU 11 just outside of the Study Area, with areas of suitable habitat also occurring elsewhere. Juvenile plants were also detected which may be this species, but are difficult to identify whilst in immature form.

Under the EPBC Act significant impact guidelines, a population of a vulnerable species must be considered to be an 'important population' to require further assessment of impact. The population of *E. aggregata* within the Study Area, it could be considered a '*population that is necessary for maintaining genetic diversity'*. As such, this species was further assessed using the significant impact criteria below.

Impact Assessment

(a) **Lead to a long-term decrease in the size of an important population;**

Two mature *E. aggregata* trees were detected adjacent the Study Area, with multiple juvenile eucalypts occurring within the Study Area. Immature eucalypt species are difficult to identify to species level, therefore those observed on site have potential to be juvenile *E. aggregata*. The Project may remove these individuals in the absence of careful design and installation techniques. Impact minimisation strategies involving sensitive placement of the pipeline during construction is likely to result in an impact avoidance outcome for this species.

(b) **Reduce the area of occupancy of the species;**

The area of occupancy of *E. aggregata* may be reduced marginally by the removal of potential *E. aggregata* juveniles.

(c) **Fragment an existing important population into two or more populations;**

The Project is utilising an existing pipeline of which a significant portion is cleared or disturbed. The proposed clearing would therefore not pose a barrier for genetic dispersal for any of the species considered.

(d) **Adversely affect habitat critical to the survival of a species;**

No areas of critical habitat have been identified within the Study Area.

(e) **Disrupt the breeding cycle of a population;**

Juvenile individuals proposed for potential removal are not yet capable of breeding. The adults in proximity will remain capable of breeding despite the Project.

(f) **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

No adult individual *E. aggregata* are proposed for removal, and the pipeline largely utilises an existing pipeline are that requires minimal vegetation removal. This species is not likely to decline as a result of this Project.

(g) **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;**

The Project is unlikely to introduce an invasive species that is harmful to *E. aggregata.*

(h) **Introduce disease that may cause the species to decline; or**

The Project is unlikely to introduce diseases that may cause this species to decline.

(i) **Interfere substantially with the recovery of the species.**

Due to only juveniles potentially being removed as a result of the Project, it is not considered that the Project will interfere substantially with the recovery of this species, as adult individuals maintain reproduction capability in the same location.

Eucalyptus pulverulenta (Silver-leaved Gum)

Eucalyptus pulverulenta is a distinctive straggly mallee or small tree with smooth grey to bronze bark that sheds in long strips. It is rare in the wild and has a highly disjunct distribution of several small stands in the Bowenfels district on the NSW Central Tablelands and a few occurrences on the NSW Southern Tablelands.

Populations occur on the crests or upper slopes of moderately steep hillsides or mountains at altitudes of 800-1000m above sea level. Occurs in open forest and woodland typically dominated by *E. mannifera, E. macrorhyncha, E. dives, E sieberi* and *E. rossii.*

Under the EPBC Act significant impact guidelines, a population of a vulnerable species must be considered to be an 'important population' to require further assessment of impact. The population of *E. cannonii* within the Study Area, it could be considered a '*population that is necessary for maintaining genetic diversity'*. As such, this species was further assessed using the significant impact criteria below.

Impact Assessment

(a) **Lead to a long-term decrease in the size of an important population;**

The species was not detected during recent and previous surveys in and around the Study Area. Potential habitat occurs in MU 37 (approximately 1.49 ha) which would be removed for the Project. Vegetation removal therefore constitutes loss of potentially suitable habitat only and is unlikely to result in a long-term decrease in the size of a potentially occurring population of *Eucalyptus pulverulenta*.

(b) **Reduce the area of occupancy of the species;**

This species has not been recorded within the Study Area. The Study Area contains 1.49 ha of potential habitat and is surrounded by approximately 22,000 ha of contiguous and similar vegetation, which is further adjoined to the north and east by other state and national parks. Since this species was not detected its area of occupancy is not being reduced.

(c) **Fragment an existing important population into two or more populations;**

The Project is utilising an existing pipeline of which a significant portion is cleared or disturbed. The proposed clearing would therefore not pose a barrier for genetic dispersal for any of the species considered.

(d) **Adversely affect habitat critical to the survival of a species;**

No areas of critical habitat have been identified within the Study Area.

(e) **Disrupt the breeding cycle of a population;**

The small area of potential habitat to be removed is unlikely to disrupt the breeding cycle of a population of *E. pulverulenta,* if present.

(f) **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

E. pulverulenta has not been recorded within the Study Area. Given the low probability of occurrence and that it was not detected during surveys the Project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat such that a proportion of a population would decline.

(g) **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;**

The Project is unlikely to introduce an invasive species that is harmful to *E. pulverulenta.*

(h) **Introduce disease that may cause the species to decline; or**

The Project is unlikely to introduce diseases that may cause this species to decline.

(i) **Interfere substantially with the recovery of the species.**

This species has not been recorded within the Study Area. The small amount of proposed clearing is unlikely to interfere with the recovery of *E. pulverulenta*.

Persoonia acerosa (Needle Geebung)

This species was not detected during current or previous surveys within the Study Area. It is known from the Blue Mountains in the Newnes Plateau south through Kings Tableland to Hilltop and east to the lower Mountains. *Persoonia acerosa* occurs in dry sclerophyll forest, scrubby low-woodland and heath. It generally occurs on clayey sandstone and laterites of the Narrabeen Group. It is strongly associated with disturbance margins such as road and trail verges. As this species is known to occur on the Newnes Plateau and suitable dry sclerophyll habitat occurs within the Study Area in MU 29, it is considered to have potential to occur.

Under the EPBC Act significant impact guidelines, a population of a vulnerable species must be considered to be an 'important population' to require further assessment of impact. If a population of *P. acerosa* was to occur within the Study Area, it could be considered a '*population that is near the limit of the species' range*', as the location would be at its northern limit. As such, this species was further assessed using the significant impact criteria below.

Impact Assessment

(a) **Lead to a long-term decrease in the size of an important population;**

The species is a conspicuous plant and it was not detected during recent and previous surveys in and around the Study Area. Vegetation removal therefore constitutes loss of potentially suitable habitat only (approximately 0.10 ha), and is unlikely to result in a long-term decrease in the size of a potentially occurring population of *P. acerosa*.

(b) **Reduce the area of occupancy of the species;**

This species has not been recorded within the Study Area. The Study Area covers approximately 0.10 ha or potential habitat within the Newnes State Forest and is surrounded by approximately 22,000 ha of contiguous and similar vegetation, which is further adjoined to the north, east and south-east by other state and national parks. Since this species was not detected its area of occupancy is not being reduced.

(c) **Fragment an existing important population into two or more populations;**

The proposed clearing is not expected to fragment an important population into two or more populations.

(d) **Adversely affect habitat critical to the survival of a species;**

No areas of critical habitat have been identified within the Study Area.

(e) **Disrupt the breeding cycle of a population;**

The small area of potential habitat to be removed is unlikely to disrupt the breeding cycle of a population of *P. acerosa*.

(f) **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

Persoonia acerosa has not been recorded within the Study Area. Given the low probability of occurrence in the northern extent of the species' range and that it was not detected during surveys (despite being a conspicuous plant) the Project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat such that a proportion of a population would decline.

(g) **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;**

A variety of weed species may be harmful to *P. acerosa.* Despite the high vehicle activity and numerous tracks that occur around the eastern portion of the Study Area, the incidences of weeds are low. Weeds are much more prevalent in the western portion of the Study Area, however it is unlikely that the Project will increase the extent of weed occurrence such that it is harmful to this species. Notwithstanding, weed management, monitoring and control practices have been recommended in this report.

(h) **Introduce disease that may cause the species to decline; or**

The Project is unlikely to introduce diseases that may cause this species to decline.

(i) **Interfere substantially with the recovery of the species.**

This species has not been recorded within the Study Area. The small amount of proposed clearing is unlikely to interfere with the recovery of *P. acerosa*.

Persoonia marginata

Persoonia marginata (Clandulla Geebung) is listed as Vulnerable under the EPBC Act. This species was not detected during current or previous surveys. The species is known to occur in the nearby Ben Bullen State Forest and is distributed throughout the Capertee district between Kandos and Portland. This species grows in dry sclerophyll forest and woodland on sandstone in heavier clayey, gravelly loam derived from Permian rocks at c. 700 m altitude on low ridges. Potential habitat for this species within the disturbance footprint includes dry sclerophyll communities including MU 26, 33 and 37.

Under the EPBC Act significant impact guidelines, a population of a vulnerable species must be considered to be an 'important population' to require further assessment of impact. If a population of *P. marginata* was to

occur within the Study Area, it could be considered as '*populations that are necessary for maintaining genetic diversity'* as the species is poorly recorded locally. As such, this species is further assessed using the significant impact criteria below.

Impact Assessment

(a) **Lead to a long-term decrease in the size of an important population;**

Persoonia marginata has not been recorded within the disturbance footprint. However, if this species was present, the removal of 3.52 hectares of potential habitat would not lead to a long-term reduction of the size of a potentially occurring population.

(b) **Reduce the area of occupancy of the species;**

This species has not been recorded within the disturbance footprint, and as a result, the Project is unlikely to reduce the area of occupancy of *P. marginata*.

(c) **Fragment an existing important population into two or more populations;**

No populations were recorded on the Study Area during surveys. Approximately 3.52 ha of potential habitat for this species will be removed as a result of the Project, however no fragmentation of habitat will occur. Newnes State Forest to the immediate north, east and south-east of the Study Area offers large tracts of suitable habitat (in excess of 22,000 ha) for this species. Connectivity to Newnes State Forest from the Study Area is continuous, with no fragmentation occurring. The Project is not expected to fragment an existing important population into two or more populations.

(d) **Adversely affect habitat critical to the survival of a species;**

No areas of critical habitat have been identified within the Study Area.

(e) **Disrupt the breeding cycle of a population;**

The small area of potential habitat to be removed is unlikely to disrupt the breeding cycle of a population of *P. marginata*.

(f) **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

Persoonia marginata has not been recorded within the Study Area. The habitat to be removed is considered potential habitat only for *P. marginata*. The Project will decrease the availability of 3.52 hectares of potential habitat for this species. However, large tracts of suitable habitat are abundant within the Newnes State Forest to the north, east and south-east of the Study Area.

(g) **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;**

A variety of weed species may be harmful to *P. marginata.* Despite the high vehicle activity and numerous tracks that occur around the eastern portion of the Study Area, the incidences of weeds are low. Weeds are much more prevalent in the western portion of the Study Area, however it is unlikely that the Project will increase the extent of weed occurrence such that it is harmful to this species. Notwithstanding, weed management, monitoring and control practices have been recommended in this report.

(h) **Introduce disease that may cause the species to decline; or**

The Project is unlikely to introduce diseases that may cause this species to decline.

(i) **Interfere substantially with the recovery of the species.**

This species has not been recorded within the Study Area. The small amount of proposed clearing is unlikely to interfere with the recovery of *P. marginata*.

Thesium australe (Austral Toadflax)

Thesium australe (Austral toadflax) is listed as Vulnerable under the EPBC Act. This species is hemiparasitic on the roots of other plants, mainly *Themeda triandra* and is generally confined to grassy woodlands, grasslands and damp sites. *Thesium australe* is found in small populations scattered through the eastern part of NSW. The closest known location of this species was recorded by RPS in the Blackmans Flat area, approximately 3 km to the north-west.

This species was not detected during current or previous surveys within the Study Area, however, grassy woodland habitat is present and this species has the potential to occur.

The recorded occurrence of *T. australe* within the region is limited to a population recorded near Blackmans Flat approximately 3 km north-west of the Study Area. Very little information is available of the regional distribution of this rare species but it has been predicted to occur from Katoomba in the south to just above Kandos in the north. However, this is only based on the occurrence of potentially suitable habitat such as damp grasslands and grassy woodlands with *T. triandra* present. These habitats are widespread within the region and the limited amount of potential habitats within the Study Area would therefore not be of high importance to this species.

Under the EPBC Act significant impact guidelines, a population of a vulnerable species must be considered to be an 'important population' to require further assessment of impact. If a population of *T. australe* was to occur within the Study Area, it could be considered a '*populations that are necessary for maintaining genetic diversity'* as the species is poorly recorded locally. As such, this species is further assessed using the significant impact criteria below.

Impact Assessment

(a) **Lead to a long-term decrease in the size of an important population;**

This species was not detected within the Study Area, and *Themeda triandra* was detected in one plot only which was within MU 33, and the available habitats are potential at most. Therefore, the Project is unlikely to affect the lifecycle of *T. australe* such that it would lead to a long-term decrease in the size of a population of this species.

(b) **Reduce the area of occupancy of the species;**

As this species was not recorded, the Project is not expected to reduce the area of occupancy of *T. australe*.

(c) **Fragment an existing important population into two or more populations;**

No areas of potential or known habitat will become fragmented as a result of the Project.

(d) **Adversely affect habitat critical to the survival of a species;**

No critical habitat for this species occurs within the Study Area.

(e) **Disrupt the breeding cycle of a population;**

It is unlikely the Project will disrupt the breeding cycle of a population if present.

(f) **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

The low lying areas of MU 33 in the west to be cleared represent a small area of potential habitat and if present its removal is unlikely to decrease the availability or quality of habitat to the extent that the species is likely to decline.

(g) **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;**

None of the activities proposed are expected to lead to an increased incidence of weeds within potential habitats of this species.

(h) **Introduce disease that may cause the species to decline; or**

The Project is unlikely to introduce diseases that may cause this species to decline.

(i) **Interfere substantially with the recovery of the species.**

The Project is unlikely to interfere with the recovery of *T. australe*.

Fauna

Bathurst Copper Butterfly (*Paralucia spinifera*)

Currently, the Bathurst Copper Butterfly (*Paralucia spinifera*) is restricted to an area within the Central Tablelands of NSW between Oberon, Hartley and Bathurst. These butterflies are found in open woodland and/or open forest with a sparse understory and native Blackthorn (*Bursaria spinosa* subsp. *lasiophylla*) (DoE, 2016b), which is a larval food plant. They occur at elevations above 850m, with a north-west aspect.

Pupation occurs for these butterflies from December to February and adult butterflies fly between August and November depending on the elevation and aspect of the area (CSIRO, 2002).

This species has been recorded in the Blue Mountains, where specifically, Bathurst Copper Butterflies were recorded at 29 sites (CSIRO, 2002 in DoE, 2016b). A total of 1892 records occur within 10km of the Study Area.

Under the EPBC Act significant impact guidelines, a population of a vulnerable species must be considered to be an 'important population' to require further assessment of impact. The local populations of the Bathurst Copper Butterfly could be considered a '*population that is necessary for maintaining genetic diversity'*. As such, this species are further assessed using the significant impact criteria below.

Impact Assessment

(a) **Lead to a long-term decrease in the size of an important population;**

This species was not detected within the Study Area during current surveys, and *B. spinosa* subsp. *lasiophylla* was also not recorded. The habitat removed is therefore not expected to provide suitable habitat for this species. Therefore, the Project is not expected to lead to a long-term decrease in size of the Bathurst Copper Butterfly population.

(b) **Reduce the area of occupancy of the species;**

The Bathurst Copper Butterfly is only found where *B. spinosa* subsp. *lasiophylla* occurs, and this species was not recorded during assessments of the Study Area. Therefore the Project is not expected to reduce the area of occupancy of the species.

(c) **Fragment an existing important population into two or more populations;**

No areas of potential or known habitat will become fragmented as a result of the Project.

(d) **Adversely affect habitat critical to the survival of a species;**

The abundance of potential habitat within the Ben Bullen State Forest and neighbouring national parks suggests that the habitats within the Study Area are not critical to the survival of the Bathurst Copper Butterfly.

(e) **Disrupt the breeding cycle of a population;**

As the Project is not expected to involve the removal of any *B. spinosa* subsp. *lasiophylla,* it is not expected to disrupt the breeding cycle of the population.

(f) **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

As the removal of vegetation is not expected to remove important habitat for this species, the Project is unlikely to modify, destroy, isolate or decrease the availability of quality habitat to the extent that Bathurst Copper Butterflies would decline.

(g) **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;**

The Project is unlikely to contribute to an increase in invasive species that may be harmful to this species.

(h) **Introduce disease that may cause the species to decline; or**

The Project is unlikely to introduce diseases that may cause this species to decline.

(i) **Interfere substantially with the recovery of the species.**

The Project is unlikely to interfere with the recovery of the Bathurst Copper Butterfly.

Giant Burrowing Frog (*Heleioporus australiacus*)

The current distribution of the Giant Burrowing Frog (*Heleioporus australiacus*) is from Olney State Forest north of Sydney extending along the coast and ranges into the highlands of Victoria. The northern population has a marked preference for sandstone ridge-top habitat and broader upland valleys. In these locations, the frog is associated with small headwater creek lines and along slow flowing to intermittent creek lines. The vegetation is typically woodland, open woodland and heath and may be associated with 'hanging swamp' seepage lines and where small pools form from the collected water. This species spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites.

Scattered records of this species occur throughout the region with a possible stronghold existing within the Katoomba – Wentworth Falls – Springwood areas. Due to its widespread distribution within conservation lands in the region, the potential habitat occurring within the Study Area would not be of high importance to the species.

Under the EPBC Act significant impact guidelines, a population of a vulnerable species must be considered to be an 'important population' to require further assessment of impact. The local populations of the Giant Burrowing Frog could be considered a '*population that is near the limit of the species range*' as the location is at their western limit. As such, this species are further assessed using the significant impact criteria below.

Impact Assessment

(a) **Lead to a long-term decrease in the size of an important population;**

This species was not detected within the Study Area during current surveys, and only potential habitat exists in the vicinity of ephemeral drainage lines and their surrounding habitats. Habitats to be removed are not considered to impact upon this species or lead to a long-term decline of an important population.

(b) **Reduce the area of occupancy of the species;**

As the Giant Burrowing Frog was not detected during surveys, potential habitat only will be removed. Therefore, the Project would not reduce the area of occupancy of the Giant Burrowing Frog.

(c) **Fragment an existing important population into two or more populations;**

No areas of potential or known habitat will become fragmented as a result of the Project.

(d) **Adversely affect habitat critical to the survival of a species;**

The abundance of potential habitat within the Newnes State Forest and neighbouring national parks suggests that the habitats within the Study Area are not critical to the survival of the Giant Burrowing Frog.

(e) **Disrupt the breeding cycle of a population;**

Due to the extent of commensurate surrounding habitat, the pipeline route to be cleared (approximately 10m wide) is not expected to disrupt the breeding cycle of a population of Giant Burrowing Frog, if present.

(f) **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

Due to the extent of commensurate surrounding habitat, the pipeline route to be cleared (approximately 10m wide) is not expected to decrease the availability or quality of habitat to the extent that this species is likely to decline.

(g) **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;**

The Project is unlikely to contribute to an increase in invasive species that may be harmful to this species.

(h) **Introduce disease that may cause the species to decline; or**

The Project is unlikely to introduce diseases that may cause this species to decline.

(i) **Interfere substantially with the recovery of the species.**

The Project is unlikely to interfere with the recovery of the Giant Burrowing Frog.

Littlejohn's Tree Frog (*Litoria littlejohni*)

The Littlejohn's Tree Frog (*Litoria littlejohni*) occurs on plateaus and the eastern slopes of the Great Dividing Range from Watagan State forest south to Buchan in Victoria (OEH 2012). Most of the records of this species are from the Sydney Basin Bioregion, with only scattered records south to the Victorian border. Littlejohn's Tree Frog is known to inhabit forest, coastal woodland and heath from elevations of 100 to 950m (White and Ehmann 1997), however these frogs are not known to be associated with any specific vegetation types (Lemckert 2004). Breeding habitat includes rocky streams, semi-permanent dams, pools and flooded hollows. Some areas of small dams exist within the Study Area, and may provide habitat for these frogs. No areas containing streams, pond or pools are proposed to be removed during the Project.

Whilst surveys and ongoing monitoring have not detected this species, it is regarded as being one of the least known and least frequently encountered frogs in New South Wales. One record exists for this species within 10 km of the Study Area.

Under the EPBC Act significant impact guidelines, a population of a vulnerable species must be considered to be an 'important population' to require further assessment of impact. The local populations of the Littlejohn's Tree Frog could be considered a '*population that is near the limit of the species' range*' as the location is at their western limit. As such, these species are further assessed using the significant impact criteria below.

Impact Assessment

(a) **Lead to a long-term decrease in the size of an important population;**

Potential breeding habitat may occur in some of the smaller ponds near the Energy Australia Ash Dams (not the Ashe Dams themselves), which run alongside some areas of the existing pipeline. These areas are not expected to be impacted during the Project. Potential habitat also occurs at the Coxs River crossing towards the middle of the pipeline. As non-breeding habitat is still quite unknown for this species (DoE 2016c), it is unknown if any removal of vegetation during the Project will lead to an impact on the population. However, it is assumed that due to the narrow impact area (10m in width), that the Project will not lead to a long-term decrease in the size of an important population.

(b) **Reduce the area of occupancy of the species;**

This species was not detected within the Study Area, and potential habitat only exists. Therefore, the Project would not reduce the area of occupancy of the Littlejohn's Tree Frog, with the exception of a small amount of potential non-breeding habitat being cleared.

(c) **Fragment an existing important population into two or more populations;**

No areas of potential or known habitat will become fragmented as a result of the Project.

(d) **Adversely affect habitat critical to the survival of a species;**

The abundance of potential habitat within the Newnes State Forest and neighbouring National Parks suggests that the habitats within the Study Area are not critical to the survival of the Littlejohn's Tree Frog.

(e) **Disrupt the breeding cycle of a population;**

Due to the extent of commensurate surrounding habitat, the pipeline route to be cleared (approximately 10m wide) is not expected to disrupt the breeding cycle of a population of Littlejohn's Tree Frog, if present.

(f) **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

The removal of vegetation during the Project is not expected to decrease the availability or quality of habitat to the extent that this species is likely to decline.

(g) **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;**

The Project is unlikely to contribute to an increase in invasive species, such as foxes and cats, which may be harmful to this species.

(h) **Introduce disease that may cause the species to decline; or**

The Project is unlikely to introduce diseases that may cause this species to decline.

(i) **Interfere substantially with the recovery of the species.**

The Project is unlikely to interfere with the recovery of the Littlejohn's Tree Frog.

Broad-headed Snake (*Hoplocephalus bungaroides*)

The Broad-headed Snake (*Hoplocephalus bungaroides*) is listed as Vulnerable under the EPBC Act. This species was not detected during current or previous surveys within the Study Area. Broad-headed Snakes select refuge based on seasonal temperature differences, preferring cooler tree hollows on top of plateaus and below cliffs during summer, and warmer sun-exposed sandstone slabs and exfoliations during winter. The species shows high site fidelity and restrict their movement to discrete home ranges (Webb & Shine, 1997). These rock features are the important habitat features for this species.

The Broad-headed Snake has a widespread distribution within the region with one record existing within the Newnes State Forest. Additional records exist within the neighbouring Ben Bullen State Forest and Gardens of Stone National Park, approximately 10 km from the Study Area. A number of scattered records are also found in the Blue Mountains National Park. Due to the large areas of suitable habitat present within neighbouring national parks, the potential habitat within the Study Area would not be of high importance to this species.

Under the EPBC Act significant impact guidelines, a population of a vulnerable species must be considered to be an 'important population' to require further assessment of impact. If a population of the Broad-headed Snake was to occur within the Study Area, it could be considered a '*population that is necessary for maintaining genetic diversity*'. As such, this species is further assessed using the significant impact criteria below.

Impact Assessment

(a) **Lead to a long-term decrease in the size of an important population;**

This species is nocturnal, sheltering by day in rock crevices and under flat sandstone rocks on exposed cliff edges, rocky outcrops and pagodas have been avoided by the proposed surface infrastructure. Areas to be cleared for surface infrastructure include 67 hollow bearing trees, which this species utilises for sheltering in summer. However, woodland nearby sandstone of escarpments is more likely to be utilised by this species in winter, which only covers a small portion of habitat of the proposed footprint. The Project is not expected to involve the removal of any rocky surfaces within the Study Area. Therefore, the small amount of clearing of potential summer refuge habitat is not likely to lead to a long-term decrease in a Broad-headed Snake population.

(b) **Reduce the area of occupancy of the species;**

The area of habitat availability and, therefore, potential occupancy may be reduced by the number of suitable hollow bearing trees, (of the 67identified) which would be removed during the Project.

(c) **Fragment an existing important population into two or more populations;**

The habitat to be removed will not force fragmentation upon an important population of this species if it did occur within the Study Area.

(d) **Adversely affect habitat critical to the survival of a species;**

The abundance of potential habitat within the Newnes State Forest and neighbouring National Parks suggests that the habitats within the Study Area are not critical to the survival of the Broad-headed Snake. Notwithstanding, those areas of habitat that may be used by this species will not be adversely affected such

that they would become unsuitable for this species, with the exception of a small loss of potential summer sheltering habitat.

(e) **Disrupt the breeding cycle of a population;**

The minor loss of potential summer sheltering habitat would not disrupt the breeding cycle of a population of Broad-headed Snake.

(f) **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

The small loss of potential summer sheltering habitat would not constitute a decrease in the availability or quality of habitat to the extent that the species is likely to decline.

(g) **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;**

The Project is unlikely to contribute to an increase in invasive species that may be harmful to this species.

(h) **Introduce disease that may cause the species to decline; or**

The Project is unlikely to introduce diseases that may cause this species to decline.

(i) **Interfere substantially with the recovery of the species.**

The Project is unlikely to interfere with the recovery of the Broad-headed Snake.

Koala (*Phascolarctos cinereus*)

The Koala (*Phascolarctos cinereus*) inhabits a range of eucalypt woodlands and forests across the eastern portion of Australia, from coastal and inland QLD through NSW and into Victoria. The population in NSW is mainly confined to the central and north coast's with some populations remaining west of the Great Dividing Range in Gunnedah and surrounds. Although Koalas are rare within the region, scattered records exist throughout the area. Due to the presence of large, neighbouring areas of conservation lands, and the lack of suitable Koala habitat (including koala feed trees and signs of use), the potential habitats found within the Study Area would not be of high importance to the Koala.

Under the EPBC Act significant impact guidelines, a population of a vulnerable species must be considered to be an 'important population' to require further assessment of impact. OEH Atlas of NSW Wildlife records show Koala occurring to the north and south of the Study Area. Therefore, the population may be '*necessary for maintaining genetic diversity*'. As such, this species is further assessed using the significant impact criteria below.

Impact Assessment

(a) **Lead to a long-term decrease in the size of an important population;**

The removal of a small amount of habitat (10m wide), with only one koala feed tree detected covering <15%, would not lead to a long-term reduction in the size of a potentially occurring population. Therefore, the Project is unlikely to lead to a long-term decrease in the size of an important population of the Koala.

(b) **Reduce the area of occupancy of the species;**

The project is unlikely to reduce the area of occupancy given that this species was not detected and only one feed tree was recorded within the Study Area.

(c) **Fragment an existing important population into two or more populations;**

The habitat to be removed will not force fragmentation upon an important population of this species if it did occur within the Study Area.

(d) **Adversely affect habitat critical to the survival of a species;**

Habitat critical to the survival of the Koala is considered to be any form of landscape corridor that is essential to the dispersal of Koalas between forest or woodland habitats (SEWPAC 2012). Critical habitat is also defined as areas of forest or woodland where:

- Primary Koala food tree species (as defined in DECC 2008b) comprise at least 50% of the overstorey trees;
- Primary Koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees;
- Primary food tree species are absent but secondary food tree species (as defined in DECC 2008b) alone comprise at least 50% of the overstorey trees;
- The above qualities may be absent in a forest or woodland but other essential habitat features are present and adjacent to areas exhibiting the above qualities (e.g. Koalas in the Pilliga are known to escape the heat of the day by taking refuge in white cypress pines, which are not food trees); or
- A relatively high density of Koalas is supported, regardless of the presence of food tree species. Koala population densities vary across their range and regional data should be used to judge relative density.

No critical habitat occurs within the Study Area. The Project is not expected to adversely affect any habitat critical to the survival of the species.

(e) **Disrupt the breeding cycle of a population;**

The Project is unlikely to disrupt the breeding cycle of a population of the Koala.

(f) **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

The small loss of potential woodland habitat from clearing is unlikely to cause a decrease in the availability or quality of habitat to the extent that the species is likely to decline.

(g) **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;**

The Project is unlikely to contribute to an increase in invasive species that may be harmful to this species.

(h) **Introduce disease that may cause the species to decline; or**

The Project is unlikely to introduce diseases that may cause this species to decline.

(i) **Interfere substantially with the recovery of the species.**

The Project is unlikely to interfere with the recovery of the Koala.

Greater Glider (*Petauroides volans*)

The Greater Glider (*Petauroides volans*) is Australia's largest gliding species. Their distribution extends from coastal Queensland through NSW and into Victoria along the east coast. It has adapted to feed almost exclusively on eucalypt leaves, but will consume eucalypt flowers and buds also. The Greater Glider occurs in a range of habitats including tall open woodland, eucalypt forests and low woodlands. Their home range extends between 0.7-3 hectares.

These species have been recorded on multiple occasions during spotlighting within the Study Area.

Under the EPBC Act significant impact guidelines, a population of a vulnerable species must be considered to be an 'important population' to require further assessment of impact. The population of Greater Gliders within the Study Area could be considered a '*populations that are necessary for maintaining genetic diversity*' as the home range is small. As such, this species is further assessed using the significant impact criteria below.

Impact Assessment

(a) **Lead to a long-term decrease in the size of an important population;**

Areas to be cleared for the Project may remove a small amount of known habitat for Greater Gliders. However, due to the abundance of similar habitat surrounding the areas to be disturbed, and the width of the Study Area (10m), this removal is unlikely to lead to a long-term decrease in the size of the population.

(b) **Reduce the area of occupancy of the species;**

This species was recorded during current and previous surveys, and will experience an incremental loss of known habitat. The area of occupancy will be reduced by an incremental amount.

(c) **Fragment an existing important population into two or more populations;**

The habitat to be removed will not force fragmentation upon an important population of this species due to the high mobility of Greater Gliders. Movement between current populations of Greater Gliders is not expected to be prevented due to the installation of the pipeline.

(d) **Adversely affect habitat critical to the survival of a species;**

No critical habitat has been described for this species.

(e) **Disrupt the breeding cycle of a population;**

The small loss of known habitat is unlikely to disrupt the breeding cycle of a population of Greater Gliders.

(f) **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

The small loss of known habitat is unlikely to cause a decrease in the availability or quality of habitat to the extent that the species is likely to decline.

(g) **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;**

The Project is unlikely to contribute to an increase in invasive species, such as foxes and wild dogs, which may be harmful to these species, further to what currently exists.

(h) **Introduce disease that may cause the species to decline; or**

The Project is unlikely to introduce diseases that may cause this species to decline.

(i) **Interfere substantially with the recovery of the species.**

The Project is unlikely to interfere with the recovery of the Greater Glider.

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

The Brush-tailed Rock Wallaby (*Petrogale penicillata*) occupies rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. They shelter or bask during the day in rock crevices, caves and overhangs and are most active at night.

Some suitable habitat exists within the Study Area, however, areas of rocky outcrops and escarpments are not expected to be impacted during the Project.

The Brush-tailed Rock Wallaby has a relatively widespread distribution within the region and records exist of this species within the Newnes State Forest. A number of records exist within the neighbouring Blue Mountains National Park and Wollemi National Park. Due to the presence of large, neighbouring areas of conservation lands, the potential habitats found within the Study Area would not be of high importance to the Brush-tailed Rock Wallaby.

Under the EPBC Act significant impact guidelines, a population of a vulnerable species must be considered to be an 'important population' to require further assessment of impact. If a population of the Brush-tailed Rock Wallaby was to occur within the Study Area, it could be considered a '*populations that are necessary for maintaining genetic diversity*' as the location is rare with disjunct populations. As such, this species is further assessed using the significant impact criteria below.

Impact Assessment

(a) **Lead to a long-term decrease in the size of an important population;**

The Project may cover areas of rocky outcrop, however these areas will not be modified or removed. Some potential forest habitat may be removed during the Project, this removal is unlikely to lead to a long-term decrease in the size of a population of Brush-tailed Rock Wallaby.

(b) **Reduce the area of occupancy of the species;**

This species is not known from within the Study Area, therefore potential habitat only is being removed.

(c) **Fragment an existing important population into two or more populations;**

The habitat to be removed will not force fragmentation upon an important population of this species if it did occur within the Study Area.

(d) **Adversely affect habitat critical to the survival of a species;**

No critical habitat has been described for this species.

(e) **Disrupt the breeding cycle of a population;**

The small loss of potential foraging habitat is unlikely to disrupt the breeding cycle of a population of Brush-tailed Rock Wallaby, if present.

(f) **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

The small loss of potential foraging habitat is unlikely to cause a decrease in the availability or quality of habitat to the extent that the species is likely to decline.

(g) **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;**

The Project is unlikely to contribute to an increase in invasive species, such as foxes and wild dogs, which may be harmful to these species.

(h) **Introduce disease that may cause the species to decline; or**

The Project is unlikely to introduce diseases that may cause this species to decline.

(i) **Interfere substantially with the recovery of the species.**

The Project is unlikely to interfere with the recovery of the Brush-tailed Rock Wallaby.

New Holland Mouse (*Pseudomys novaehollandiae*)

The New Holland Mouse (*Pseudomys novaehollandiae*) 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 dry open heathlands, eucalypt forests and woodlands with a dense leguminous understorey and sandy soils, and vegetated sand dunes. Populations are at highest densities in areas which are in early to mid-regeneration stages after disturbances such as fire (Murphy 2005).

The New Holland Mouse is very rare within the region, with one record found within 10km of the Study Area. The vegetation community found to occur within the entire Study Area which is most likely to provide habitat for the New Holland Mouse is MU26 - Newnes Plateau Narrow-leaved Peppermint – Silvertop Ash Layered Open Forest. This community covers approximately 1.56 ha within the Northern Study Area.

Under the EPBC Act significant impact guidelines, a population of a vulnerable species must be considered to be an 'important population' to require further assessment of impact. If a population of the New Holland Mouse was to occur within the Study Area, it could be considered a '*populations that are near the limit of the species' range*', as the location would be at its western limit (excluding a disjunct population at Goobang). As such, this species is further assessed using the significant impact criteria below.

Impact Assessment

(a) **Lead to a long-term decrease in the size of an important population;**

The Project will involve the removal of native vegetation, of specific note, is the vegetation community MU26, where 1.56 ha are expected to be removed. This community is most suited to the habitat requirements of the New-Holland Mouse. Vegetation corresponding to MU26 is largely present along the eastern stretch of the Study Area. The removal of 1.56 ha of this community is not expected to lead to a long-term decrease in the size of the New-Holland population, should they occur within the Study Area.

(b) **Reduce the area of occupancy of the species;**

The most suitable habitat within the vicinity of the Study Area will only be impacted by the removal of 1.56 ha. Due to the extent of suitable habitat surrounding the Study Area, the removal of vegetation is not expected to reduce the area of occupancy of the species enough to cause an impact to the population.

(c) **Fragment an existing important population into two or more populations;**

The habitat to be removed should not force fragmentation upon an important population of this species if it did occur within the Study Area.

(d) **Adversely affect habitat critical to the survival of a species;**

No critical habitat has been described for this species.

(e) **Disrupt the breeding cycle of a population;**

Due to the lack of detection within the Study Area and the extent of commensurate surrounding habitat the Project is not expected to disrupt the breeding cycle of a population of the New Holland Mouse.

(f) **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

The small loss of potential woodland habitat from clearing is unlikely to cause a decrease in the availability or quality of habitat to the extent that the species is likely to decline.

(g) **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;**

The Project is unlikely to contribute to an increase in invasive species, such as cats, foxes and wild dogs that may be harmful to this species.

(h) **Introduce disease that may cause the species to decline; or**

The Project is unlikely to introduce diseases that may cause this species to decline.

(i) **Interfere substantially with the recovery of the species.**

The Project is unlikely to interfere with the recovery of the New Holland Mouse.

Large-eared Pied Bat (*Chalinolobus dwyeri*)

The Large-eared Pied Bat (*Chalinolobus dwyeri*) is listed as Vulnerable under the EPBC Act. It is mainly found in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. Records of this species exist in dry sclerophyll forest and woodland, both to the east and west of the Great Divide. This species has been recorded during surveys. This species has also been recorded on numerous occasions during annual monitoring throughout the Newnes Plateau (BMS 2010a, 2011a).

The Large-eared Pied Bat has a widespread distribution within the region with several records from the neighbouring Wollemi National Park and Gardens of Stone National Park to the north and the Blue Mountains National Park to the south of the Study Area. Due to the presence of large, neighbouring areas of conservation lands, the potential habitats found within the Study Area would not be of high importance to the species.

Under the EPBC Act significant impact guidelines, a population of a vulnerable species must be considered to be an 'important population' to require further assessment of impact. If a population of the Large-eared Pied Bat was to occur within the Study Area, it could be considered a '*population that is necessary for maintaining genetic diversity*'. As such, this species is further assessed using the significant impact criteria below.

Impact Assessment

(a) **Lead to a long-term decrease in the size of an important population;**

Roosting sites required by the Large-eared Pied Bat, are caves, cliffs, minor cliffs and pagodas. Some of these habitats (minor cliffs) do occur within the Study Area, however they are not expected to be impacted during works. The Project does include clearing a corridor of native vegetation, however, these areas removed would not lead to a long term decrease in the size of the Large-eared Pied Bat population due to the extensive neighbouring habitat available.

(b) **Reduce the area of occupancy of the species;**

The project is unlikely to reduce the area of occupancy of this species as this species is highly mobile and can utilise the air space above the pipeline for foraging as it currently would.

(c) **Fragment an existing important population into two or more populations;**

No areas of potential habitat will become fragmented as a result of the Project.

(d) **Adversely affect habitat critical to the survival of a species;**

Sandstone cliffs and fertile wooded valley habitat within close proximity of each other, as well as any maternity roosts, should be considered habitat critical to the survival of the Large-eared Pied Bat (Department of Environment and Resource Management 2011). No impacts are expected to these features and subsequently no impacts would be expected to possible critical habitat, such as cave roosting sites. The areas proposed to be cleared are not expected to impact sandstone cliffs.

(e) **Disrupt the breeding cycle of a population;**

No habitat features required for breeding is expected to be impacted during the Project.

(f) **Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

The small loss of potential foraging habitat would not constitute a decrease in the availability or quality of habitat to the extent that the species is likely to decline.

(g) **Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;**

The Project is unlikely to contribute to an increase in invasive species that may be harmful to these species.

(h) **Introduce disease that may cause the species to decline; or**

The Project is unlikely to introduce disease that may cause these to decline species.

(i) **Interfere substantially with the recovery of the species.**

The Project is unlikely to interfere with the recovery of the Large-eared Pied Bat.

Assessment of Significance for Endangered Species

Regent Honeyeater (*Anthochaera phrygia*)

The Regent Honeyeater (*Anthochaera phrygia*) is listed as critically endangered under the EPBC Act. Regent Honeyeaters are endemic to South-east Australia, extending from south-east Queensland to central Victoria. This distribution is, however, extremely segmented. Preferred habitat includes Box-Ironbark eucalypt woodland and dry sclerophyll forest. Seasonal movements appear to be dictated by the flowering of various species of *Eucalyptus* sp. that are characteristic of the dry forests and woodlands of South-Eastern Australia.

The Regent Honeyeater are well known as occurring in the Capertee area, individuals are recorded in more easterly habitat, particularly in areas characterised by winter-flowering *Eucalyptus* ssp. when westerly habitats are experiencing extended dry periods. As such, this species may occur in Newnes Plateau forests on an intermittent basis.

The Regent Honeyeater has been well-documented from the Capertee and Glen Alice area, located within approximately 38 km north of the Study Area. One record exists within the Wolgan State Forest, and another record near Ben Bullen, approximately 17 km north-east of the Study Area. Due to the widespread distribution of winter-flowering Eucalypt species within the region, the potential habitats in the Study Area would not be of high importance to this species.

Impact Assessment

(a) **Lead to a long-term decrease in the size of a population;**

The Study Area occurs within a large area containing contiguous forest, woodland, heath and rocky habitats. These habitats continue throughout the Newnes State Forest and into the Gardens of Stone National Park, Blue Mountains National Park and Wollemi National Park. Local populations of this bird species would extend into these adjacent protected habitats. Therefore, the loss of habitat during the Project and impacts to the Regent Honeyeater population is considered small, relative to the available occupied habitats.

(b) **Reduce the area of occupancy of the species;**

The project is unlikely to reduce the area of occupancy of this highly mobile species.

(c) **Fragment an existing population into two or more populations;**

The habitat to be removed will not force fragmentation upon a population of this species, if it occurred within the Study Area.

(d) **Adversely affect habitat critical to the survival of a species;**

Eucalyptus albens (White Box), *Eucalyptus melliodora* (Yellow Box), *Eucalyptus leucoxylon* (Yellow Gum) and *Eucalyptus sideroxylon* (Mugga Ironbark) growing in high quality sites, where nectar production is copious and relatively predictable, appear to be critical to the survival of the Regent Honeyeater (Menkhorst et. al. 1999). None of these tree species have been recorded within the Study Area. Therefore, no critical habitat will be affected.

(e) **Disrupt the breeding cycle of a population;**

The breeding cycle of a population of the Regent Honeyeater, if present, is unlikely to be disrupted by the Project.

(f) **Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

The small loss of potential woodland habitat from clearing would not constitute a decrease in the availability or quality of habitat to the extent that the species is likely to decline.

(g) **Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;**

The Project is unlikely to contribute to an increase in invasive species that may be harmful to this species.

(h) **Introduce disease that may cause the species to decline; or**

The Project is unlikely to introduce diseases that may cause this species to decline.

(i) **Interfere with the recovery of the species.**

The Project is unlikely to interfere with the recovery of the Regent Honeyeater.

Spotted-tailed Quoll (*Dasyurus maculatus maculatus*)

The Spotted-tailed Quoll (*Dasyurus maculatus maculatus*) is listed as endangered under the EPBC Act. The nominated subspecies *D. maculatus maculatus* occurs from southern Queensland to Tasmania. This species is one of the largest carnivorous marsupials. Previous and current fauna surveys carried out by RPS across the Newnes Plateau have not recorded the presence of the Spotted-tailed Quoll. The eight years of annual monitoring, which occurs over the Centennial tenements on the Newnes Plateau, has also failed to record this species. Notwithstanding, numerous records of Spotted-tailed Quoll exist within a 10 km radius of the Study Area, as well as suitable habitat. Similarly, extensive tracts of suitable habitat would occur throughout the Blue Mountains area.

The Spotted-tailed Quoll is found in a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Nests are made in rock caves and hollow logs or trees, and basking sites are usually found nearby.

OEH Atlas of NSW Wildlife data indicates a widespread distribution of the Spotted-tailed Quoll throughout the region with a stronghold in the Blue Mountains National Park. The species has been recorded within the Newnes State Forest. Due to its general habitat preferences and the presence of large, neighbouring areas of conservation lands, the potential habitats found within the Study Area would not be of high importance to the Spotted-tailed Quoll.

Impact Assessment

(a) **Lead to a long-term decrease in the size of a population;**

The Project includes clearing of native vegetation for installation pipeline infrastructure. The area of native vegetation to be removed is approximately 27.84 ha, which includes suitable habitat for this species. Similar connected habitat is widely available for this species. Therefore, the Project is unlikely to lead to a long-term decrease in the size of a population of the Spotted-tailed Quoll.

(b) **Reduce the area of occupancy of the species;**

No individuals were detected within the Study Area. Thus, habitat only is being reduced, not a known area of occupancy.

(c) **Fragment an existing population into two or more populations;**

The habitat to be removed will not force fragmentation upon an important population of this species if it did

occur within the Study Area.

(d) **Adversely affect habitat critical to the survival of a species;**

No critical habitat has been described for this species.

(e) **Disrupt the breeding cycle of a population;**

The nature of the Project is not considered likely to disrupt the breeding cycle of a population, if one occurred in the vicinity of the Study Area.

(f) **Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

The small loss of potential woodland habitat from clearing is unlikely to cause a decrease in the availability or quality of habitat to the extent that the species is likely to decline.

(g) **Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;**

The Project is unlikely to contribute to an increase in invasive species, such as foxes or wild dogs, which may be harmful to this species.

(h) **Introduce disease that may cause the species to decline; or**

The Project is unlikely to introduce diseases that may cause this species to decline.

(i) **Interfere with the recovery of the species.**

The Project is unlikely to interfere with the recovery of the Spotted-tailed Quoll.

Southern Brown Bandicoot (*Isoodon obesulus obesulus*)

The Southern Brown Bandicoot (*Isoodon obseulus obseulus*) is found in a variety of habitats including dry sclerophyll forests, grasslands, heathlands, scrub and regenerating areas with adequate ground cover. A sandy (soft) substrate is preferred, and areas with a regular mosaic fire regime appear to offer the best habitat. They are nocturnal, and sleep by day in a nest of heaped vegetation with a hollow centre. The nest is usually concealed in a depression or amongst dense vegetation or ground litter.

Previous and current fauna surveys carried out by RPS across the Newnes Plateau has not recorded the presence of the Southern Brown Bandicoot.

OEH Atlas of NSW Wildlife data shows only four records of the Southern Brown Bandicoot. The two closest records are located approximately 27 km south-east of the Study Area. However, these records were based on hair samples which may limit their accuracy. Two additional records are found within the Blue Mountains National Park, within a distance of approximately 45 km south-east of the Study Area. Due to its general habitat preferences and the presence of large, neighbouring areas of conservation lands, the potential habitats found within the Study Area would not be of high importance to the Southern Brown Bandicoot.

Impact Assessment

(a) **Lead to a long-term decrease in the size of a population;**

The Project includes clearing of native vegetation for the Project. The area of native vegetation to be removed is approximately 27.84 ha, which includes suitable habitat for this species. Similar connected habitat is widely available for this species. Therefore the Project is unlikely to lead to a long-term decrease in the size of a population of the Southern Brown Bandicoot.

(b) **Reduce the area of occupancy of the species;**

The area of habitat availability and therefore, potential occupancy may be incrementally reduced by the Project, however as the infrastructure footprint is only 10m wide, it is not expected to reduce the area of occupancy of the species.

(c) **Fragment an existing population into two or more populations;**

The habitat to be removed will not force fragmentation upon an important population of this species if it did occur within the Study Area.

(d) **Adversely affect habitat critical to the survival of a species;**

No critical habitat has been described for this species.

(e) **Disrupt the breeding cycle of a population;**

As the infrastructure footprint is 10m wide, it is not expected to remove enough suitable nesting areas to disrupt the breeding cycle of the population if it did occur within the Study Area.

(f) **Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;**

The loss of potential woodland habitat from clearing is unlikely to cause a decrease in the availability or quality of habitat to the extent that the species is likely to decline.

(g) **Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;**

The Project is unlikely to contribute to an increase in invasive species, such as foxes or wild dogs, which may be harmful to this species.

(h) **Introduce disease that may cause the species to decline; or**

The Project is unlikely to introduce diseases that may cause this species to decline.

(i) **Interfere with the recovery of the species.**

The Project is unlikely to interfere with the recovery of the Southern Brown Bandicoot.

Appendix 2

Northern and Southern Study Area – Credit Reports

Biodiversity credit report

This report identifies the number and type of biodiversity credits required for a major project.

Date of report: 17/08/2016 Time: 4:19:01PM Calculator version: v4.0

Major Project details

Proposal ID:	161/2016/3649MP
Proposal name:	Springvale Pipeline - Northern = V1 Southern =V2
Proposal address:	Newnes Plateau- Blackmans Flat NSW 2000
Proponent name:	Centennial Coal Company Limited - Springvale
Proponent address:	Centennial Coal Company Limited - Springvale Lidsdale NSW 2000
Proponent phone:	02 6355 9814
Assessor name:	Arne Bishop
Assessor address:	PO Box 428 Hamilton NSW 2303
Assessor phone:	02 4940 4200
Assessor accreditation:	161

Summary of ecosystem credits required

Plant Community type	Area (ha)	Credits created
Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion	0.47	22.00
Narrow-leaved Peppermint - Mountain Gum - Brown Barrel moist open forest on high altitude ranges, northern South Eastern Highlands Bioregion	1.11	58.00
Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion	0.46	8.00
Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	22.71	858.00
Ribbon Gum - Snow Gum grassy forest on damp flats, eastern South Eastern Highlands Bioregion	0.63	24.00
Sydney Peppermint - Narrow-leaved Peppermint shrubby open forest on sheltered slopes of the Newnes Plateau, Sydney Basin Bioregion	0.73	35.00
Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin Bioregion	1.71	91.00
Tableland swamp meadow on impeded drainage sites of the western Sydney Basin Bioregion and South Eastern Highlands Bioregion	0.02	1.00
Total	27.84	1,097

Credit profiles

1. Narrow-leaved Peppermint - Mountain Gum - Brown Barrel moist open forest on high altitude ranges, northern South Eastern Highlands Bioregion, (HN558)

Number of ecosystem credits created	58
IBRA sub-region	Capertee (Part B)

Offset options - Plant Community types	Offset options - IBRA sub-regions
Narrow-leaved Peppermint - Mountain Gum - Brown Barrel moist open forest on high altitude ranges, northern South Eastern Highlands Bioregion, (HN558) Blaxland's Stringybark - Blue Mountains Ash - Blackwood moist open forest on basalt caps of the Blue Mountains, Sydney Basin Bioregion, (HN507) Brown Barrel - Mountain Grey Gum tall moist forest on basalts of the Southern Highlands Bioregion and Sydney Basin Bioregion, (HN516) Sydney Peppermint - White Stringybark moist shrubby forest on elevated ridges, Sydney Basin Bioregion, (HN601)	Capertee (Part B) and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

2. Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion, (HN514)

Number of ecosystem credits created	22
IBRA sub-region	Capertee (Part B)

Offset options - Plant Community types	Offset options - IBRA sub-regions
Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion, (HN514) Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion, (HN614) Ribbon Gum - Yellow Box grassy woodland on undulating terrain of the eastern tablelands, South Eastern Highlands Bioregion, (HN573)	Capertee (Part B) and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

3. Ribbon Gum - Snow Gum grassy forest on damp flats, eastern South Eastern Highlands Bioregion, (HN572)

Number of ecosystem credits created	24
IBRA sub-region	Capertee (Part B)

Offset options - Plant Community types	Offset options - IBRA sub-regions
Ribbon Gum - Snow Gum grassy forest on damp flats, eastern South Eastern Highlands Bioregion, (HN572)	Capertee (Part B) and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

4. Sydney Peppermint - Narrow-leaved Peppermint shrubby open forest on sheltered slopes of the Newnes Plateau, Sydney Basin Bioregion, (HN599)

Number of ecosystem credits created	35
IBRA sub-region	Capertee (Part B)

Offset options - Plant Community types	Offset options - IBRA sub-regions
Sydney Peppermint - Narrow-leaved Peppermint shrubby open forest on sheltered slopes of the Newnes Plateau, Sydney Basin Bioregion, (HN599) Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin Bioregion, (HN600)	Capertee (Part B) and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

5. Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin Bioregion, (HN600)

Number of ecosystem credits created	91
IBRA sub-region	Capertee (Part B)

Offset options - Plant Community types	Offset options - IBRA sub-regions
Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin Bioregion, (HN600) Sydney Peppermint - Narrow-leaved Peppermint shrubby open forest on sheltered slopes of the Newnes Plateau, Sydney Basin Bioregion, (HN599)	Capertee (Part B) and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

6. Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion, (HN570)

Number of ecosystem credits created	858
IBRA sub-region	Capertee (Part B)

Offset options - Plant Community types	Offset options - IBRA sub-regions
Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion, (HN570) Inland Scribbly Gum - Brittle Gum low woodland of the eastern tablelands, South Eastern Highlands Bioregion, (HN543)	Capertee (Part B) and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

7. Tableland swamp meadow on impeded drainage sites of the western Sydney Basin Bioregion and South Eastern Highlands Bioregion, (HN602)

Number of ecosystem credits created	1
IBRA sub-region	Capertee (Part B)

Offset options - Plant Community types	Offset options - IBRA sub-regions
Tableland swamp meadow on impeded drainage sites of the western Sydney Basin Bioregion and South Eastern Highlands Bioregion, (HN602)	Capertee (Part B) and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

8. Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion, (HN630)

Number of ecosystem credits created	8
IBRA sub-region	Capertee (Part B)

Offset options - Plant Community types	Offset options - IBRA sub-regions
Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion, (HN630) Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion, (HN520)	Capertee (Part B) and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

Summary of species credits required

Common name	Scientific name	Extent of impact Ha or individuals	Number of species credits created
Capertee Stringybark	Eucalyptus cannonii	3.00	39
Small Pale Grass-lily	Caesia parviflora subsp. minor	3.00	42
Large-eared Pied Bat	Chalinolobus dwyeri	0.73	9

Appendix 3

Staff Curriculum Vitae

CURRICULUM VITAE

Arne Bishop

Ecology Manager

Newcastle, NSW

Bachelor of Environmental Science, University of Canberra, 2009

Bachelor of Landscape Architecture, University of Canberra, 2009

Cert IV Horticulture (Landscape), Canberra Institute of Technology, 2003

Cert II Australian Land Conservation and Restoration, Conservation Volunteers Australia, 2001

Accredited Biobanking Assessor

Areas of Expertise

Arne has over 16 years experience in the environmental sector. In his position as Ecology Manager, Arne manages the Newcastle environment department including the day to day running of projects, verification of reports and other outputs and ensures clients are well informed of project progress and key findings.

Arne's current and previous roles have provided him with an extensive knowledge of a plethora of exotic and endemic NSW flora, fauna, ecological communities and migratory species. He conducts ecological assessments on a daily basis, which aim to identify the likelihood for threatened entities such as threatened flora, fauna, populations and communities listed under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or *Threatened Species Conservation Act 1995* (TSC Act) to occur within a specified area.

Arne is an accredited BioBanking Assessor and has conducted BioBanking assessments for Major Projects (State Significant Infrastructure and State Significant Developments) under the Framework for Biodiversity Assessment (OEH 2014) and assessments for smaller developments under the *BioBanking Assessment Methodology* (OEH 2014). He has also conducted EPBC offset calculations under the *EPBC Act Environmental Offsets Policy* (SEWPAC 2012).

During his career, Arne has project managed and/or participated in numerous large-scale land development, mining, energy and infrastructure projects. He subsequently possesses a firm understanding and working knowledge of local, state and federal government legislation and policies that underpin environmental assessments, environmental mitigation, management and offsetting techniques.

Selected Project Experience

Urban Growth

Reticulated Water, Sewer and Recycled Water (Glossodia, Huntlee new town and Cooranbong), Flow Systems - RPS has prepared a number of REF's to enable licences to be sought by the client for the provision of reticulated water, sewer and recycled water across large urban release areas in accordance with the *Water Industry Competition Act 2006*. Conducted notional BioBanking calculations to quantify biodiversity impacts and potential offset requirements.

Subdivision and Urban Development at Windmill Downs Tamworth, Combined Development Group – Conducted detailed floristic surveys to determine the condition and extent of the EPBC Act Critically Endangered Ecological Community - White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box-Gum Woodland).

Lower Hunter Lands subdivision, Coal and Allied – Preparation of a detailed Part 3A ecological inventory and impact assessment for a proposed residential subdivision including extensive flora, fauna and habitat surveys over approximately 3,800 hectares. Ongoing liaison, negotiations and presentations were made to authorities and community forums. The project involved significant offsets that helped to secure regional corridors and conservation initiatives long sought after in the region.

Catherine Hill Bay and Gwandalan, Rose Group – Preparation of detailed Part 3A ecological impact assessment for a proposed residential development over two sites in Catherine Hill Bay and Gwandalan. The project also involved negotiating approval under the EPBC Act including preparation Preliminary Information.

Huntlee Ecological works, LWP Property Group – Undertook Ecology works to inform Major Project Approval and negotiations under the EPBC Act for the new Hunter Valley town at Huntlee. This project involved critically endangered species, offsets and presentations to stakeholder groups.

Subdivision and Urban Development at Hills Plain Tamworth, Marloelle – Conducted detailed floristic surveys to determine the condition and extent of the EPBC Act Critically Endangered Ecological Community - White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box-Gum Woodland).

Infrastructure

Bells Line of Road Corridor – Chifley Rd Upgrade, RMS – Conducted targeted threatened species filed surveys and assisted in the preparation of a biodiversity assessment for the proposed Chifley Road upgrade located on the Bells Line of Road between Bell and Scenic Hill.

Westmead Hospital Upgrade, Price Waterhouse Coopers and Johnstaff – Ecological surveys and reporting. Ecological opportunities and constraints were assessed in relation to the relevant state and federal legislation to inform the concept design.

Energy & Mining

Mandalong South Powerline Relocation - Flora and Fauna Impact Assessment, Centennial Coal – Conducted targeted threatened seasonal threatened species surveys, client liaison and report development. Conducted notional BioBanking calculations to quantify biodiversity impacts and potential offset requirements.

Gunnedah Basin, Santos – Conducted multiple projects over approximately two years. These projects included; ecological works for Santos within the Gunnedah Basin covering gas exploration and provision of infrastructure, including, gas pipelines and access tracks. Works included field survey, preparation of advice, impact assessments, EPBC referrals, preparation and implementation of well lease rehabilitation plans, liaison and negotiations with regulators and agencies.

Springvale Temperate Highland Peat Swamp (THPSS) Monitoring, Centennial Coal – Ecological field surveys and associated monitoring report preparation for Springvale underground mine on the Newnes Plateau project.

Angus Place and Springvale Extension Projects, Centennial Coal – Ecological surveys were undertaken over a period of 1.5 years to aid in the production of a Flora and Fauna Report for both the Angus Place and Springvale underground mines. The project role included flora and fauna field surveys and assistance with associated reporting. Conducted notional BioBanking calculations for Springvale Extension Project to quantify biodiversity impacts and potential offset requirements.

Bulga Mine Annual Fauna Monitoring, Glencore – Conducted and project managed an annual monitoring program for the past four years. The program spans two operations and involves seasonal bird surveys, habitat assessments, and the full spectrum of fauna monitoring methodologies, provides technical input and document review.

Airly Coal Mine Flora and Fauna Surveys and Assessment, Centennial Coal – A range of flora and fauna surveys were undertaken to inform both the Airly Baseline Survey Report and the Airly Flora and Fauna Report. Project tasks included; review of specialist reports, interpretation of legislative requirements, targeted field survey, assessment of fauna habitat quality and value to threatened species, identification of project impacts and measures to avoid or mitigate potential impacts.

Mandalong Mine Extension Project, Centennial Coal – Project tasks included preliminary desktop assessment, interpretation of legislative requirements, targeted field survey, assessment of fauna habitat quality and value to threatened species, identification of project impacts and measures to avoid or mitigate potential impacts. Conducted notional BioBanking calculations to quantify biodiversity impacts and potential offset requirements

Beltana Underground Mine Bat Impact Assessment and Monitoring, Glencore – Conducted extensive fieldwork to identify potential habitat, assessed habitat using night vision technology and developed reporting.

Previous Experience

Environmental Consultant – Ecological Australia 2008 - 2010

Arne completed several contracts as an environmental consultant for Eco Logical Australia, assisting with threatened species identification and monitoring on a range of projects.

Field Assistant / Consultant – Alison Rowell 1999 - 2010

This role included working on flora and fauna surveys, and habitat / vegetation assessment and mapping

Green Corps Traineeship – Conservation Volunteers Australia (CVA) 2001

Arne received accredited practical and theoretical training in; First Aid (Level 2, St Johns); Occupational Health and Safety and Environmental Concepts. This training contributed to Certificate II in Australian Land Conservation and Restoration.

Memberships & Achievements

Accredited BioBanking Assessor (accreditation number 161)

Snake and Spider Safety Awareness for Employees (SSSafe) Training

Four Wheel Drive Training and Certification

First Aid Certification

Member – Ecological Consultants Association

Member – Royal Zoological Society NSW

Member – Birds Australia

OH&S Induction Training (White Card)

Award for Excellence for First Place in Conservation Biology and Genetics, University of Canberra

RPS

CURRICULUM VITAE

Mark Aitkens

Senior Ecologist
Newcastle, NSW
Bachelor of Science (Environmental Biology), University of Technology Sydney (UTS), 1996
Accredited BioBanking Assessor

Areas of Expertise

Mark is senior ecologist with 20+ years experience in the delivery of terrestrial and aquatic ecology services to the private and public sectors. As a consulting ecologist, Mark is experienced in all aspects of project delivery including design and implementation of seasonally based flora and fauna surveys, identification of terrestrial and aquatic species and ecological communities, impact assessment, biodiversity offsetting under State and Commonwealth policies and design and implementation of monitoring programs.

Selected Project Experience

Energy & Mining

Wambo – As the project manager for the 2013 and 2014 monitoring periods, Mark oversaw the production of aquatic ecosystems monitoring, flora and habitat complexity monitoring, indicator species monitoring (birds), riparian ecosystem function analysis for three streams, Landscape Function Analysis for riparian and overburden rehabilitation areas.

Caroona Coal – Prepared a draft Biodiversity Offset Strategy for the BHP Caroona Coal project involving the sourcing and analysis of prospective offset sites compatible with the impacts identified within the Caroona Coal precinct.

Whitehaven Coal – Designed and performed targeted threatened species surveys for the endangered vine *Tylophora linearis* and shrub *Pomaderris queenslandica* within Leard State Forest and Maules Creek Mine offset lands.

Spur Hill Coal Project – Designed and performed seasonal fauna surveys for the proposed Spur Hill Coal mine at Denman in the Upper Hunter Valley.

Peabody Coal – Project managed the supply of the Upper Hunter Strategic Assessment for Wambo Coal operations, designed and performed fauna surveys for the South Wambo underground project, ecological impact assessments for South Wambo underground, advice regarding environmental incidents, monitoring for the rehabilitation of North Wambo Creek diversion, monitoring of subsidence impacts, and preparation of the Wilpinjong Coal Biodiversity Management Plan.

Shenhua Watermark Coal Project – Provided expert ecology skills in the servicing of exploration programs involving borehole clearances and analysis of threatened species constraints including, but not limited to, the endangered vine *Tylophora linearis*.

Moolarben Coal Mine – Project managed the supply of ecological impact assessments for Stages 1 and 2 of the Moolarben Coal Project. Designed and performed flora and fauna surveys over six consecutive seasons for an application area of 10,000 ha involving the validation of vegetation and habitat condition mapping.

Linear Projects

Oxley Highway to Kempsey Pacific Highway Upgrade (approvals) – Preparation of supplementary documentation to assist the Project's State and Commonwealth assessments. Prepared Preliminary Documentation to support a Referral under the EPBC Act, including the design and performing of specific

targeted surveys for listed MNES such as *Mixophyes iteratus*. Actively participated in consultation and liaison with the Commonwealth Department.

Oxley Highway to Kempsey Pacific Highway Upgrade (monitoring) – Performed monitoring surveys for the State listed *Maundia triglochinoides* and the State and Commonwealth listed Giant Barred Frog (*Mixophyes iteratus*) in accordance with a Before Impact Control After monitoring design. Analysed results and reported findings including an evaluation of Project impacts and performance of mitigation measures.

Kempsey Bypass Pacific Highway Upgrade – Performed monitoring surveys for the Green-thighed Frog including the evaluation of project impacts on the species and effectiveness of mitigation measures.

Frederickton to Eungai Pacific Highway Upgrade – Performed monitoring surveys for the State and Commonwealth listed Hairy Joint Grass (*Arthraxon hispidus*) and State listed *Maundia triglochinoides* including the evaluation of project impacts on the species and effectiveness of mitigation measures.

Hunter Expressway – Prepared the Biodiversity Offset Strategy for the offsetting of 'regrowth' not assessed in the original environmental impact statement. Assessed candidate offset sites and provided justifications for their suitability as offsets for the HEX project.

Maitland to Minimbah Third Track Upgrade (rail) – Project managed the implementation of the Flora and Fauna Management Plan. Prepared a site specific management / monitoring plan for the eviction of a colony of Eastern Bentwing Bats (*Miniopterus schriebersii*) located within the impact area. Located and assessed the projects biodiversity offsets including the preparation of a Biodiversity Offset Strategy using the NSW BioBanking methodology covering both State and Commonwealth conditions of consent.

Biobanking Statements

Marys Mount Quarry – Project managed the assessment of the Mary's Mount blue metal quarry at Gunnedah involving the preparation of a red flag assessment for Semi-evergreen Vine Thicket.

Emerald Beach – Performed field surveys and preliminary BioBanking assessment for a residential development at Emerald Beach, Coffs Harbour LGA.

Mullaway – Performed field surveys and preliminary BioBanking assessment for a seniors living development at Emerald Beach, Coffs Harbour LGA.

Bonville – Performed field surveys and preliminary BioBanking assessment for a residential development at Emerald Beach, Coffs Harbour.

Biobanking Agreements

Valley Arm – Performed field surveys and preliminary BioBanking assessment for land owned by the Mindarriba LALC resulting in an approved BioBanking agreement at Payne's Crossing, Singleton LGA.

Butterwick – Sourced and project managed a BioBanking assessment for privately owned land resulting in an approved BioBanking agreement at Butterwick, Port Stephens LGA.

Dunns Creek – Designed and performed a BioBanking assessment for privately owned land resulting in an approved BioBanking agreement at Dunn's Creek, Port Stephens LGA.

Karuah – Designed and performed a BioBanking assessment for Council owned land resulting in an approved BioBanking agreement at Karuah, Port Stephens LGA.

Mullaway – Performed field surveys and preliminary BioBanking assessment for a seniors living development at Emerald Beach, Coffs Harbour LGA.

EPBC Act Assessments

Marys Mount Quarry – Project managed and prepared Preliminary Documentation for a 'controlled action' declared under the EPBC Act. Assessment involved the consideration of MNES impacted by the quarry including, but not restricted to Semi-evergreen Vine Thicket EEC and the Koala. Calculated and report biodiversity offset requirements within a Biodiversity Offset Strategy.

Rosewood Estate – Project managed and prepared Preliminary Documentation for a 'controlled action' declared under the EPBC Act. Assessment involved a detailed consideration of White Box Yellow Box Blakely's Redgum Grassy Woodland and Derived Native Grasslands, a critically endangered ecological community.

Management / Monitoring Plans

Marys Mount Quarry – Project managed and prepared a Koala Plan of Management for an important population impacted by the Marys Mount Blue Metal Quarry at Gunnedah. Involved obtaining State and Commonwealth approval of the Plan.

Biodiversity Management Plan, Wilpinjong Coal – Prepared the OEH endorsed Biodiversity Management Plan for the Wilpinjong Coal mine including management action, time and cost specifications for management zones. Defined completion criteria for management zones including interim performance targets. Devised a specific BACI style monitoring program including design and methodological elements.

Previous Experience

Senior Ecologist – Niche Environment and Heritage Pty Ltd 2012 – 2015

Senior accredited BioBanker involved in preparation and review of BioBanking assessments. Senior ecologist responsible for the preparation and review of ecological/ biodiversity assessment reports for State Significant Development or designated development. Preparation and implementation on monitoring programs. Preparation or review of EPBC Act Referrals and Preliminary Documentation. Preparation of Biodiversity Offset Strategies.

Senior Ecologist – GHD Pty Ltd 2010 – 2012

Senior accredited BioBanker involved in preparation and review of BioBanking assessments. Senior ecologist responsible for the preparation of ecological/ biodiversity assessment reports for State Significant Development or designated development.

Manager / Principal Ecologist – Ecovision Consulting 2003 – 2010

Preparation of flora and fauna impact assessments, threatened species management, monitoring plans and offset strategies. Preparation of Species Impact Statements and assessments under Part 3A of the EP&A Act.

Ecologist – HLA-Envirosciences Pty Limited 2001 – 2003

Ecologist responsible for the provision of flora and fauna impact assessments, statement of environmental effects and environmental impact statements.

Ecologist – Conacher Travers 1999 – 2000

Ecologist responsible for the provision of flora and fauna impact assessments, statement of environmental effects and environmental impact statements.

Manager / Ecologist – Ecovision Consulting 1996 – 1998

Ecologist responsible for the provision of flora and fauna impact assessments, statement of environmental effects and environmental impact statements.

Memberships & Achievements

Planning for Bushfire Protection - University of Technology Sydney, 2004

BioBanking Assessors Course - Ryde Tafe, 2009

BioCertification Assessors Course - OEH Newcastle, 2013

Landscape Function Analysis - Introductory Course, 2013

RPS

CURRICULUM VITAE

Lauren Eather

Ecologist

Newcastle, NSW

Bachelor of Science, University of Newcastle

Areas of Expertise

During the eight years Lauren has been working as an Ecologist, she has gained a broad range of ecological field experience and experience in Ecological Assessment and management reporting in accordance with relevant State and Commonwealth government legislative frameworks. In addition, Lauren has developed numerous Bushfire Threat Assessments and Bushfire Attack Level certificates informed by field surveys and desktop assessments in accordance with Planning for Bushfire Purposes (2006). Her experience within the consulting industry has primarily included a wide range of flora and fauna assessment disciplines as required by a wide range of public and private clients including Centennial Coal, Santos and NSW Roads and Maritime Services. Lauren's knowledge of the Central Coast, Hunter, Greater Lithgow and Liverpool Plains regions has expanded extensively since the commencement of her career.

Selected Project Experience

Urban Growth

Multi-dwelling Townhouse Project (SNL Building Constructions) – Production of an Ecological Assessment informed by flora and fauna field surveys involving vegetation mapping and flora and fauna identification.

Nest Box Monitoring Program (Rosegroup) – Conduct biannual monitoring of over 500 nest boxes to comply with Conditions of Consent for residential development at Gwandalan.

Boatmans Creek Culvert Upgrade Vegetation Management Plan (Royal Haskonings) – Site inspection and preparation of a Vegetation Management Plan that provided a practical approach to vegetation management for stream bank stability, erosion mitigation through revegetation, and native vegetation enhancement.

Infrastructure

Newcastle Heavy Rail Project (UrbanGrowth) – Undertake field work and preparation of ecological impact assessment to inform the proposed rezoning of the Newcastle Heavy Rail Corridor.

Pacific Highway Upgrade-Oxley Highway to Kempsey (NSW Roads and Maritime Services) - Implementation of the Microchiropteran Bat Management Plan prepared for the 37km upgrade of the Pacific Highway between the Oxley Highway and Kempsey on the NSW Mid-north coast. For this project Lauren was involved in the installation of 158 bat roost boxes and the provision of GIS data to inform future monitoring activities.

Energy & Mining

Bulga Mine Annual Fauna Monitoring (Glencore) – Lauren has been involved in an annual monitoring program that spans two operations and involves seasonal bird surveys, habitat assessments and the full spectrum of fauna monitoring methodologies targeting threatened species as well as comprising an overall species list, and providing technical input and annual report writing

Angus Place Longwalls 900 and 910 Flora and Fauna Monitoring (Centennial Coal Angus Place) – Pre and postmining baseline surveys were undertaken by Lauren including flora and fauna species diversity surveys, vegetation condition assessments and nest box erection. Monitoring of multiple sites provides a

comparable data set to display any notable changes as a result of longwall mining within this mining lease area. Swamp vegetation monitoring was a separate component of this project which required a memorandum to comment on overall swamp health and potential impacts as a result of surrounding mining activities. This project is ongoing.

Neubeck Open Cut Coal Mine (Centennial Coal) – Flora and fauna field surveys over a three year period and the production of the Flora and Fauna Assessment as part of an overriding Environmental Impact Statement were undertaken for the proposed Neubeck open cut coal mine. Surveys involved targeted threatened species surveys, vegetation mapping, flora and fauna identification and habitat mapping.

Airly Coal Mine Flora and Fauna Surveys (Centennial Airly) – A range of flora and fauna surveys were undertaken to inform both the Airly Baseline Survey Report and the Airly Flora and Fauna Report.

Airly Site Specific Biodiversity Management Plan (Centennial Airly) – Baseline flora and fauna assessments primarily undertaken for the Airly Flora and Fauna Report informed the production of the Airly Biodiversity Management Plan, both of which Lauren was involved in. The BMP outlined areas of ecological importance and ecological issues on site with associated management actions and monitoring requirements in line with the Development Approval.

Previous Experience

Environmental Scientist - Ecobiological (2011)

Primary roles included bush regeneration and the identification of a wide range of native and non-native plant species for rehabilitation of various sites throughout the Hunter and Central Coast regions. Some ecological surveys and Ecological Assessment reporting was carried out during Lauren's time with Ecobiological

Trainee Ecologist - Pygmy Possum Ecological Consulting (2008-2010)

Undertaking ecological field surveys was the primary role at Pygmy Possum Ecological Consulting. Fauna surveys were carried out across the Central Coast, Lake Macquarie and into the Hunter region. Basic reporting and data entry were undertaken throughout Lauren's time with Pygmy Possum Ecological Consulting

Volunteer Experience

Bush regeneration at Trig Shepards Hill, Bar Beach with Newcastle Landcare (2013);

Regent Honeyeater habitat restoration in the Capertee region with Birdlife Australia (2012);

Amphibian (*Litoria citropa*) acoustic research in the Watagan Mountains, NSW with Carl Gerhardt (2012);

Biodiversity research for independent researchers and Australian Geographic in East Kimberley (2011);

Amphibian (*Litoria subglandulosa* and *Mixophyes balbus*) research at the New England Tablelands with Marion Anstis, Simon Clulow and Carl Gerhardt (two separate occasions 2010);

Bandicoot Research in Manly with the Australian Wildlife Conservancy (2010);

Microbat dietary surveys and tracking at Empire Bay with Leroy Gonsalves (2010);

Green and Golden Bell frog research at the Sydney Olympic Park (2010);

Bush-stone Curlew surveys at Empire Bay on the Central Coast undertaking call play back methods (2010).

Bush regeneration at Wamberal Lagoon Nature Reserve with National Parks and Wildlife Services primarily restoring Littoral Rainforest (EEC) (2007-2010); and

Fauna research including pit trapping, Elliot trapping, triangulation (for amphibians) and spotlighting for the Watagans fauna database (2007).

Memberships & Achievements

NSW Driver's Licence (Class C)

OH&S Induction Training (White Card)

4WD course

ChemCert II certification

Landscape Function Analysis Training

Snake Awareness and Handling Training

Member of the Ecological Society of Australia (ESA)

Member of Birdlife Australia

Member of the Australian Mammal Society (AMS)

Conferences

Australasian Network for Environment and Transport (ANET) Conference, Coffs Harbour NSW (Attendee) 2014

Australasian Raptor Conference, Adelaide SA (Attendee) 2013

National Koala Conference, Port Macquarie NSW (Attendee) 2013

Society for Conservation Biology Conference - Oceania, Darwin NT (Attendee) 2012

Appendix D Heritage

Cultural Heritage Impact Assessment

Springvale Water Treatment Project

For Springvale Coal Pty Limited

Prepared by:

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Acknowledgements

Centennial Coal would like to acknowledge the Traditional Custodians of the Blue Mountains in which it operates. Centennial also recognises that the territorial boundary and extent of each Aboriginal group's interest and spiritual and cultural connection to the Country varies.

We acknowledge the importance of the Traditional Owners in the greater understanding of the area, and special acknowledgement is extended to the Elders (past, present and future) for they are the holders of knowledge, traditions, culture and aspirations of the Aboriginal people.

Document Status

Version	Purpose of Document	Orig	Review	Review Date	Approval for Issue	Date Issued
Draft V.1	Internal Review	G Goode	T Boer-Mah	23/05/2016	T Boer-Mah	23/05/2016
Draft V.2	Revised Report issue to Client	G Goode	T Boer-Mah	26/07/2016	T Boer-Mah	26/07/2016
Draft V.3	Revised Report issue to Client	G Goode	T Boer-Mah	12/08/2016	T Boer-Mah	15/08/2016
Final	Final issue to Client	G Goode	T Boer-Mah	17/08/2016	T Boer-Mah	17/08/2016

Executive Summary

Springvale Coal Pty Ltd (Springvale Coal), a subsidiary of Centennial Coal (Western Operations), commissioned RPS to prepare an Aboriginal and historic heritage Cultural Heritage Impact Assessment (CHIA) for the proposed Springvale Water Treatment Project (the Project). The Project Application Area (PAA) comprises a twenty-metre wide linear pipeline corridor with a ten-metre wide disturbance footprint within the corridor extending between the existing Gravity Tank on Newnes Plateau and the Water Treatment Plant (WTP) location within the Mount Piper Power Station (MPPS) site. This also includes a network of pipelines from the WTP to the Springvale Coal Services Site (SCSS) and the cooling towers water system at MPPS (**Figure 7**).

An improved environmental outcome is proposed in the Project through the transfer of water from existing underground mine-dewatering facilities for treatment within the WTP and subsequent reuse in the MPPS's cooling water system. Treated water that cannot be used at MPPS will be discharged into Wangcol Creek, within the upper catchment of the Coxs River.

The main components of the Project shown in **Figure 1** comprise the following:

- The Gravity Tank Compound on Newnes Plateau
- A transfer pipeline from the Gravity Tank Compound to a new water treatment plant to be located at the Mount Piper Power Station (MPPS) site;
- A water treatment plant incorporating desalination processes for the treatment of water prior to use in the cooling water system at MPPS, or discharge to Wangcol Creek;
- A network of pipelines from the new water treatment plant to:
- The cooling water system at MPPS (the Cooling Water Pipeline);
- A new licensed discharge point (LDP) within the Springvale Coal Services Site for discharge into Wangcol Creek (the Treated Water Discharge Pipeline);
- The tailings dams within the Springvale Coal Services Site for the transfer of residuals (the Residuals Pipeline); and
- A crystalliser to provide further treatment of the additional salt load generated within the MPPS cooling tower blowdown system.

Staged survey works and consultation began in 2011 and continued until 2016. There are two pipeline alignments proposed on Newnes Plateau: a northern alignment (Northern Study Area) and a southern alignment (Southern Study Area) (**Figure 2** and **Figure 3**, respectively). The Northern and Southern Study Areas are collectively referred to as the Project's Study Area. Centennial Coal have advised that the disturbance footprint for the pipeline corridor will not exceed ten metres in width and is wholly located within the Northern Study Area surveyed in this assessment. The eastern portion of the Study Area is located approximately 10 kilometres (km) north of Lithgow, while the western portion of the Study Area is situated approximately 18 km northwest of Lithgow. Lithgow is located in the South Eastern Highlands of the Blue Mountains area and is approximately 140 km from Sydney, NSW. The Project involves the transfer of water from existing underground mine dewatering facilities at Springvale Mine and Angus Place Colliery for industrial reuse at the MPPS.

The Project is classified as a State Significant Development (SSD) under the *State Environmental Planning Policy (State and Regional Development) 2011* which requires consent for the Project under Part 4 Division 4.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Project is located in the Lithgow Local Government Area (LGA).

Springvale Mine and Angus Place Colliery operate a water management scheme incorporating a series of dewatering bore facilities on the Newnes Plateau for the management of safe water levels in the underground workings. Mine water from these two mines is currently discharged to Coxs River via a licensed discharge point. EnergyAustralia owns and operates the MPPS. The power station has a high demand for make-up water for use in the cooling water system. Water is drawn from the Coxs River and Fish River water supply schemes. An improved environmental outcome is proposed through the transfer of mine water from existing underground mine dewatering facilities for treatment and reuse at the MPPS. Discharge of treated water to Wangcol Creek (within the upper Coxs River catchment) will only occur when MPPS is operating at a reduced capacity. The MPPS operates as a zero discharge site with no release water by-products from the cooling water system to receiving waters.

This report has been prepared for inclusion in the Environmental Impact Statement (EIS) prepared under Division 4.1 of Part 4 of the EP&A Act and has been prepared in accordance with the relevant legislation (**Appendix 1**). The aim of this document is to assist regulators in understanding the potential impacts to Aboriginal and historical heritage items resulting from the proposed Project.

The Aboriginal Cultural Heritage Consultation Requirements (ACHCRs) for proponents (DECCW 2010) have been followed in this Project. This report considers the environmental and archaeological context of the Study Area including results from a search of the Aboriginal Heritage Information Management System (AHIMS) database (**Appendix 2**) and the relevant Historic Heritage databases.

This CHIA has undertaken the necessary background research and visual inspections required to identify historic and Aboriginal heritage and assessed the potential impact of the proposed works in relation to the installation of the pipeline.

This assessment has identified that the curtilage of The Cottage (Item Number I191) on Lot 101, DP829410 Castlereagh Highway, a historic heritage item listed on the Lithgow LEP, extends into the Study Area; however, the heritage buildings associated with this item are located approximately 200 metres east of the Study Area (**Figure 4**). The Study Area encapsulates a 10 metre x 10 metre section of the western part of the curtilage. The proposed works will have minor visual impact on this heritage item, but will not harm any built heritage and thus satisfies Section 121S (2) of the EP&A Act. Works should be limited to the 10 metre x 10 metre area identified.

One unlisted heritage item the European Surveyor's Tree (EST JN1) abuts the Study Area. As such, this area should be clearly marked as a No Go Zone to prevent access during construction and thus prevent harm to the heritage item by the proposed works (**Figure 6**).

There are seven extant Aboriginal sites in proximity to the Study Area: AHIMS #45-1-0210, AHIMS #45-1-0218, AHIMS #45-1-0237 (artefact scatters), AHIMS #45-1-2721, #45-1-2723, #45-1-2724 (isolated finds) and AHIMS #45-1-2758 (scarred tree) (**Figure 5**). Due to their proximity to the Study Area each of these sites should be clearly marked as NO GO ZONE areas (**Figure 6**) to prevent access during construction and thereby prevent harm to the Aboriginal objects at these sites.

It should be noted that there are currently heritage management plans which have been prepared for Aboriginal and Historic heritage for Centennial Coal's Western operations: Centennial's *Western Holdings Aboriginal Cultural Heritage Management Plan 2014* (ACHMP) (Centennial Coal 2014) and Centennial's *Historic Heritage Management Plan Western Holdings 2014* (HHMP) (Centennial Coal 2016). These management plans will be updated with the current Project as required following approval.

Recommendation 1

The proposed works within the curtilage of The Cottage (I191) must be limited to the 10 metre x 10 metre section of the Project Application Area and not further encroach on the curtilage of this item **(Figure 4**).

Recommendation 2

The proposed works must be limited to the defined Project Application Area. NO GO ZONE areas should be marked prior to and during construction for: European Surveyor's Tree (EST JN1), AHIMS #45-1-0210, AHIMS #45-1-0218, AHIMS #45-1-0237 (artefact scatters), AHIMS #45-1-2721, #45-1-2723, #45-1-2724 (isolated finds) and AHIMS #45-1-2758 (scarred tree) (**Figure 6**).

Recommendation 3

If during works suspected Aboriginal or skeletal material is identified then procedures outlined in Centennial's *Western Holdings Aboriginal Cultural Heritage Management Plan 2014* (ACHMP) (Centennial Coal 2014) must be followed.

Recommendation 4

If during works suspected historic material is identified then procedures outlined in Centennial's *Historic Heritage Management Plan Western Holdings 2014* (HHMP) (Centennial Coal 2016) must be followed.

Terms, Definitions and Abbreviations

Abbreviation/Term	Meaning
Aboriginal Culturally Modified Tree/ Scarred Tree	"Means a tree that, before or concurrent with (or both) the occupation of the area in which the tree is located by persons of non-Aboriginal extraction, has been scarred, carved or modified by an Aboriginal person by: (a) the deliberate removal, by traditional methods, of bark or wood from the tree, or (b) the deliberate modification, by traditional methods, of the wood of the tree" NPW Regulation 80B (3). Culturally Modified trees are sometimes referred to as scarred trees.
Aboriginal Object	"Any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises NSW, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains" (DECCW 2010:18).
Aboriginal Place	"A place declared under s.84 of the NPW Act that, in the opinion of the Minister, is or was of special significance to Aboriginal culture" (DECCW 2010:18). Aboriginal places are gazetted by the minister.
ACHAR	Aboriginal Cultural Heritage Assessment Report
ACHCR	Aboriginal Cultural Heritage Consultation Requirements for Proponents.
ACHMP	Aboriginal Cultural Heritage Management Plan
Activity	A project, development, or work (this term is used in its ordinary meaning and is not restricted to an activity as defined by Part 5 EP&A Act 1979).
AHIMS	Aboriginal Heritage Information Management System.
BP	Years before present as determined by radiocarbon dating. Sometimes these dates are calibrated (cal. years BP) this indicates a radiocarbon date has been calibrated using the dendrochronology curves, making the date more accurate than an uncalibrated date.
CHIA	Cultural Heritage Impact Assessment
DECCW	Parts of the former Department of Environment, Climate Change and Water (is now the Office of Environment and Heritage – OEH).
Development area	"Area proposed to be impacted as part of a specified activity or development proposal" (OEH 2011:ii). This report has used proposed **impact area** to mean the same as development area.
DGRs	Director-General's Requirements issued by DoPI.
Disturbed Land	"Land is disturbed if it has been the subject of a human activity that has changed the land's surface, being changes that remain clear and observable." (DECCW 2010:18).
DoPI	Department of Planning and Infrastructure (from April 2011) previously known as Department of Planning (DoP).
Due Diligence	"Taking reasonable and practical steps to determine whether a person's actions will harm an Aboriginal object and, if so, what measures can be taken to avoid that harm" (DECCW 2010:18).
EIS	Environmental Impact Statement.
EP&A Act	NSW *Environmental Planning and Assessment Act 1979.*
GDA	Geodetic Datum Australia.
GIS	Geographic Information System.
GSE	Ground Surface Exposure.
GSV	Ground Surface Visibility.
GTC	Gravity Tank Compound
Harm	"Destroy, deface, damage an object, move an object from the land on which it is situated, cause or permit an object to be harmed." (DECCW 2010:18).
LALC	Local Aboriginal Land Council.

Abbreviation/Term	Meaning
LDP	Licensed Discharge Point
LEP	Local Environmental Plan
LGA	Local Government Area.
ML	Mining Lease.
MPPS	Mount Piper Power Station
NPW Act	NSW *National Parks and Wildlife Act 1974* (administered by OEH).
NPW Regulation	NSW *National Parks and Wildlife Regulation 2009* (administered by OEH).
NPWS	National Parks and Wildlife Service.
OEH	Office of Environment and Heritage (formerly DECCW).
PAD	Potential Archaeological Deposit.
Project Application Area	A twenty-metre wide linear pipeline corridor with a ten-metre wide disturbance footprint within the corridor extending between the existing Gravity Tank on Newnes Plateau and the Water Treatment Plant (location within the Mount Piper Power Station and associated infrastructure
The Project	Springvale Water Treatment Project
RAP	Registered Aboriginal Party
Springvale Coal	Springvale Coal Pty Ltd
SCSS	Springvale Coal Services Site
Study Area	“The area that is the subject of archaeological investigation. Ordinarily this would include the area that is being considered for development consent, inclusive of the proposed development footprint” (OEH 2011:ii).
WTP	Water Treatment Project

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1.0 Introduction

Springvale Coal Pty Ltd Limited, a subsidiary of Centennial Coal (Western Operations) requires an Aboriginal and historic heritage Cultural Heritage Impact Assessment (CHIA) that will be integrated along with other specialist assessments into an Environmental Impact Statement (EIS). This report is for the proposed Springvale Water Treatment Project (the Project) which involves the transfer of water from existing underground mine dewatering facilities at Springvale Mine and Angus Place Colliery for industrial reuse at the Mount Piper Power Station's (MPPS) cooling water system following treatment in a new water treatment plant. Treated water not able to be reused will be discharged to Wangcol Creek (**Figure 1**).

The Project is classified as a State Significant Development (SSD) under the *State Environmental Planning Policy (State and Regional Development) 2011* which requires consent for the Project under Part 4 Division 4.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Project is located in the Lithgow Local Government Area (LGA).

The objectives of this CHIA are to provide an assessment of the Study Area for Aboriginal heritage values, to identify whether Aboriginal sites, objects or places would be impacted by the proposed works, and to provide appropriate mitigation and management recommendations, where required. This CHIA also identifies whether non-Indigenous heritage sites, objects or places would be impacted by the proposed works, and to provide appropriate mitigation and management recommendations, as required.

This Aboriginal and non-Indigenous CHIA report has been prepared in accordance with the following guidelines:

- *Aboriginal cultural heritage consultation requirements for proponents 2010* (NSW Department of Environment, Climate Change and Water [DECCW] 2010a) (the ACHCRs);
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b);
- *Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW* (NSW Office of Environment and Heritage [OEH] (2011);
- *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (NSW Department of Environment and Conservation [DEC] 2005);
- *Burra Charter* (Australia ICOMOS 2013)
- *Ask First; A Guide to Respecting Indigenous Heritage Places and Values* (Australian Heritage Commission 2002);
- *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010) ("Due Diligence Code");
- *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects* (Minerals Council 2010) ("Minerals Due Diligence Code");
- *NSW Heritage Manual* (NSW Heritage Office 1996);
- *Statements of Heritage Impact* (Heritage Office and Department of Urban Affairs and Planning 2002).

1.1 Project Application Area

The Project Application Area (PAA) comprises a twenty metre wide linear pipeline corridor containing a ten metre wide disturbance footprint within that corridor. The PAA extends from the existing Gravity Tank on Newnes Plateau and the Water Treatment Plant location within the Mount Piper Power Station (MPPS) site.

Associated infrastructure including the existing Gravity Tank site compound, the water treatment plant location at MPPS and a network of pipelines from the water treatment plant to the Springvale Coal Services Site and the cooling water system at MPPS (**Figure 4**). This PAA corresponds to the Northern Study Area (Refer Section 1.3) and includes the northern pipeline alignment. This pipeline alignment has been selected due to a smaller disturbance or impact footprint (27.84 ha) compared to the southern pipeline alignment assessed in the Southern Study Area.

1.2 Project Description

The Water Treatment Project (WTP) will include the installation of a water transfer pipeline and associated infrastructure. The key elements of the Project include:

- A pipeline system to transfer up to 36 ML/day of dewatered mine water from the existing gravity tank forming a part of the Springvale Mine's approved dewatering facilities on the Newnes Plateau to a new water treatment plant at the MPPS site;
- A new water treatment plant at the MPPS incorporating the desalination processes to reduce the salinity in mine water to a standard suitable for either industrial reuse or environmental release;
- Transfer of treated water from the water treatment plant to the MPPS cooling water system (Cooling Water Pipeline) to contribute to the demand for make-up water;
- Transfer of any excess treated water via a pipeline to a new licensed discharge point (LDP) located in the Springvale Coal Services site (Western Coal Services Project, SSD 5579) for environmental release to Wangcol Creek (the Treated Water Discharge Pipeline);
- Transfer of the saline brine stream from water treatment plant to the MPPS cooling water blowdown system for integration with existing treatment and brine disposal practices (the Residuals Pipeline); and
- Installation of a crystalliser to provide further treatment of the additional salt load generated within the MPPS cooling tower blowdown system.

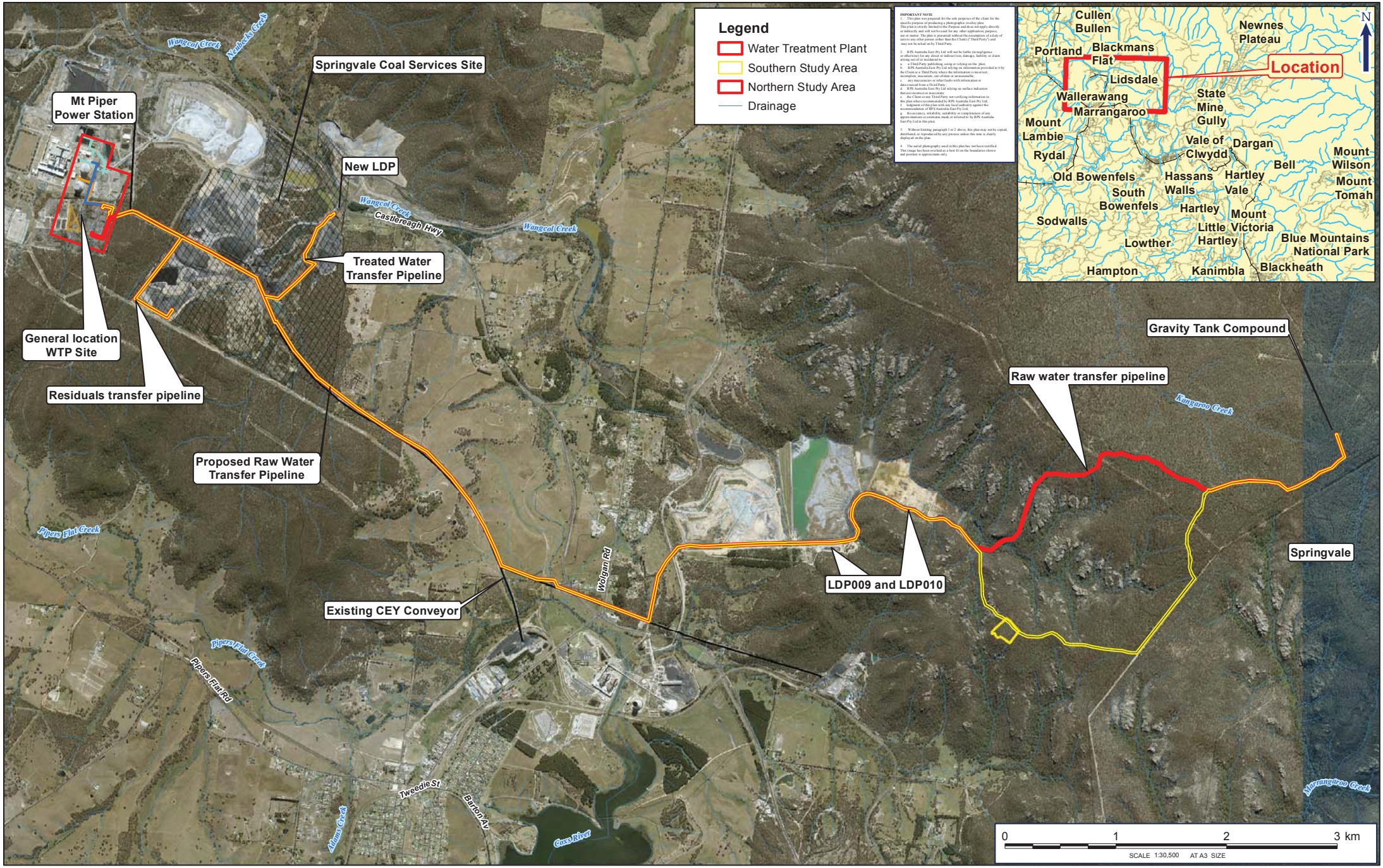
1.3 The Study Area

This impact assessment report has been prepared for the Project's Study Area (**Figure 1**) which comprises the Northern Study area and the Southern Study Area, corresponding to, respectively, a northern (**Figure 2**) and southern (**Figure 3**) alignment, which have both been investigated in this report. The Northern and Southern Project areas are collectively referred to as the Study area. The Study Area is located within the Lithgow Local Government Area (LGA).

The western portion of the Study Area in the vicinity of MPPS is surrounded by industrial and agricultural lands accommodating infrastructure, cleared lands and road networks. The eastern portion of the Study Area is on the Newnes Plateau within Newnes State Forest managed by Forestry Corporation of NSW. The central portions of the Study Area are situated within Centennial owned lands, private lands and EnergyAustralia lands with uses such as mining, forestry, pastoral farming and energy resources. The impact or disturbance footprint is a linear 10 m wide easement located within the Study Area traversing from the Gravity Tank in the east to the MPPS in the west and includes the gravity tank compound, the cooling tower pipeline, the treated water discharge pipeline, the residuals transfer pipeline, the LDP, tailings dams and the water treatment plant footprint. The eastern end of the Study Area is located approximately 10 km north of Lithgow, with the western end situated approximately 18 km northwest of Lithgow. Lithgow is located in the South Eastern Highlands in the Blue Mountains and is approximately 140 km from Sydney, NSW.

1.4 Acknowledgments

The Aboriginal component of this report has been written by suitably qualified heritage professionals in accordance with s1.6 and r1 of the Code of Practice for Archaeological Investigation (DECCW 2010:4,20). RPS Senior Cultural Heritage Consultant Gillian Goode prepared this report assisted by RPS Cultural Heritage Consultant Jo Nelson. Newcastle Cultural Heritage Manager Tessa Boer-Mah reviewed the report.



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TITLE : **FIGURE 1: STUDY AREA**	LOCATION : **SPRINGVALE**	DATUM:GDA 1994 PROJECTION: GDA 1994 MGA Zone 56	DATE : **15/08/2016** PURPOSE: **HERITAGE**	VERSION (PLAN BY): B A3 (Natalie.Wood) PATH: J:\JOBS\Centennial\All Jobs\131758 JV Energy Australia Springvale\10 - Drafting\Arcgis Map Documents\Arch\Report Figures\131758 Figure 1 Location B A3 20160812.mxd

CLIENT: **CENTENNIAL COAL**
JOB REF: **PR131758**

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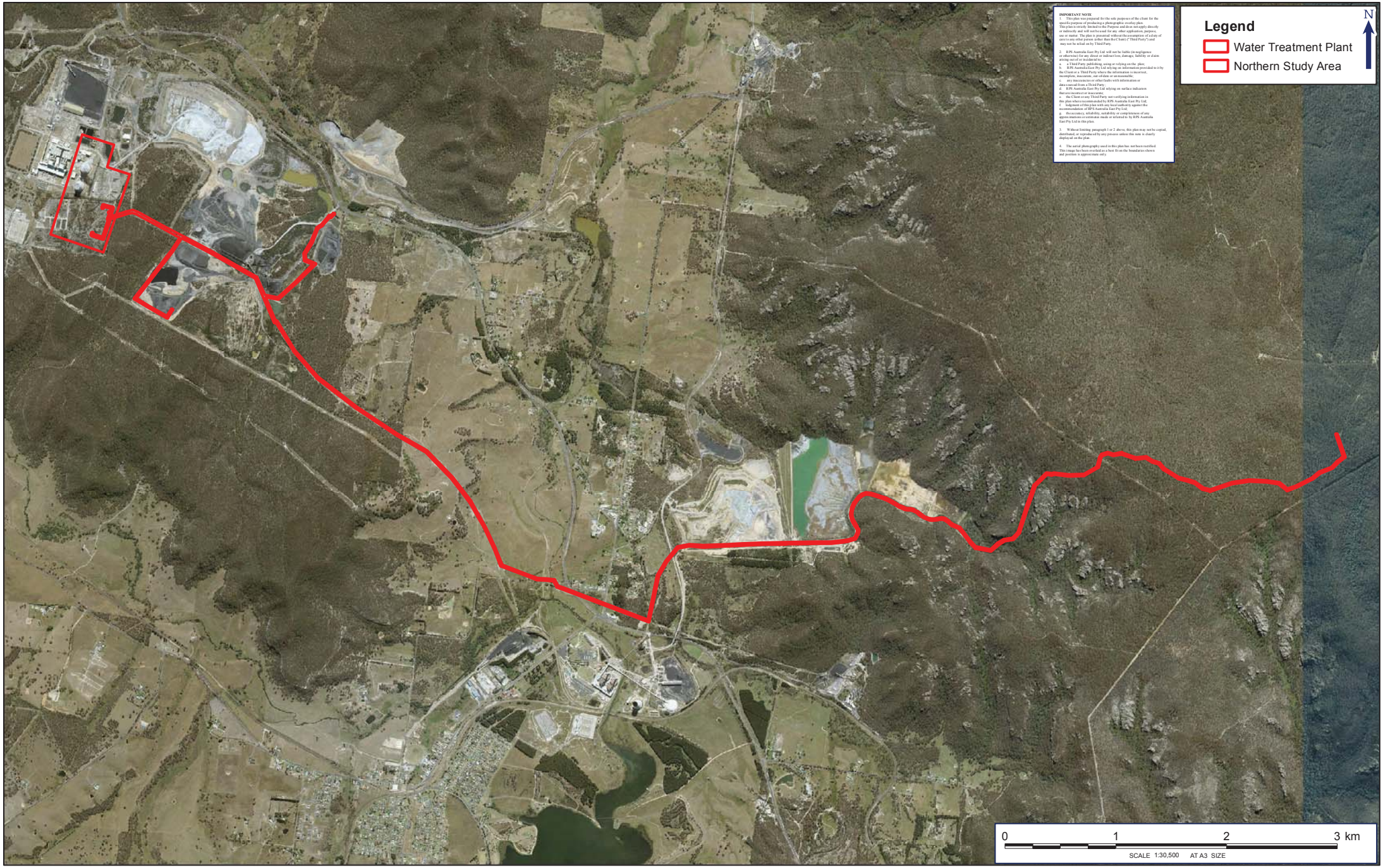

TITLE : **FIGURE 2: NORTHERN STUDY AREA**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **15/08/2016**

PURPOSE: **HERITAGE**

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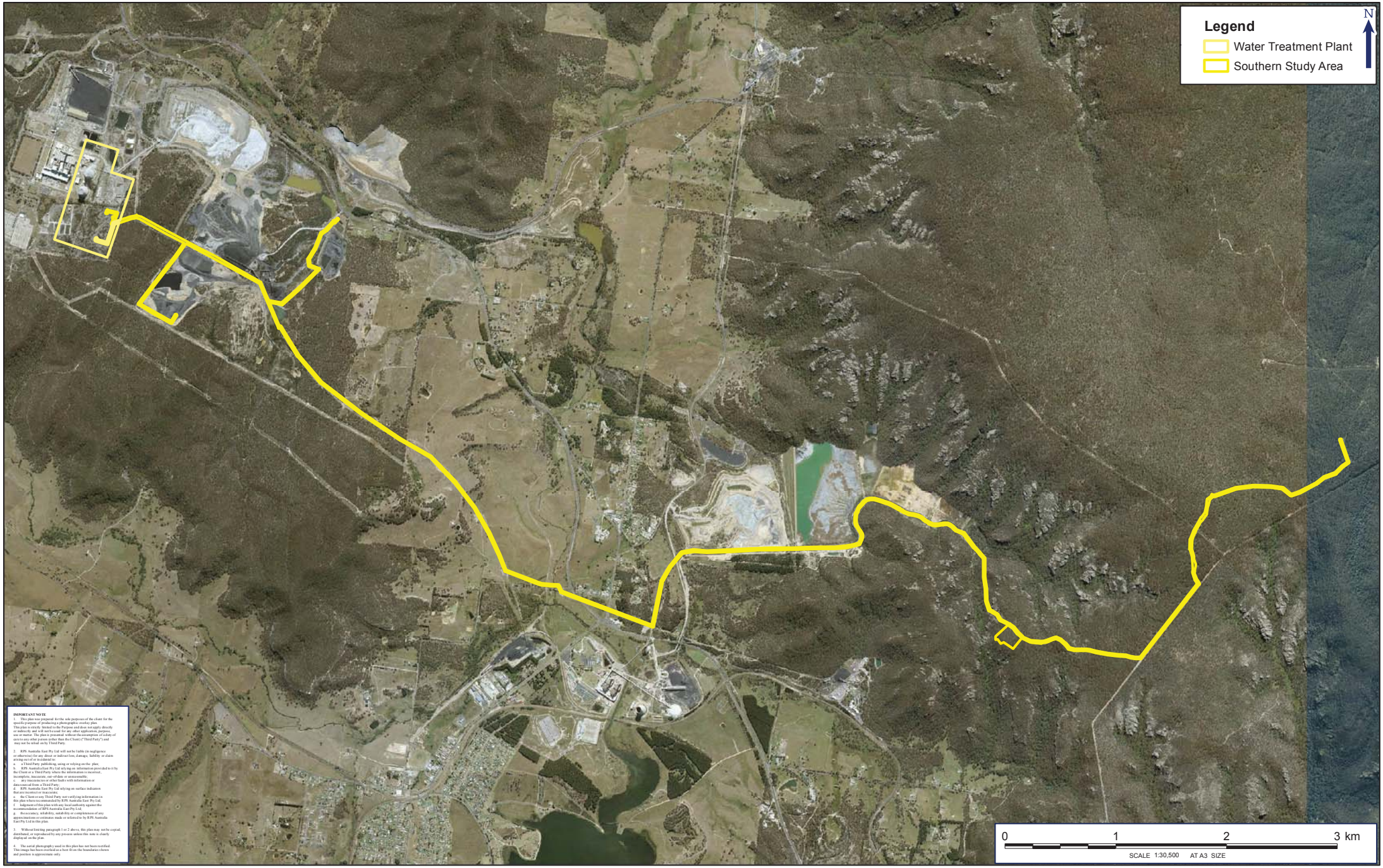

TITLE : **FIGURE 3: SOUTHERN STUDY AREA**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **15/08/2016**

PURPOSE: **HERITAGE**

VERSION (PLAN BY): B A3 (Natalie.Wood)

PATH: J:\JOBS\Centennial\All Jobs\131758 JV Energy Australia Springvale\10 - Drafting\Arcgis Map Documents\Arch\Report Figures\131758 Figure 3 South B A3 20160812.mxd

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2.0 Legislative Context

This project is being assessed primarily in accordance with the *Environmental Planning and Assessment Act 1979* (EP&A Act) and it is under this legislation that the Secretary's Environmental Assessment Requirements (SEARs) for the Project have been issued and addressed in this report. The legislation and regulations that protect Aboriginal heritage and historic heritage have also been outlined.

2.1 Environmental Planning and Assessment Act 1979

The EP&A Act regulates a system of environmental planning and assessment for New South Wales. Land use planning requires that environmental impacts are considered, including the impact on cultural heritage and specifically Aboriginal heritage. Within the EP&A Act, Parts 3, 4 and 5 relate to Aboriginal heritage.

Part 3 regulates the preparation of planning policies and plans. Part 4 governs the manner in which consent authorities determine development applications and outlines those that require an environmental impact statement. Part 5 regulates government agencies that act as determining authorities for activities conducted by that agency or by authority from the agency. The National Parks & Wildlife Service is a determining authority under Part 5 of the EP&A Act.

Under 4.1 of EP&A Act, a development may be declared a State Significant Development (SSD) if it meets specific criteria. The consent authority for a state significant development is the Minister, although under Section 23 the minister may delegate consent authority function to the Planning Assessment Commission, the Secretary or to any other public authority. An AHIP under section 90 of the NPW Act is not required for developments which have been declared a SSD in accordance with 89J (1)(d) of the EP&A Act. However, an EIS is still required for an SSD and SEARs typically issued will include provisions for the assessment and management of Aboriginal heritage, as well as Aboriginal consultation.

The EP&A Act ensures that Aboriginal and historic heritage is properly assessed in land use planning and development.

2.2 Aboriginal Cultural Heritage

Although there are a number Acts and regulations protecting and managing cultural heritage in New South Wales (see **Appendix 1**); the primary ones which apply to this report include:

- *National Parks and Wildlife Act 1974* (as amended)
- *National Parks and Wildlife Regulation 2009*
- *Environmental Planning and Assessment Act 1979*

In brief, the *National Parks and Wildlife Act 1974* (as amended) protects Aboriginal heritage (places, sites and objects) within NSW; the *National Parks and Wildlife Regulation 2009* provides a framework for undertaking activities and exercising due diligence.

2.2.1 National Parks & Wildlife Act 1974 (as amended)

The *National Parks and Wildlife Act 1974* (as amended) (NPW Act) protects Aboriginal heritage (places, sites and objects) within NSW. Protection of Aboriginal heritage is outlined in s86 of the NPW Act, as follows:

- "A person must not harm or desecrate an object that the person knows is an Aboriginal object" s86(1),
- "A person must not harm an Aboriginal object" s86(2)

- "A person must not harm or desecrate an Aboriginal place" s86(4).

Penalties apply for harming an Aboriginal object or place. The penalty for knowingly harming an Aboriginal object (s86[1]) and/or an Aboriginal place (s86[4]) is up to $550,000 for an individual and/or imprisonment for 2 years; and in the case of a corporation the penalty is up to $1.1 million. The penalty for a strict liability offence (s86[2]) is up to $110,000 for an individual and $220,000 for a corporation.

Harm under the NPW Act is defined as any act that; destroys defaces or damages the object, moves the object from the land on which it has been situated, causes or permits the object to be harmed. However, it is a defence from prosecution if the proponent can demonstrate 1) that harm was authorised under an Aboriginal Heritage Impact Permit (AHIP) (and the permit was properly followed), or 2) that the proponent exercised due diligence in respect to Aboriginal heritage. The **'due diligence' defence (s87(2))**, declares that: if a person or company has exercised due diligence to ascertain that no Aboriginal object was likely to be harmed as a result of the activities proposed for the Project Area; then liability from prosecution under the NPW Act will be removed or mitigated if it later transpires that an Aboriginal object was harmed. If any Aboriginal objects are identified during the activity, then works should cease in that area and Office of Environment and Heritage (OEH) notified (DECCW 2010:13). The due diligence defence does not authorise continuing harm.

Notification of Aboriginal Objects

Under s89A of the NPW Act Aboriginal objects (and sites) must be reported to the Director-General of OEH within a reasonable time (unless it has previously been recorded and submitted to AHIMS). Penalties of $11,000 for an individual and $22,000 for a corporation may apply for each object not reported.

2.2.2 National Parks and Wildlife Regulation 2009

The *National Parks and Wildlife Regulation 2009* (NPW Regulation) provides a framework for undertaking activities and exercising due diligence in respect to Aboriginal heritage. The NPW Regulation outlines the recognised due diligence codes of practice which are relevant to this report, but it also outlines procedures for Aboriginal Heritage Impact Permit (AHIP) applications and Aboriginal Cultural Heritage Consultation Requirements (ACHCRs) (DECCW 2010); amongst other regulatory processes.

2.2.3 Native Title Act

The Commonwealth Government enacted the *Native Title Act (1993)* to formally recognise and protect native title rights in Australia following the decision of the High Court of Australia in Mabo & Ors v Queensland (No. 2) (1992) 175 CLR 1 ("Mabo").

Although there is a presumption of native title in any area where an Aboriginal community or group can establish a traditional or customary connection with that area, there are a number of ways that native title is taken to have been extinguished. For example, land that was designated as having freehold title prior to 1 January 1994 extinguishes native title, as does any commercial, agricultural, pastoral or residential lease. Land that has been utilised for the construction or establishment of public works also extinguishes any native title rights and interests for as long as they are used for that purpose. Other land tenure, such as mining leases, may be subject to native title, depending on when the lease was granted.

2.2.4 Aboriginal Land Rights Act 1983

The purpose of this legislation is to provide land rights for Aboriginal people within NSW and to establish Local Aboriginal Land Councils (LALCs). The land able to be claimed by LALCs, on behalf of Aboriginal people, includes Crown Land that (s36):

- Is able to be lawfully sold, leased, reserved or dedicated;
- Is not lawfully used or occupied;
- Does not comprise lands which, in the opinion of the Crown Lands Minister, are needed or are likely to be needed for residential purposes;
- Are not needed, nor likely to be needed for an essential public purpose;
- Does not comprise land under determination by a claim for native title; and
- Is not the subject of an approved determination under Native Title.

Claims for land are by application to the Office of the Registrar, Aboriginal Land Rights Act (1983).

2.2.5 Guidelines

2.2.5.1 ICOMOS Burra Charter

The ICOMOS Burra Charter defines the basic principles and procedures to be followed in the conservation of cultural heritage in Australia. Article 2 declares "'The aim of conservation is to retain the cultural significance of a place' and must include provision for its security, its maintenance and its future." The principles that are set out in the Burra Charter guide and inform the assessment of significance of a place. As noted above, Cultural Significance means aesthetic, historic, scientific, or social value for past, present or future generations. Significance assessments are a helpful tool in the management of cultural heritage resources through allowing managers to make informed decisions especially in land use issues. Definitions of these concepts of significance are (Australia ICOMOS 1999):

- Aesthetic value (visual aspects of site);
- Scientific value or research potential (rarity, quality and representativeness of site);
- Social value (spiritual, political and cultural aspects of site); and
- Historic value (aesthetic, scientific and social values combined).

Aesthetic value encompasses aspects of sensory perception including form, scale, colour, texture and material of the fabric. Scientific value is the importance of the item in relation into its rarity, quality or representativeness. Social value encompasses the spiritual, political, national or other associations to a majority or minority group. Historic value is the history of the place, its association with historic figure and/or its role in a historical event.

2.2.5.2 Ask First: A Guide to Respecting Indigenous Heritage Places and Values

Ask First (2002) was commissioned by the Australian Heritage Commission to help Australians protect different aspects of their natural and cultural heritage places, and is intended to be complementary to the Australia ICOMOS Burra Charter and the Australian Natural Heritage Charter. Ask First is a practical guide for land developers, land users and managers, cultural heritage professionals and others who may have an impact on Indigenous heritage. The main focus of the guidelines is to emphasise that consultation and negotiation with Indigenous stakeholders is the best means of addressing Indigenous heritage issues. The guidelines also emphasise the need to comply with relevant Territory and Commonwealth Indigenous cultural heritage legislation and statutory authorities.

Ask First states that in recognising the rights and interests of Indigenous peoples in their heritage, all parties concerned with identifying, conserving and managing this heritage should acknowledge, accept and act on the principles that Indigenous people:

- Are the primary source of information on the value of their heritage and how it is best conserved;
- Must have an active role in any Indigenous heritage planning process;
- Must have input into primary decision-making in relation to Indigenous heritage so that they can continue to fulfil their obligations towards this heritage; and
- Must control intellectual property and other information relating specifically to their heritage, as this may be an integral aspect of its heritage value.

2.3 Historic Heritage Legislative Framework

2.3.1 Commonwealth Heritage Protection

At the Commonwealth level, the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides for the management and protection of Australia's heritage places, including World Heritage properties. It provides for the listing of natural, historic or Indigenous places that are of outstanding national heritage value to the Australian nation, as well as heritage places on Commonwealth lands and waters or under Australian Government control.

2.3.2 State Heritage Protection

Heritage protection and management in NSW is afforded under the *National Parks and Wildlife Act 1974* and the *Heritage Act 1977*. Under these Acts heritage permits are required for any works with the potential to impact on heritage, including built heritage and archaeological heritage. Historic heritage items are assessed in terms of level of significance, that is, they are of State level significance or of local significance.

Historical archaeological relics, buildings, structures, archaeological deposits and features with State heritage significance are protected under the *Heritage Act 1977* (and subsequent amendments) and may be identified on the SHR or by an active Interim Heritage Order (IHO). Approval must be gained from the NSW Heritage Council when making changes to a place listed on the SHR or a place covered by an IHO. That approval is sought through lodgement of a s.57 or a s.60 application prior to commencement of works.

Section 170 of the *Heritage Act 1977* requires each State Government agency to keep records of heritage items owned or operated by it. The management of s170 Register items needs to be in line with the *State Agency Heritage Guide* (2001) under the *Heritage Act 1977* s.170A (3), and for rail infrastructure, also the *Asset Management Strategy* (2011).

Approval from the NSW Heritage Division is required when excavating any land in NSW where there is potential of disturbing an archaeological relic (of non-Indigenous origin). Under the *Heritage Act 1977* a 'relic' is defined as any deposit, artefact, object or material evidence that:

(a) relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and

(b) is of State or local heritage significance

The application type required to gain approval is dependent on whether the site is of local or state significance. The following provides an overview.

2.3.3 Local Heritage Protection

The EP&A Act and its regulations, schedules and associated guidelines require that environmental impacts are considered in land use planning and development assessment. The EP&A Act defines 'environment' as '…all aspects of the surroundings of humans, whether affecting any human as an individual or in his or her

social groupings.' The environment therefore includes cultural heritage. Heritage items and places are described in LEPs and shown on the heritage maps which accompany the LEP. All LEPs contain clauses dealing with heritage conservation. Under the EP&A Act all local governments in NSW are required to maintain a register of heritage places as Schedule 5 under their LEP.

The proposed works would be carried out under the *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP). This legislation is intended to facilitate the delivery of infrastructure across NSW. The proposed works are development that is permissible without consent, however a requirement of the EP&A Act is that assessment be conducted under Part 5 (environmental assessment).

Under the Infrastructure SEPP, a public authority or a person acting on behalf of a public authority, must not carry out development that would impact on a heritage item unless the authority or the person has:

(a) had an assessment of the impact prepared, and

(b) given written notice of the intention to carry out the development, with a copy of the assessment, to the council for the area in which the heritage item or heritage conservation area (or the relevant part of such an area) is located, and

(c) taken into consideration any response to the notice that is received from the council within 21 days after the notice is given.

3.0 Aboriginal Consultation

Aboriginal consultation has been undertaken in accordance with the Aboriginal Cultural Heritage Consultation Requirements (DECCW 2010). The Aboriginal consultation has been undertaken over a number of years and is summarised in **Table 1** and the Registered Aboriginal Party (RAP) list compiled in **Table 2**. The RAPs have been consulted in relation to survey methodologies (**Table 3**), with the majority having participated in the surveys (Table 4).

A gap analysis identified areas along the pipeline route that required visual inspection. The majority of the Study Area for the Project was previously surveyed by RPS with representatives from the RAPs. Due diligence visual inspection of parts of the Study Area was also undertaken with an invite to the groups to participate.

Table 1 Summary of main stages of the ACHCRs for each Project

ACHCRs Due Dates for each component per Project					
Stage	**Component**	**Western Coal Services CHIA**	**Lidsdale Siding CHIA**	**Water Treatment Project CHIA**	**Springvale Mine Extension Project CHIA**
1	Newspaper Job Advert	22/11/2011	06/10/2011	06/10/2011	06/10/2011
	Expression of Interest Letters	23/11/2011	20/10/2011	20/10/2011	20/10/2011
2 & 3	Response to Survey Methodology	20/11/2012	06/12/2011	13/01/2016	23/12/2011
	Invite to Site/Survey	13/01/2012	16/12/2011	28-29/01/2016	30/05/2013
4	Feedback of Draft Report	24/19/2012	16/08/2012	See Note 1 below	27/04/2012 & 10/07/2013

Feedback received from the RAPs for the Western Coal Services CHIA, Lidsdale Siding CHIA and Springvale Mine Extension Project CHIA Reports.

Table 2 Registered Aboriginal Parties

Registered Aboriginal Parties
Warrabinga Native Title Claimants Aboriginal Corporation
North-East Wiradjuri
Bathurst Local Aboriginal Land Council
Gundungurra Tribal Council Aboriginal Corporation
Mingaan Aboriginal Corporation
Mooka Traditional Owners
Wiray-dyuraa Ngumnbaay-dyil
Wiray-dyuraa Maying-gu
Wiradjuri Council of Elders
Gundungurra Tribal Council Aboriginal Corporation Native Title Claimants
Wiray-dyuraa Ngambaay-dyil and Wiray-dyuraa Maying-gu
Warrabinga/Wiradjuri People Native Title Claimants

The Survey Methodology and Information Gathering Letter Reports were provided to each of the RAPs that had registered an interest at Stage 1 of the OEH ACHCR process for each of the Study Areas. Both hardcopy and electronic copies were provided to each of the Aboriginal stakeholder groups for the purpose of obtaining comments or feedback. **Table 3** lists those groups who responded to the request for comment or feedback to the methodology contained within the report.

Table 3 Aboriginal Stakeholder responses to survey methodology for each previous project

Western Coal Services CHIA	Lidsdale Siding CHIA	Water Treatment Project ACHAR	Springvale Mine Extension Project CHIA
Warrabinga Native Title Claimants Aboriginal Corporation	Warrabinga Native Title Claimants Aboriginal Corporation	Mingaan Aboriginal Corporation	Mingaan Aboriginal Corporation
North-East Wiradjuri	North-East Wiradjuri	Warrabinga Native Title Claimants Aboriginal Corporation	Warrabinga Native Title Claimants Aboriginal Corporation
Bathurst Local Aboriginal Land Council	Bathurst Local Aboriginal Land Council	Wiray-dyuraa Ngambaay-dyil	Wiray-dyuraa Ngambaay-dyil and Wiray-dyuraa Maying-gu
Gundungurra Tribal Council Aboriginal Corporation	Gundungurra Tribal Council Aboriginal Corporation	Wiray-dyuraa Maying-gu	Gundungurra Tribal Council Aboriginal Corporation
Mingaan Aboriginal Corporation	Mingaan Aboriginal Corporation	Gundungurra Tribal Council Aboriginal Corporation	North East Wiradjuri Company Ltd
Mooka Traditional Owners	Wiray-dyuraa Ngumbaau-dyil	North East Wiradjuri Aboriginal Corporation	Bathurst Local Aboriginal Land Council
Wiray-dyuraa Ngumbaau-dyil		Bathurst Local Aboriginal Land Council	
Wiray-dyuraa Maying-gu			
Wiradjuri Council of Elders			

Representatives from the following RAP Groups participated in the visual inspection of the Study Area (**Table 4**).

Table 4 Field survey participants for each previous project

Western Coal Services CHIA	Lidsdale Siding CHIA	Water Treatment Project ACHAR	Springvale Mine Extension Project CHIA
	North-East Wiradjuri	North East Wiradjuri Aboriginal Corporation	Gundungurra Tribal Council Aboriginal Corporation
Warrabinga Native Title Claimants Aboriginal Corporation	Bathurst Local Aboriginal Land Council	Gundungurra Tribal Council Aboriginal Corporation Native Title Claimants	Warrabinga Native Title Claimants Aboriginal Corporation
North-East Wiradjuri	Gundungurra Tribal Council Aboriginal Corporation	Mingaan Aboriginal Corporation	North East Wiradjuri Company Ltd.
Bathurst Local Aboriginal Land Council		Warrabinga/Wiradjuri People Native Title Claimants	Mingaan Aboriginal Corporation
Gundungurra Tribal Council Aboriginal Corporation			Bathurst Land Council
Mingaan Aboriginal Corporation			Wiraydyuraa Ngambaay-dyil & Wiray-dyuraa Maying-gu

Western Coal Services CHIA	Lidsdale Siding CHIA	Water Treatment Project ACHAR	Springvale Mine Extension Project CHIA
Mooka Traditional Owners			
Wiray-dyuraa Ngumbaau-dyil			
Wiray-dyuraa Maying-gu			
Wiradjuri Council of Elders			

Copies of the reports were provided to each of the RAPs that had registered an interest at Stage 1 of the OEH ACHCR process for each section of the Project. Both hardcopy and electronic copies were provided to each of the Aboriginal stakeholder groups in **Table 3** for the purpose of obtaining comments/feedback about the report.

A total of 28 days is provided to the representatives for responses and comments to each of the reports, as stated in Section 4.4, subsection 4.4.3 of the OEH ACHCRs. Reminders were issued to the Aboriginal Stakeholder groups one day prior to the closing date for receiving comments and feedback. The detailed consultation log for these previous projects is located in **Appendix 3** of this report.

4.0 Historic Heritage Context

The heritage items are selected on the basis of how they demonstrate the history of the Wallerawang and Lithgow region. This overview contextualises what is listed in the Project Area and its heritage significance.

4.1 Historical Overview

Lithgow Valley's first European settlers arrived in 1824 and the town was named in 1827 by Hamilton Hume, in honour of William Lithgow, Governor Brisbane's private secretary (Leslie, 1988:6). By 1860, only four more families had settled in the valley. When the western railway line was extended to Lithgow in 1869 the town began to thrive (Leslie 1988:20).

Construction of a railway line into the Lithgow Valley began in 1866. When it was completed in 1869, the Zig Zag Railway was acclaimed as a major engineering feat. (Leslie1988:19). Furthermore, it enabled the industrialisation of Lithgow by making the exportation of coal commercially viable. Thomas Brown commenced Lithgow's first commercial coal mine (Leslie1988:21). Brown commenced the first commercial coalmine the year the railway arrived.

Lithgow was declared a city in 1945. By that time much of the heavy industry was gone, although light industry continued to prosper and the population peaked in the years just after World War II (Leslie 1988:22).

4.1.1 Coal Mining in the Lithgow District

In 1838, Andrew Brown of "Cooerwull" wrote in his diary 'getting coal' (Cremin and Jack 1987:3). This is the first written record of coal in the Lithgow Valley. In 1868, the construction of the railway line through the Valley spread workmen who built their campsites close to the cuttings, embankments and viaducts throughout the length of the valley. To supply their needs for cooking fires and for heating during the cold winter, a Mr. Poole in 1868 opened the Hermitage Colliery as the first commercial mine to engage in mining and selling coal. By 1874, there were four mines producing - Eskbank Colliery (at the eastern end of Main Street near the present Hoskins Church), the Lithgow Valley Colliery, Vale of Clywdd Colliery and the Hermitage Colliery. The owners of the Lithgow Valley Colliery secured contracts to supply coal to the Railways to run their locomotives.

4.1.2 Coal Measures of NSW in 1908 Source; Carne, J. Geological Survey of NSW, 1908. Wallerawang District Collieries

The nature of coal as a high volume resource necessitates that it is able to be delivered in bulk or to be located near to established transport infrastructure. In NSW, especially in the Western Coalfields region, it meant that railway networks needed to be developed. The failure of several coal mines in the Cullen Bullen region prior to the development of the Wallerawang-Mudgee railway line is testament to the importance of developing bulk haulage networks for coal (Christison 2003:7).

The railway reached Wallerawang in 1870. The Cobb and Co Coach Service provided transport between the station at Wallerawang and Bathurst and Mudgee, using the route approximating the current Castlereagh Highway. The exploitation of coal reserves began in Wallerawang around 1873 with a number of mines being opened on the Lithgow seam at Mount Piper, mid-way between Wallerawang and Lidsdale. Completion of the Wallerawang – Mudgee railway branch line in the 1880s coincided with the rapid growth of the coal mining industry in the Western Coalfields. The Lithgow coal seam outcropping was variable in nature between Lidsdale and Portland where it was predominantly expressed in clay shales. The seam became workable once again at Irondale (Carne 1908:201). The mines in the Wallerawang district generally followed the railway line and included Irondale Colliery (1883), Ivanhoe Colliery (1893) and the

Commonwealth Colliery (1895), which became the first open cut mine in NSW during World War II (1940). In addition were the Cullen Bullen and Invincible coal mines nearby. The Lithgow coal seam quality was best in its lowest portions, which at Cullen Bullen exhibited an average thickness of four feet, but at both Irondale and Ivanhoe had little more than one foot that was workable (Carne 1908:201).

The accessibility of the Lithgow coal seam at various localities in the region dictated that mines and mining communities developed in close proximity to one another. The best example is at Lithgow, where colliery headworks were located within 100-200 metres of one another (Christison 2003:9). Generally speaking, coal mines between the years 1831-1946 were worked using manual labour using a large number of workers mostly employed on contract or piecework arrangements. Miners normally would walk, ride a horse or push bike to their work place and were expected to provide their own mining tools and equipment (Christison 2003:29).

4.1.3 Oil Shale Mining in the Region

The first shale oil deposits in NSW were discovered in 1815, and full-scale mining in the area had begun within the next decade. During the 1860s and 1870s, production was at its peak at the Mount Kembla, Joadja, Katoomba, and Hartley Vale mines. Gradually, however, production at these older mines waned, and by the 1890s mine lease holders were actively seeking alternate mining sites. Rich coal seams were identified near Capertee, and in 1896 the mining leases at Genowlan and Airly Mountains were acquired by the Australian Kerosene Oil and Mineral Company (of the Joadja and Katoomba mines) and the Hartley Vale Company (NSW Shale and Oil Company) (Mills 1998: 9).

The Airly mine was renamed by the Hartley Vale Company as the ‘New Hartley Shale Mine’. Shale from this area required more complex processing than the shale that had been extracted from the old Hartley Vale mine. Consequently, a new retort design was developed and plans to construct the Torbane Retort Complex and an associated private railway were underway by 1898.

In 1913, following several tumultuous years of poor export demand, multiple strikes, disputes between the management and mine workers, and a steady decline in the supply of shale and mine productivity, the New Hartley Shale Mine and Torbane Retort Complex were shut down. In the early 1920s, salvageable items from the mine were removed and relocated to more productive mines at nearby Newnes.

The Newnes mine, located in a remote area of the Wolgan Valley, was established in 1906 and provided a readily accessible source of shale. After an initial investment of $800 into the development of these mines by Sir George Newnes of the Commonwealth Oil Corporation, the mines and the town of Newnes flourished, with the mines producing almost 70,000 tonnes of shale per year by 1912. Operations were suspended in 1912 due to increasing financial difficulties, and ownership of the mines was taken up by John Fell and Company. Production was revived, and continued successfully under Fell until the early 1920s. At this time, shale mining in the area decreased dramatically due to the high cost of shale production and continuing labour problems (Mills 1998: 9). Firebricks from the Newnes mines were relocated to the Clyde Refinery at Duck Creek, and the retorts and engines were moved to the Glen Davis mine in 1939 (Mills 1998: 10).

4.1.4 Newnes

The township of Newnes was established in association with the commencement of mining in the area. During the early operational years of the Commonwealth Oil Corporation, the population of Newnes grew rapidly and numbered just over 1600 in 1911.

As the production of the mines increased in the first decade of the 1900s, a major period of development and construction occurred at Newnes. 1907 was a particularly busy year, and saw the construction of a general

store, newsagency, hairdressing salon, school, two butcher shops, a livery stable, a hop saloon, a billiard hall, a primary school and the local police station and post office (Taylor 1987:30-31).

With the liquidation of the Commonwealth Oil Company, the population of Newnes decreased dramatically; only around 200 citizens remained by 1914. A population revival occurred following the outbreak of World War I and the oil works were re-opened, but this was short lived; the town declined again following the cessation of mining operations in 1923, and by 1926 most of the mine workers and their families had left the area. The town's telephone services were removed in 1928, and the train service was discontinued in 1926 (Taylor 1987: 43).

During the 1930s and depression years, the Newnes township was largely dismantled for re-erection in nearby communities including Rylstone, Kandos and Lithgow. Mining operations ended permanently by 1939 and in the 1950s and 60s, the structural remnants of the Newnes Township were demolished.

4.2 Analysis of Physical and Documentary Research

A number of searches were undertaken of both State and Federal heritage databases to confirm if there were any known heritage items that may be affected by the proposed works.

4.2.1 World Heritage List

A search of the World Heritage List was undertaken. There are no world heritage items in the Study Area; however, although outside of the Study Area, the Greater Blue Mountains is listed on the World Heritage register.

4.2.2 Commonwealth Heritage List

The Commonwealth Heritage List is a list of natural, Indigenous and historic heritage places owned or controlled by the Australian Government. These include places connected to defence, communications, customs and other government activities that also reflect Australia's development as a nation. A search of the Commonwealth Heritage List indicated that there are no items listed in the Study Area.

4.2.3 NSW State Heritage Register

The NSW State Heritage Register contains listings for heritage items of state significance. There are no items of state heritage significance in the Study Area.

4.2.4 Lithgow Local Environmental Plan Heritage

Items of significance at the local government level are included in the Local Environmental Plan (LEP) as Heritage Schedules. These are a list of European and some Aboriginal items that are listed with a council as having heritage value.

4.2.4.1 The Cottage – Item I1191 on Lot 101, DP829410 Castlereagh Highway

A search of the Lithgow LEP 2014 Schedule 5 has indicated that the Study Area overlaps a small portion of the curtilage of a historic heritage item listed on the Lithgow LEP Item I191 "The Cottage" which is on Lot 101, DP829410 Castlereagh Highway) (**Table 5**). The heritage buildings associated with this item are located approximately 200 metres east of the Study Area. The Study Area encapsulates a 10 metre x 10 metre section of the curtilage.

Table 5 Heritage Item on the Lithgow Local Environmental Plan 2014

Name of Item	Address	Suburb	Heritage Significance	Item Number
The Cottage	Lot 101, DP 829410, Castlereagh Highway	Lidsdale	Local	I191

4.3 Unlisted Heritage Items

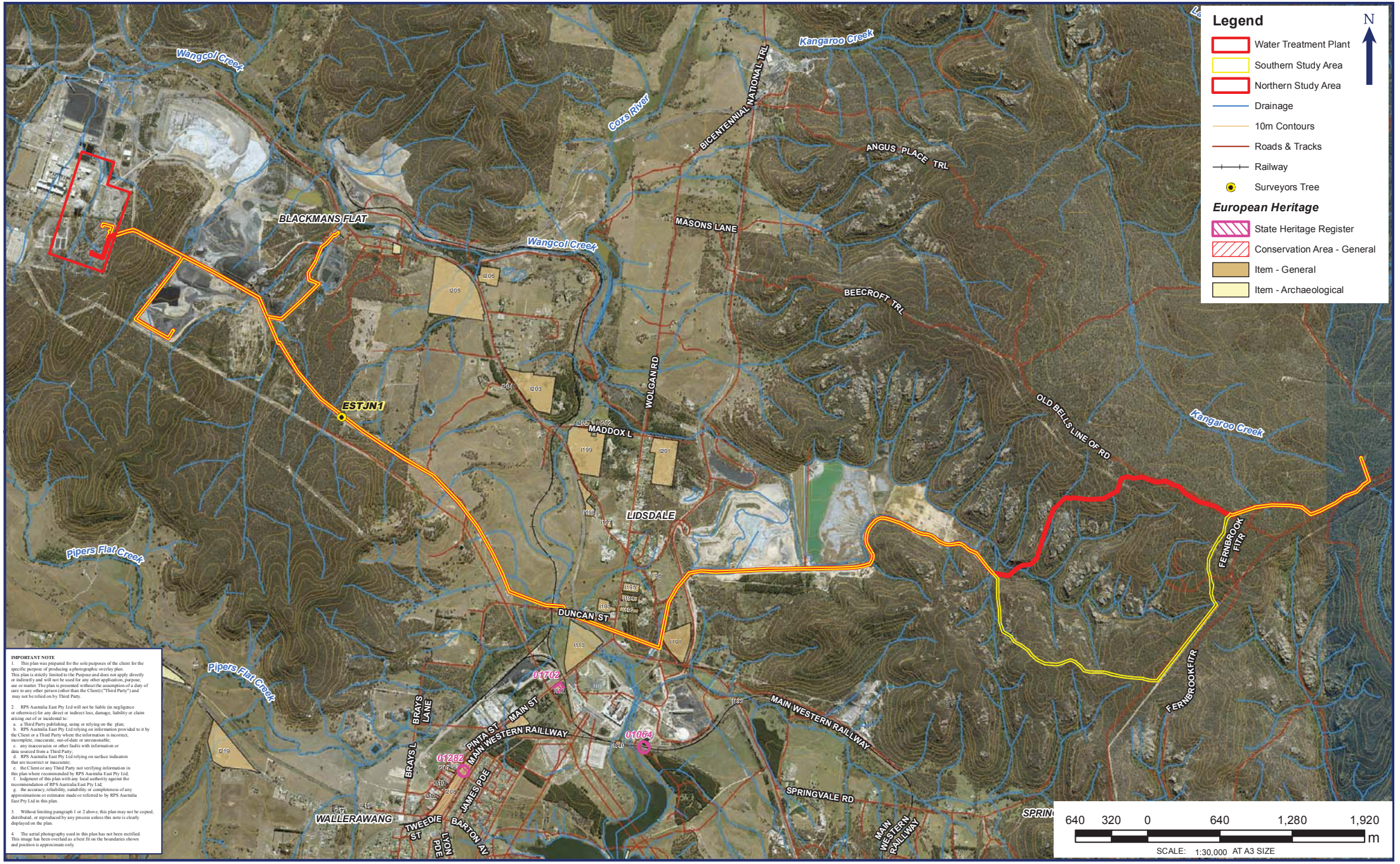
One European Surveyor's Tree abuts the Study Area (**Table 6**) used as a surveying marker. The tree is marked with two blazes.

Table 6 Heritage Item - Unlisted

Name	Type	Zone 56 GDA Easting	Zone 56 GDA Northing
ES JN1	European Surveyor's Tree with two blazes	224430	6304465

4.4 Summary

The Study Area extends 10 metres into the heritage curtilage of "The Cottage," but does not extend to the built heritage items. There is one European Surveyor's Tree (EST JN1) which abuts the Project Area.



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TITLE : **FIGURE 4: HERITAGE ITEMS IN THE VICINITY OF STUDY AREA**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **15/08/2016**

PURPOSE: **HERITAGE**

VERSION (PLAN BY): B A3 (Natalie.Wood)

PATH: J:\JOBS\Centennial\All Jobs\131758 JV Energy Australia Springvale\10 - Drafting\Arcgis Map Documents\Arch\Report Figures\131758 Figure 4 Heritage B A3 20160812.mxd

CLIENT: **CENTENNIAL COAL**

JOB REF: **PR131758**

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5.0 Environmental Context

An understanding of environmental context is important for the predictive modelling and interpretation of Aboriginal sites. The local environment provided natural resources for Aboriginal people, such as stone (for manufacturing stone tools), food and medicines, wood and bark (for implements such as shields, spears, canoes, bowls, shelters, amongst others), as well as areas for camping and other activities. The nature of Aboriginal occupation and resource procurement is inextricably linked to the local environment and, therefore, needs to be considered as part of the cultural heritage assessment process. A summary of the environmental context needs to be undertaken as per the guidelines (DECCW 2010:8&9; OEH 2011:5).

The majority of the Study Area incorporating the water treatment plant and associated infrastructure at MPPS, the new licensed discharge point (LDP) in the vicinity of the existing LDP006, the tailings dams and residual transfer pipeline, the pipeline corridor alongside the overland conveyor, the Gravity Tank Compound and the Existing Water Transfer Pipeline (**Figure 1**) areas are extremely modified. There are some areas of natural vegetation with the potential for intact soils in the area directly to the east of the existing conveyor belt, and in the eastern portion of the Study Area in the valley below the Newnes Plateau and atop the Newnes Plateau. Walking trails, logging routes and access tracks along the northern route have also been subject to moderate to high levels of disturbance. There are some areas that have not been previously cleared but the majority of the Study Area is in a highly disturbed context. It is considered unlikely that there will be extensive areas with intact A horizon soils. If subsurface artefacts are present; it is anticipated that they would be restricted to topsoil layers with sufficient depth (10 to 30 cm) and that they would not be present in clay layers. Generally soils in these areas are highly disturbed with little evidence of intact A horizon soils and therefore little likelihood of *in situ* deposit. The eastern part of the Study Area extends up a steep sided valley to the Newnes Plateau above. Due to water runoff and the nature of the steep terrain, there are no areas within the disturbance footprint for the Study Area that are likely to exhibit features that are indicative of a Potential Archaeological Deposit (PAD) or *in situ* deposit. The valley floor is subject to the effects of inundation and flooding, the cliff sides are precipitous and no rockshelters have been previously identified in this area.

5.1 Local Environment

Aboriginal people often made stone tools using siliceous, metamorphic or igneous rocks and, therefore, understanding the local geology can provide important information regarding resources in a study area. The nature of stone exploitation by Aboriginal people depends on the characteristics of the source, for example whether it outcrops on the surface (a primary source), or whether it occurs as gravels (a secondary source) (Doelman, Torrence et al. 2008).

5.1.1 Geology and Soils

The Study Area extends from Mount Piper Power Station near Blackmans Flat in the west to the Newnes Plateau in the east in the Blue Mountains. The Newnes Plateau surface is gently to moderately inclined and is covered by friable Narrabeen Group sandstones and pagoda rock formations on the plateau margins. Vertical sandstone cliffs descend from the edge of the plateau in the eastern part of the Project Area. The western part of the Study Area is characterised by gently undulating to rolling hills on the Permian and Devonian sedimentary sequences and minor Carboniferous granites (King 1993: 2-3). Much of the Study Area is in disturbed terrain.

The geology for the Study Area is primarily an undifferentiated mix of sandstone, shale and tuff, formed from the Clifton Subgroup of the Narrabeen Group, laid down in the Triassic period characterised by undifferentiated sandstone, shale and tuff. This is bounded by nearby deposits of the Illawarra Coal

Measures (Pi) laid down in the Permian period, comprising shale, sandstone, conglomerate and chert, with coal and seams of torbanite and a quaternary alluvium of gravel, sand, silt and clay, found mainly along watercourses (Bryan, McElroy et al. 1966). The presence of sandstone in the Study Area is an important in owing to its necessity in the manufacture and maintenance of stone tools. Rockshelters may be suitable for occupation and can provide for protection from adverse weather . Flat lying fine-grained sandstone near to a water source can be useful sharpening stone artefacts or may be used for grinding ochre or seeds.

Soil landscapes in the Study Area are described in King 1993 (King 1993). A variety of soil types dominate the landscape (King 1993):

- Disturbed Terrain (xxz) is characterised by land that has been disturbed by human activity to a depth of at least 100cm. This is evident in the western part of the Study Area at the Mt Piper Power Station in the area of the proposed WTP site and across much of the central part of the pipeline route;
- Hassans Walls colluvial soil landscape (hwz) is characterised by cliffs derived from the Narrabeen Group sandstones and steep colluvial talus sideslopes developed over the Permian Illawarra Coal Measures and the Shoalhaven Group with a local relief of >100m. This soil landscape occurs in the western extent close to MPPS, in the central part of the Study Area and in the valley where the northern and southern alternative routes meet in the eastern part of the Study Area. These stony and sandy soils are generally shallow to moderately deep;
- Lithgow residual soil landscape (liz) has flat to undulating rises and broad valley floors on the Permian Illawarra Coal Measures and the Berry Formation and occurs in the western and central parts of the Study Area and is characterised by shallow topsoils. Topsoils (li1, li2, li3) in this landscape are generally 0-30cm in depth and then transition to clay subsoils from 30cm (li4). Topsoils (li1: 0-11cm) comprise dull yellowish brown sandy clay loam; dark reddish brown clay loam (li2:0-10cm) and/or hardsetting bleached massive fine sandy clay loam (li3; 0-30cm);
- Cullen Bullen erosional soil landscape (cbz) is the dominant soil landscape in the western and central part of the Study Area characterised by shallow to moderately deep topsoils in rolling hills and rises on Illawarra Coal Measures and the Berry Formation. Topsoils (cb1 and cb2) in this landscape are generally up to 50cm in depth and then transition to clay subsoils (cb3). Topsoils comprise dark reddish brown sandy clay loam (cb1: 0-21cm) and are underlain by hardsetting bleached massive fine sandy clay loam (cb2: 21-50cm);
- Pipers Flat alluvial landscape (pfz) has high watertables and seasonal waterlogging and occurs in level to very gently undulating drainage depressions and floodplains on recent alluvium overlying the Berry Foramation and Illawarra Coal Measures. Soils are moderately deep to deep (>100cm) and this soil landscape only occurs in a small part of the central part of the Study Area;
- Long Swamp soil landscape (lsz) is characterised by level to very gently inclined closed sedgeland and closed heath with open forest on swamp margins that occur on recent alluvium overlying the Permian Illawarra Coal Measures. Soils are moderately deep (>100cm). This soil landscape is evident at the junction of the northern and southern alternative route options;
- The Wollangambe erosional soil landscape is characterised by the erosive action of running water with localised rock outcrops, broken scarps and small rock ledges and cliffs which occur at the edges of the swamps, with shallow soils on crests (<30cm), moderately deep soils on slopes (<100cm) and shallow sands over rock and occurs alongside the valley along the southern alternative route in the south of the Study Area;
- The Medlow Bath (mbz) residual soil landscape occurs on the narrow crests and inclined sideslopes on the Narrabeen Group sandstones and is characterised by localised rock outcrops with shallow (<40cm deep) organic rich sands over bedrock, earthy well drained sands (<80cm) on crestal ridges and moderately deep yellow earths and earth sands on side slopes;
- Newnes Plateau soil landscape (npz) in the eastern part of the Study Area is characterised by level to

gently undulating wide crests and ridges on plateau surfaces of Triassic Grose Sandstone at elevations generally of >1000m with some rock outcrop; soils are shallow (<50cm deep) on rocky crests; moderately deep (up to 150cm) on inclined sideslopes and in association with shale/ironstone lenses; and deep (>200cm) on deeply weathered friable sandstone;

- The Deanes Creek Swamp soil landscape (dcza) is characterised by narrow gently inclined elongated swamps of closed heath and sedgeland with waterlogged humic gleys and sandstone bedrock; soils are generally shallow comprising sandy loam and clay loams and the hard setting bleached sandy loam. Angular blocky clay is the dominant subsoil, which is characterised by a reddish-brown to bright yellowish-brown colour. Texturally, the subsoil is clayey and forms massive angular blocks when wet. Soil fertility can be low whilst the hard-setting topsoil restricts deep root penetration and in terms of shrink-swell capacity, the shrinkage can reach depths of up to 35 cm.

If subsurface artefacts are present, it is anticipated that they would be restricted to topsoil layers with sufficient depth (10 to 30cm) and that they would not be present in clay layers. The effects of water erosion removing topsoils may mean that there is a low potential for subsurface *in situ* material to be present.

5.1.2 Topography and Hydrology

The purpose of the following summary is to provide an indication of drinkable water which may have been available to Aboriginal people in the past. It does not replace more detailed surface water and groundwater studies. The hydrology of the Study Area incorporates the Wangcol Creek and Coxs River catchments. These high order watercourses and their tributaries traverse the area that would have been accessible as drinkable water for Aboriginal groups moving through the area. As such, there was enough water in the area to sustain at least seasonal habitation and these resource zones were probably large enough to provide reliable water for most of the year.

The landscape in this region ranges from flat to gently inclined rises and broad valley floors in the western part of the Study Area. There are steep sided cliffs in the eastern part of the Study Area before the Study Area ascends to the gently to moderately inclined Newnes Plateau in the eastern part of the Study Area (King 1993).

Due to water runoff from rainfall, topsoils in the area may be affected by sheet erosion washing A horizon soils down slope thereby exposing the clayey B horizon. Thus, where B Horizon soils are exposed, they are generally severely eroded and have been affected by water runoff and sheet wash erosion. The presence of potential stratified archaeological material is possible in areas where A horizon soils occur in undisturbed landscapes. A horizon soils can also be re-deposited on a previously eroded B horizon. Artefacts may occur *in situ* within A horizon soils or atop the exposed B Horizon.

5.1.3 Flora and Fauna

The purpose of the following summary is to provide an indication of the types of flora and fauna which may have been available to Aboriginal people in the past for sustenance and raw material resources; it does not replace more detailed ecological studies.

The vegetation communities in the Study Area are likely to have provided habitat for a variety of animals and which could be potential food and raw material sources for Aboriginal people. Typical animals that could have been hunted by Aboriginal people include kangaroos, wallabies, sugar gliders, possums, echidnas, a variety of lizards and snakes, birds, as well as rats and mice. The bones of such animals have been recovered from excavations of Aboriginal sites suggesting that they were sources of food (Attenbrow 2003:70-76), although the hides, bones and teeth of some of the larger mammals may have been used for Aboriginal clothing, ornamentation, or other implements.

5.1.4 Climate

Approximately 18,000 years ago climatic conditions began to change, affecting the movement and behaviour of past human populations in their environments. During this time, notably at the start of the Holocene (11,477 years ago), the melting of the ice sheets in the Northern Hemisphere and Antarctica caused sea levels to rise, with a corresponding increase in rainfall and temperature. The change in climatic conditions reached its peak about 6,000 years ago (Short 2000:19-21; Lambeck, Yokoyama et al. 2002). Up until 1,500 years ago, temperatures decreased slightly before stabilising, about 1,000 years ago, at a point similar to the temperature currently experienced. Consequently, the climate in the locality of the Study Area for the past 1,000 years would likely have been similar to the present day, providing a year round habitable environment.

According to the Bureau of Meteorology (2012) from the weather station at Lidsdale the region generally experiences greater rainfall in January with a mean average of 108.5 mm, while the month of July is driest with a mean average of 52.2 mm recorded between 1938 -1978. The temperature in this region generally remains moderate to cool throughout the year. The highest temperature generally occurs in January where a mean average of 24.6°C has been documented. During the month of July, the Study Area experiences a cold temperature change which can drop below 0°C.

5.1.5 Synthesis

The majority of the Study Area for the Springvale Water Treatment Project is extremely modified with high levels of ground surface disturbance although there are some areas that have not been cleared. Natural vegetation with the potential for intact soils in the area lie directly to the east of the existing conveyor belt, and in the eastern portion of the Study Area in the valley below the Newnes Plateau and atop the Newnes Plateau. Walking trails, logging routes and access tracks along the northern route have also been subject to disturbance. It is considered unlikely that there will be extensive areas with intact A horizon soils. If subsurface artefacts are present, it is anticipated that they would be restricted to topsoil layers with sufficient depth (10 to 30 cm) and that they would not be present in clay layers.

Soils in these areas are highly disturbed with little evidence of intact A horizon soils and therefore little likelihood of *in situ* deposit. The eastern part of the Study Area extends up a steep sided valley to the Newnes Plateau above. Due to water runoff and the nature of the steep terrain, there were no areas identified within the disturbance footprint for the Study Area that exhibited features that were indicative of a Potential Archaeological Deposit (PAD) or *in situ* deposit. The valley floor showed evidence of inundation and flooding and the cliff sides were precipitous and there were sheer sided rock faces with no overhangs or crevices. The Newnes Plateau above also contained no areas within the footprint of the Study Area that exhibited the features for a PAD.

The presence of sandstone in the Study Area is important as it may provide for suitable shelter for past Aboriginal communities and may have been used in the manufacture and maintenance of stone tools. The available sources of water and the possibilities of shelter in the nearby pagodas and cliff faces in the faces in the eastern part of the Study Area suggest that this part of the Study Area may be suitable for habitation by past Aboriginal communities. None of the rock faces within the Study Area contained rockshelters or grinding grooves. The flora and fauna in the Study Area indicates that there was a rich and diverse range of food and other resources available for exploitation by past Aboriginal communities. The acidity of the soil would appear to preclude the presence of artefacts of organic matter, leaving stone tools as the most likely artefacts to be recorded in the Study Area. However, the soils' susceptibility to water erosion may mean that there is a low potential for subsurface *in situ* material to be present. There are no previously recorded rockshelters or grinding grooves within the Study Area although there are a number of previously recorded stone artefact sites and a scar tree site in proximity to the Study Area.

6.0 Aboriginal Heritage Context

The Aboriginal heritage assessment process requires review of previous archaeological and heritage reports.

6.1 Historic Records of Aboriginal Occupation

It is important that Aboriginal sites are contextualised within the local and regional landscape in order to inform the assessment of significance and to develop a predictive model of Aboriginal sites in the Study Area. Historical information provides further information for the interpretation of archaeological sites.

6.1.1 Ethnography

The ethnographic information used to interpret the archaeological record is often biased and may be deeply prejudiced particularly in relation to lifestyle, social practices, community interactions, religion and other facets of Aboriginal life (L'Oste-Brown, Godwin et al. 1998). It is important to recognise the possible bias when using early European accounts that describe the lifestyles of Aboriginal people, particularly the interpretation of their daily life and beliefs. Nonetheless, some ethnographic records can provide important information and insight on local Aboriginal customs and cultural materials evidenced during the early years of European settlement.

6.1.2 The Traditional Owners and Aboriginal History after European Contact

A number of distinct Aboriginal groups were identified as occupying the Sydney Basin area when the First Fleet arrived in 1788. The Blue Mountains region was home to three large language groups: the Dharug, the Wiradjuri and the Gundungurra. Initial contact between the European settlers and the Dharuk people occurred in 1791 when Phillip's party arrived at the banks of the Hawkesbury and greetings were exchanged with the natives, peacefully sharing their campfire on the river bank at Pitt Town. Tench and Dawes made plans to explore the Blue Mountains and were ferried across the river by Aborigines in bark canoes (Fitzhardinge 1964 cited in Mid Mountains Historical Society 2007).

In 1794, 22 settlers obtained land along the shorelines of the Hawkesbury-Nepean. Within a year there were 546 people occupying the banks of the river which accounted for the main source of the colony's food supply. This area was also an important source of food for the Dharuk people (Mid Mountains Historical Society 2007).

Initially, when white explorers entered the Blue Mountains they did not record any large groups of 'Aborigines' being in residence. Aboriginal presence was noted by Blaxland in 1814 in the valleys where he heard people calling (Gollan 1987). However, an earlier expedition by Barrallier in 1802, who met and observed Aborigines in the Wollondilly Valley, were escorted out of the Blue Mountains by an Aboriginal guide who had knowledge of the tracks leading to the coast. This first contact record and contemporary opinion suggests that the identity of the mountain people adjacent to the Cumberland Plain were the Dharug (Gollan 1987).

Three Frenchmen; Quoy, Gaudichaud and Pellion travelled across the Blue Mountains to Bathurst where they encountered Aborigines in the Springwood area. Pellion made drawings of the natives, including Karadra a sick old man lying on kangaroo skins near a fire and being looked after by a younger man. It was recorded that a local native man was peacefully disposed towards the explorers (Mid Mountains Historical Society 2007).

Windradyne (c.1800-1829), was an Aboriginal resistance leader, he was also known as “Saturday”. Windradyne was a northern Wiradjuri man of the upper Macquarie River region in central-western New South Wales (First Australians ND).

On arrival of the first settlers, Windradyne attempted to peacefully communicate with the European counterparts. Windradyne had Wiradjuri people befriend the new settlers and assist them with areas to camp. However, when the Europeans began to clear the land it became obvious to the Aborigines that their arrival to Australia was not on a temporary basis. The settlers started destroying the environment and places that were sacred to the natives. Windradyne was determined to not let these people destroy local families and their society. After the conflict many of the Wiradjuri surrendered to the British, but Windradyne was able to elude capture, and later in 1824 Windradyne and 130 Wiradjuri warriors walked for 17 days from Bathurst across the Blue Mountains and into the settlement of Paramatta to attend the annual native feast. On arrival to the feast Windradyne had the word peace stuck in his hat (First Australians ND). He was accepted by the British as a result of this encounter.

According to Tindale (1974) the area falls within the limits of the land occupied by the Wiradjuri group. However, due to the location of the Study Area at the foothills of the Blue Mountains, it was often referred to as a zone of interaction between different Aboriginal groups residing in the vicinity of the Study Area, such as the Gundungurra, Wiradjuri and Darung people (Comber 2009). Early records of Aboriginal occupation in the Blue Mountains is quite scarce, largely relying on the few references made to Aboriginal subsistence strategies in the diaries of early settlers in the region.

6.2 Local Archaeological Heritage Context

The local Aboriginal heritage context provides a review of previous archaeological work conducted in the local landscape, determines whether Aboriginal sites have been previously identified (AHIMS search) in the Study Area and informs the predictive model of Aboriginal sites for the area. The review of previous archaeological work includes relevant local research publications and archaeological consultancy reports.

Two types of archaeological investigations are generally undertaken: excavations and surveys. Archaeological excavations can provide high-resolution data regarding specific sites, such as the dates or chronology of Aboriginal occupation and information on stone tool technology (reduction sequences, raw material use, tool production, usewear and retouch). Archaeological surveys generally cover wider areas than excavations and can provide important information on the spatial distribution of sites.

The detection of sites during survey can be influenced by the degree of disturbance or erosion present. As such, sensitivity mapping is sometimes required to interpret survey results. The local Aboriginal heritage context also provides a context for assessing archaeological significance of sites.

6.2.1 Aboriginal Heritage Information Management System (AHIMS)

A search of the AHIMS on 3 May 2016 covering the Study Area (Appendix 2) revealed that there are no Aboriginal sites in the Study Area; however, as discussed below, there are seven extant sites within 30 metres of the Study Area.

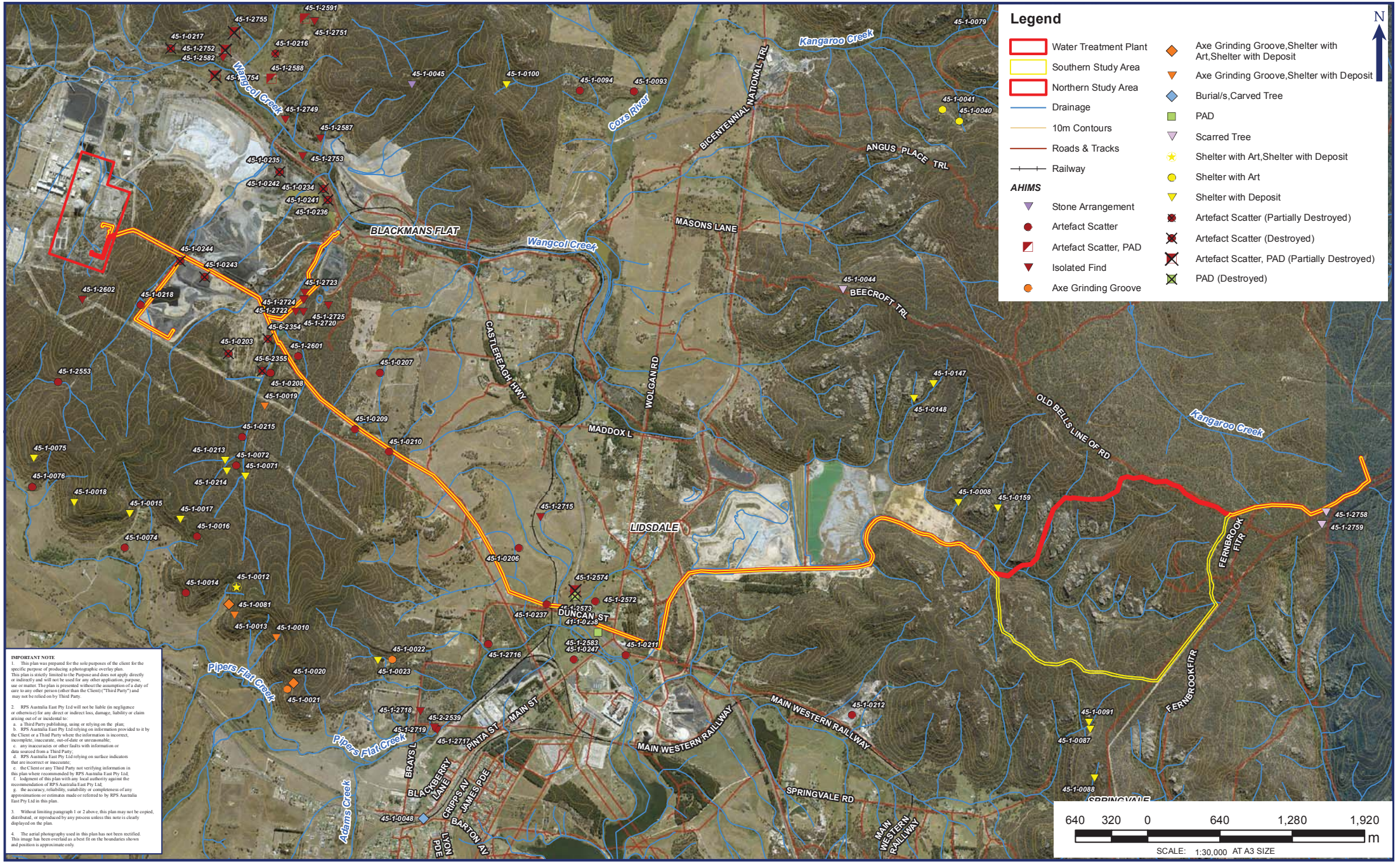
The AHIMS results show 94 previously recorded sites in the local area (after adjustments were made due to errors on the AHIMS database and duplication of recorded sites).

There were 51 artefact sites (artefact scatters and isolated finds) of which 11 were no longer extant and two were partially destroyed; of the six artefact scatters with PAD two were still extant and four had been partially destroyed; and of the three PADs one had been destroyed. Rockshelter sites (n=27) were the second most common site and included rockshelter sites with art, with deposit and with grooves, all of which were extant. There were two grinding groove sites, three scarred tree sites, one stone arrangement and one burial with carved tree site all of which were extant. **Table 7** summarises the frequency of site type with percentages representing occurrence for each site type within the Study Area.

Table 7 Summary of AHIMS Sites within the searched co-ordinates

Site Type	Frequency	Percent
Study Area	**(Count)**	**%**
Artefact Scatter	35	37.23
Isolated Finds	16	17.02
Artefact Scatter with PAD	6	6.38
PAD	3	3.20
Rockshelter with Deposit	18	19.15
Rockshelter with Art	2	2.13
Rockshelter with Art and Deposit	1	1.06
Rockshelter with Deposit and Grinding Grooves	4	4.25
Rockshelter with Art, Deposit and Grinding Grooves	2	2.13
Grinding Grooves	2	2.13
Scarred Trees	3	3.20
Burial and Carved Tree	1	1.06
Stone Arrangement	1	1.06
Total Sites within Study Area	**94**	**100**

Source: AHIMS Search 3 May 2016



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TITLE : **FIGURE 5: AHIMS WITHIN THE VICINITY OF THE STUDY AREA**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **15/08/2016**

PURPOSE: **HERITAGE**

VERSION (PLAN BY): B A3 (Natalie.Wood)

PATH: J:\JOBS\Centennial\All Jobs\131758 JV Energy Australia Springvale\10 - Drafting\Arcgis Map Documents\Arch\Report Figures\131758 Figure 5 AHIMS B A3 20160812.mxd

CLIENT: **CENTENNIAL COAL**

JOB REF: **PR131758**

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There are 11 Aboriginal sites previously recorded within 30 metres of the Study Area (**Table 8**) of which seven were found to be extant (valid). One of these had only been partially salvaged under a Consent to Salvage Permit (AHIMS Site #45-1-0237). Four of the previously recorded sites had been previously salvaged under Consent to Destroy/ Consent to Salvage Permits issued by the OEH and were no longer valid (**Table 8)**.

Table 8 Previously recorded AHIMS Sites within 30 metres of the Study Area

AHIMS Site Number	Name	Zone 56 MGA Easting	Zone 56 MGA Northing	Site Type	Site Type
45-1-0209	S4; Wallerawang	226405	6302740	Artefact Scatter	Not Valid
45-1-0210	S3; Wallerawang	226705	6302540	Artefact Scatter	Valid
45-1-0218	57 Blackmans Flat	224505	6303840	Artefact Scatter	Valid
45-1-0237	Springvale Colliery	228105	6301190	Artefact Scatter	Valid – Partially Salvaged
45-1-0243	S13; Springvale Colliery	224970	6303900	Artefact Scatter	Not Valid
45-1-0244	S13; Springvale Colliery	224855	6304230	Artefact Scatter	Not Valid
45-1-2721	CS SU4 – A4	225953	6303887	Isolated Find	Valid
45-1-2723	CS SU4 – A2	225959	6303943	Isolated Find	Valid
45-1-2724	CS SU4 – A1	225946	6303882	Isolated Find	Valid
45-1-2758	RPS SV ST1	235004	6302002	Scar Tree	Valid
45-6-2354	Lamberts Creek 6	225530	6303350	Artefact Scatter	Not Valid

The results of the AHIMS searches showed that seven sites remained extant within 30 metres of the Study Area **Table 7**. It is important that none of these extant sites are harmed by the proposed development works.

Table 9 Extant sites within 30 metres of the Study Area

AHIMS Site #	Name	Type	Zone 56 GDA Easting	Zone 56 GDA Northing	Site Status
45-1-0210	S3;Wallerawang	Artefact Scatter	226705	6302540	Valid
45-1-0218	57 Blackmans Flat	Artefact Scatter	224505	6303840	Valid
45-1-0237	Springvale Colliery	Artefact Scatter	228105	6301190	Partially Salvaged - Valid
45-1-2721	CS SU4 – A4	Isolated Find	225953	6303887	Valid
45-1-2723	CS SU4 – A2	Isolated Find	225959	6303943	Valid
45-1-2724	CS SU4 – A1	Isolated Find	225946	6303882	Valid
45-1-2758	RPS SV ST1	Scar Tree	235004	6302002	Valid

6.3 Review of Previous Archaeological Studies

Gorecki, P.P (1983) Archaeological Survey Kariwara Colliery Lease, Lithgow NSW.

A field survey was undertaken in January 1983 commissioned by Longworth and McKenzie Pty Limited. The survey was conducted on the Newnes Plateau approximately nine kilometres north of Lithgow in the Newnes State Forest. The survey aimed to locate and establish archaeological significance of Aboriginal relics and provide recommendations regarding protective measures for them. A previous assessment of Gorecki covered an area immediately east of the current Study area. The survey area in the study was divided into four environmental zones based upon geology, topography, vegetation cover and ground cover visibility. The archaeological potential of these zones were assessed. The four zones incorporated: lagoon paddock, valley floors including Sawyers Swamp Creek, Kangaroo Creek and Wolgan River, escarpments and plateaux.

The results of the survey found five archaeological sites and 19 potential occupation sites. Potential occupation sites were overhangs or covered areas which may have been used for shelter in the past, but had no deposit at all. Gorecki also considered that some may have had the potential to contain relics. Common sites found were a combination of shelters with art and deposit consisting of quartz, chert, indurated mudstone, quartzite and fine grained igneous inclusions (Gorecki 1983).

Electricity Commission of New South Wales [McIntyre, S] (1990) Archaeological Survey of the Proposed Kariwara Longwall Coal Mine

Newcom Collieries proposed to construct a new longwall coal mine in the Newnes Plateau in an area abutting the existing Angus Place mine. The aim of the archaeological investigation was to locate all archaeological sites likely to be affected by mine subsidence. The field survey was undertaken over a six week period in 1986. Test excavations were also carried out to determine whether PADs were Aboriginal sites (Electricity Commission of New South Wales 1990).

Rich and Gorman (1992) Proposed Springvale Colliery and Conveyor, Wallerawang: Archaeological Survey for Aboriginal Sites.

An archaeological assessment was conducted for the proposed Springvale Colliery and related facilities located near Wallerawang (Rich and Gorman 1992). The survey was divided into four locations; Springvale Pit Top Area 500m x 350m, Proposed Springvale Longwall Mine Area 7.5km x 5km, Proposed Conveyor Route measuring less than 10m wide and approximately 10km long and the Proposed Washery covering an area of 1km x 500m, including the reject emplacements and dams.

The field survey uncovered 11 artefact scatter sites, an isolated find, two possible site locations, and three shelters with PAD (Potential Archaeological Deposit).

The artefact scatters were generally located on well exposed areas containing several artefacts with dominant raw materials of quartz, quartzite and mudstone. Shelters were predominantly composed of sandstone pagodas which are typical for the regional landscape and commonly located along tributary lines. Two of the shelters contained evidence of rock art. Archaeological test excavations were recommended to be carried out at the two potential site locations.

Rich (1993) Springvale Coal Project, Wallerawang, NSW: Archaeological Inspection of Aboriginal Sites affected by Construction Works.

This report was undertaken by Rich subsequent to the 1992 archaeological assessment undertaken by Rich and Gorman (1992). An assessment was made of existing recorded sites that had been, or were likely to be, affected by development works.

Several recommendations were made additional to those outlined in the 1992 report. These included the updating of existing recorded site cards where necessary (Rich 1993).

Oz Ark (2005) Flora/Fauna and Heritage Assessment: Open Cut Mine Expansion Mining Lease 1448

OzARk was commissioned by Centennial Coal to undertake an archaeological assessment within Mining Lease 1448 as part of an EIS. This area was to the west of Mt Piper Power Station and incorporated a section of the existing conveyor from Mt Piper Power Station through Western Main Colliery Holdings. The conveyor connected to Lidsdale Siding and to Springvale Pit Top. Ozark noted that this area had been surveyed previously by Rich and Gorman (1992) and that archaeological test excavation at two sites had been undertaken by Haglund in 1992 in Lamberts Gully.

The proposed project was an extension to the existing Lamberts Gully Open Cut Coal Mine. The report involved a desk top study of previously recorded sites in the vicinity of the Study Area, which identified that eight Aboriginal sites had previously been recorded within Mining Lease 1448. Of these eight sites, five were open sites, two were initially potential archaeological deposits (PAD) later assessed to be open sites and a single isolated find. The field team attempted to relocate the previously recorded sites with varying degrees of success. The assessment identified three sites that were directly in the area of impact. As a result, it was recommended that the proponent apply to the Director–General of OEH for a Section 90 permit to impact these sites (Ozark 2005).

RPS HSO (2009) Lidsdale Siding Loading Facility Project, Ivanhoe Coal Pty Ltd

In 2009, Centennial Coal engaged RPS (formally RPS HSO) to undertake an archaeological investigation for the proposed upgrade to the Lidsdale Siding loading facility. The field survey was undertaken in two parts: the existing coal loading operations and the existing rail siding. The survey of the existing coal loading operations was undertaken for the purpose of investigating impact to potential Aboriginal and European heritage material items. No evidence of Aboriginal cultural heritage was identified despite excellent visibility. Survey of the rail siding yielded the same result with no Aboriginal cultural material identified.

RPS (2012) Springvale Colliery Aboriginal Archaeological Due Diligence Assessment

RPS was engaged by Springvale Coal Pty Ltd (Springvale) to prepare a Cultural Heritage Due Diligence Assessment for the proposal to drill eight boreholes and associated access tracks in the Newnes State Forest on the Newnes Plateau as part of an ongoing exploration drilling programme by Springvale for testing coal quality in order to refine the existing geological model.

The survey identified two new sites both of which were in close proximity to proposed drilling locations. The report recommended these drilling locations be adjusted to prevent impact to the Aboriginal sites, and that proposed works proceed accordingly.

RPS (2012) Lidsdale Siding Loading Facility Project, Ivanhoe Coal Pty Ltd

RPS was commissioned by Lidsdale Siding, a subsidiary of Centennial Coal (Western Operations) and managed by Ivanhoe Coal Pty Ltd, to prepare a Cultural Heritage Assessment for the proposed upgrade to the existing Lidsdale Siding Rail Loading Facility (automation of the train loading facility) under Part 3A Section 75F Major Projects of the EP& A Act . This CHA report formed part of the Environmental Assessment (EA) for the project.

Areas of archaeological sensitivity pertaining to Aboriginal Heritage were identified in the Study Area. The sites were all confined to clearings created for access tracks. There was one previously recorded site and artefact scatter (# 45-7-0237).

RPS (2013) Angus Place Mine Extension Project Cultural Heritage Impact Assessment

RPS was engaged by Centennial Angus Place to prepare a Cultural Heritage Impact Assessment for the proposed extension of mining operations within the mine's current mining lease as part of the Angus Place Mine Extension Project. The Project Application Area is located in the Lithgow LGA at the Angus Place Pit Top and a large area on Newnes Plateau (LGA).

The overall Project Application Area encompassed four study areas, comprising 29 survey units in total, which covered an area of 5030.5 hectares (ha). The largest of these study areas was located on the Newnes Plateau to the east of the pit top area and contained 21 survey units. The remaining three study areas were smaller, and were partially located in a valley area composed of paddocks and pastoral land to the immediate north (three survey units), south (three survey units), and east (two survey units) of the pit top area.

The objective of the Cultural Heritage Impact Assessment was to identify all archaeological (Aboriginal and historical) sites (potential and actual) within the Project Application Area to formulate mitigation and management strategies necessary for inclusion in an Environmental Impact Statement. It was considered that three sites within the Project Application boundary were at risk of mine subsidence and no sites would be affected by proposed surface works. No new Aboriginal objects or places were identified as part of this investigation.

RPS (2013)Western Coal Services Project, NSW, Cultural Heritage Impact Assessment

RPS was commissioned by Coal Services, a subsidiary of Centennial Coal (Western Operations), to prepare a Cultural Heritage Impact Assessment for the proposed Western Coal Services Project-Blackmans Flat. This Cultural Heritage Impact Assessment was to be integrated into an overall Environmental Impact Statement in support of an application for Development Approval under Division 4.1 of Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act 1979).

The objective of the Cultural Heritage Impact Assessment was to identify all Aboriginal and historical archaeological sites and potential for sites within the lease/licensed areas to formulate mitigation and management strategies necessary for inclusion into an. The Project Application Area was divided into six survey units. Of the 14 previously registered AHIMS sites within the Project Application Area boundary, it was considered that three were at potential risk of harm from mine subsidence and would be managed as part of a monitoring program prescribed with the report. A total of six new Aboriginal sites were recorded during the survey, all of which consisted of isolated finds. A total of ten sites were previously recorded by other cultural heritage consultants – seven had been salvaged under a S90 AHIP leaving three extant sites. No constraints were placed on non-Aboriginal heritage in the local area as the Project Area was well removed from any listed heritage items.

RPS (2013) Springvale Mine Extension NSW, Cultural Heritage Impact Assessment

RPS was engaged by Springvale Coal Pty Limited (Springvale Coal) to prepare a Cultural Heritage Impact Assessment as part of an Environment Impact Statement for the Springvale Mine Extension Project. The Project Application Area was within the Springvale mining lease within the Lithgow LGA. The components of Springvale Mine's existing operations were an underground longwall mine accessed via the Springvale pit top, supporting surface infrastructure within the pit top area, and an area on Newnes Plateau within the Newnes State Forest. It should be noted that this assessment considered the duplication of Springvale Delta Water Transfer Scheme footprint which follows the same alignment to LDP 009.

Targeted site inspections were conducted in 2012 within the Project Application Area. Additional field survey was also conducted in May 2013. The survey area was divided into 36 survey units. Thirty previously registered sites were identified within the Project Application Area and four new sites were identified by RPS during the site survey. Nineteen were inside the Project Application Area and the remaining eleven in the 50 metre boundary just outside it. A further four sites were identified by RPS during the field survey. Of these 34 sites, three were identified as being at risk of being impacted by subsidence. The impact avoidance and minimisation mitigation measures were directed entirely at these three sites. No historic heritage sites were recorded and none were listed in any heritage register inside the Project Application Area. As such no historic heritage items need to be managed for the proposed works.

6.4 Predictive Model

The following predictive model aims to provide testable statements about the nature and distribution of evidence of Aboriginal occupation on the basis of environmental information, as well as the review of relevant archaeological and heritage reports. The predictive model is necessary for the formulation of appropriate field methodologies and to provide information for the assessment of archaeological significance.

According to the AHIMS database search coupled with past Aboriginal heritage assessments conducted in the local region, the most common site types were surface artefact sites, rockshelters, PADs, grinding grooves and scarred trees.

Surface artefact sites and PADs have been identified, primarily, on the valley floors (creek flats, hillocks and lower slopes). This patterning is likely attributable to the higher order water courses available in this landform suite which made it an ideal location for Aboriginal campsites.

Rockshelters and grinding grooves have been identified on ridgelines and slopes. This distribution is influenced by the nature of outcropping sandstone, whereby rockshelters can only be formed on suitably large outcropping sandstone cliffs, boulders, or shelves and grinding grooves require high quality sandstone and a water source (to assist in grinding implements).

Scarred Trees are the remaining evidence of the utilisation of bark, which was commonly used for shields, shelter, various bark containers and sometimes water craft. Ethnographic evidence suggests that bark was a commonly used material by Aboriginal people. However, logging and other land uses by Europeans have removed much of the trees both historically and in more recent times, as such, much of the evidence for scarred trees has been removed. Scarred Trees have been identified infrequently in the local area and where present have been found in remote, difficult to access locations such as ridgelines and slopes.

The Study Area crosses all of the landforms where Aboriginal sites occur. However, the density of Aboriginal sites is not high across the local area, with many of the sites occurring in areas which are difficult to access (as is the case for rockshelters, grinding grooves and scarred trees). The valley floors are also highly disturbed which reduces the likelihood of in-situ artefacts.

Due to the extent of previous archaeological investigations and the extensive disturbance and modifications to the majority of the Study Area: previous ash plant at Mt Piper, installation of previous infrastructure including conveyor belt, conveyor tunnel and bridges, desalination plant, powerlines, access roads and pipelines, it is considered that the likelihood of finding additional Aboriginal sites is very low.

6.5 Summary of the Aboriginal Heritage Context

Many archaeological assessments have been undertaken within the Study Area. Common site types are artefact sites (artefact scatters, isolated finds and PADs), scar trees, stone arrangements, rockshelters in the surround high country and grinding grooves in the creek beds. Due to the pipeline being placed in an existing conveyor belt and pipeline disturbance envelope, high rates of water runoff and extensive modifications within the Study Area, it is considered unlikely that additional sites will be found.

7.0 Aboriginal Heritage Survey and Field Results

7.1 Survey Methodology

The Study Area was surveyed in accordance with the requirements set out in the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010) and the Guide for Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011).

7.1.1 Survey Aims

The purpose of the survey was to inspect visible ground surfaces, observe exposed soil profiles, sample all landform types in the Study Area and record any material evidence for Aboriginal occupation. The survey also aimed to record any cultural sites or Aboriginal landscapes, if identified by the Aboriginal stakeholders.

This heritage assessment has been undertaken in accordance with best practice guidelines for survey reporting and included the following components:

- Documentation of survey coverage;
- Documentation of results; and
- Documentation of significance of sites/areas to the Aboriginal community.
- The survey methodology aimed to provide adequate coverage of the Study Area, sample coverage of all landforms, areas of exposure, as well as, vegetated areas. The locations of previously recorded sites were also inspected.

Each survey area was described, detailing the level of exposure and ground surface visibility. The purpose of describing the survey units is to ensure comparability of results between different areas of the local landscape. Areas with high visibility and exposure generally have high levels of land surface disturbance, which can expose high quantities of archaeological material (particularly stone artefacts). Conversely, areas of low visibility and exposure are generally more intact (undisturbed) landscapes, where the likelihood of identifying sites (particularly artefact scatters) is generally lower. Areas of low visibility however, usually provide a higher potential for locating intact archaeological deposits which have been protected by vegetation coverage.

In accordance with OEH guidelines photographic recording was undertaken of landforms, survey units, Aboriginal cultural material, areas of archaeological or cultural sensitivity, levels of disturbance, as well as, other areas/items of interest. Photographs were scaled, as appropriate.

Field notes incorporated details including the size, location, contents and condition of Aboriginal heritage in the area and survey units. Size was recorded, either by GPS or tape measure. Location was recorded using differential GPS. The conditions of Aboriginal sites/areas of sensitivity were recorded providing detailed descriptions of the levels and cause of disturbances, erosion, land clearing and similar factors.

The Aboriginal stakeholder(s) participating in the survey were asked about the cultural significance of the survey area and where applicable and/or appropriate, about the significance of Aboriginal sites and/or areas of archaeological sensitivity. An opportunity to comment on cultural significance was also provided in the survey preparation documentation and post survey reporting.

7.2 Archaeological Field Survey Results

The Study Area includes previously modified and disturbed areas. Staged survey works have been undertaken since consultation was begun in 2011 and have continued until 2016. Individual survey coverage results can be found in the following reports:

- Lidsdale Siding Project (RPS 2012),
- Western Coal Services Project (RPS 2013),
- Springvale Mine Extension Project (RPS 2013),
- Coal Stockpile Expansion, Springvale (RPS 2016), and
- Booster Station & Borehole to Gravity Tank Electrical Route, Springvale (RPS 2016).

The current Study Area incorporates a highly modified and disturbed landscape: the proposed Water Treatment Plant location at the MPPS site, the Treated Water Pipeline route and the Residuals Transfer Pipeline from the water treatment plant to the new licensed discharge point and the reject emplacement area within the Springvale Coal Services Site, existing southern pipeline route, specifically the DN450 section, the existing above-ground pipelines from LDP009 to Skelly Road in the vicinity of the now decommissioned Wallerawang Power Station, the pipeline route along the overland conveyor from Skelly Road all the way to MPPS and the Gravity Tank Compound on Newnes Plateau.

Natural vegetation does occur in a part of the Study Area. This vegetation occurs in the eastern part of both alternative routes (the Northern and the Southern Study Areas) extending across the escarpment onto the Newnes Plateau.

7.2.1 Mt Piper Power Station

The proposed Water Treatment Plant location and the previous stockpile and laydown area at MPPS were extremely modified with numerous tracks covered by imported fill, concrete hardstand area, drainage culverts, cyclone fencing and part of the conveyor system (Plate 1 to Plate 4). There were bunded with some regrowth vegetation evident but with no mature trees present. Cyclone fencing surrounds the area with access via locked gates and tracks covered with imported gravels. Some areas were landscaped and grassed. There was a large concrete culvert system with metal bridges crossing the culverts across much of this part of the Study Area. A conveyor belt was located on the eastern side of the survey unit and there are stockpiles of gravel and soil nearby. Ground surface visibility (GSV) was 75% and ground surface exposure (GSE) was 80%.

▲No Aboriginal cultural material or items of historical significance occur in this area.

7.2.2 Vegetated Area and Footprint adjacent to the European Surveyor's Tree ESJN1

This area, located within the central portion of the Study Area, was predominantly natural or regrowth vegetation although there were dilapidated wire fences, access tracks and felled trees in this area. This included a vegetated area between the MPPS and vegetated area adjacent to the coal conveyor belt in the western part of this area (Plate 5 & Plate 6). Soils were predominantly A and B horizon soils in the undisturbed areas, and exposed B horizon in the disturbed areas along access tracks, fencelines, conveyor belt and cleared areas. Ground surface visibility (GSV) was 70% and ground surface exposure (GSE) was 50%.

Mature trees in this area were inspected and a European Surveyor's Tree ESJN1 was identified. The tree had two blazes on the southern face of the tree (Plate 7 to Plate 10). No Aboriginal Scarred Trees or other

sites were identified. The European Surveyor's Tree, EST JN1, was identified within 30 metres of the Study Area (**Table 10**) close to an access track. The area was heavily modified (Plate 11 to Plate 14). The area around the tree will be marked as a NO GO ZONE during ground surface disturbance works to prevent harm to the tree.

Table 10 European Surveyor's Tree

Name	Type	Zone 56 GDA Easting	Zone 56 GDA Northing
EST JN1	European Surveyor's Tree	224430	6304465

▲No Aboriginal cultural material or items were identified in this area; one European Surveyor's Tree (EST JN1) was identified and a NO GO ZONE area will be clearly marked around the tree to prevent harm to the tree.

7.2.3 Residuals Transfer Pipeline and Treated Water Discharge Pipeline

This section of the Springvale Water Pipeline was initially surveyed as part of the Western Services Coal Project (RPS 2013b). Additional due diligence visual inspection of the amended disturbance footprint for the residuals transfer pipeline and treated water discharge pipeline was undertaken by RPS in May 2016. This part of the Study Area extended across Castlereagh Highway to the north of LDP006 to a newly proposed licensed discharge point. Several previously recorded sites are extant in proximity to the Study Area but none within the proposed disturbance footprint for the infrastructure in this area. There were no areas of natural vegetation evident in the footprint for the residuals transfer pipeline or treated water discharge pipeline sections and the area was heavily modified. The areas around the artefact sites will be marked as NO GO ZONE areas during ground surface disturbance works. GSV was 90% and GSE 90%.

A number of previously recorded AHIMS Sites remain extant: #45-1-0218, #45-1-2721, #45-1-2723 and #45-1-2724 and were found to be within 30 metres of the Study Area but none of the sites occur within the disturbance footprint of the Study Area.

Previously recorded sites AHIMS #45-1-0243, #45-1-0244 and #45-6-2354 were no longer extant. The sites were re-inspected to ensure that no further artefacts remained at this site. No artefacts were present at these and the sites are therefore not valid.

▲Four extant AHIMS Sites #45-1-0218, #45-1-2721, #45-1-2723 and #45-1-2724 were within 30 metres of the disturbance footprint. NO GO ZONE areas will be clearly marked around the artefact sites to prevent harm to the artefacts at the sites.

7.2.4 Existing Overland Conveyor Footprint

There were no areas of natural vegetation evident in that portion of the Study Area that included the overland conveyor. There were extensive sections of cleared land and some areas with regrowth planting evident. The area is highly modified (Plate 15 to Plate 27). Part of the conveyor is underground in a tunnel in the Duncan Road to Wolgan Road area (Plate 28 & Plate 29). The pipeline alignment then passes between Wolgan Road and Skellys Road before passing uphill towards the area known as LDP009. GSV was 80% and GSE 85%.

There were three previously recorded Aboriginal sites, AHIMS #45-1-0209, #45-1-0210 and #45-1-0237 close to the disturbance footprint for the proposed pipeline. According to the AHIMS database, AHIMS #45-1-0209 was located underneath the existing conveyor belt. This site area was inspected and no artefacts were identified. It is considered that this is no longer a site and should be deregistered. The areas around the artefact sites will be marked as NO GO ZONE areas during ground surface disturbance works.

The curtilage of "The Cottage" (I191) a historic heritage listed item extends into the Study Area; however the heritage buildings associated with this item are located approximately 200 metres east of the Study Area. The Study Area encapsulates a 10 x 10 metre section of the western part of the curtilage. The proposed works will have minor visual impact on this heritage item, but will not impact any built heritage and thus satisfies Section 121S (2) of the EP&A Act. Works should be limited to the 10 metre x 10 metre area identified.

▲Three extant AHIMS Sites #45-1-0209, #45-1-0210 and #45-1-0237 were within 30 metres of the disturbance footprint. NO GO ZONE areas will be clearly marked around the artefact sites to prevent harm to the artefacts at the sites.

7.2.5 Pipeline

An area to the east Skellys Road covering the mid sloped portion of the pipeline had been surveyed previously. This area was re-inspected and the pipeline and defined track were cleared of vegetation and well maintained (Plate 30 to 36). The pipeline and access track measuring approximately 15 metres in width is flanked by open woodland vegetation with an understorey of shrubs and leaf litter. Ground surface visibility on either side of the pipeline and track was deemed low (≈5% - 20%) with visibility increasing to approximately 90% on the exposed track. This area is highly modified with no remnant vegetation and the clay B horizon evident within the disturbance footprint. GSV was 90% and GSE 90%. This portion of the pipeline footprint is set on a moderate gradient (≈30 degrees), gradually becoming steeper toward the top of the hill. Some sections had been paved with concrete and formed part of existing drainage culverts. An electrical pump station is located on the hill toward the most westerly portion of the pipeline route. The area also showed signs of extensive disturbance with road side litter, bitumen fragments and rubbish dumping and access for the nearby desalination and revegetation area.

▲No Aboriginal cultural material or items of historical significance were identified within the proposed disturbance footprint for this part of the Study Area.

7.2.6 Alternative Southern Pipeline Route

The Southern Study area incorporated a 750 metre stretch of track located within the Newnes Plateau above the cliffline. A large proportion of this area (Beecroft Track) had been previously inspected for archaeological objects during the Springvale Extension of Mine Project. The track has been well maintained and is flanked on either side by juvenile and mature eucalyptus sp. trees with an understorey of shrubs and leaf litter. Ground surface visibility along the length of the east-west trending route was excellent (≈80%), and was used for vehicle access. The unnamed track extension that trended south of Beecroft Track offered higher surface visibility (≈60%) and was devoid of vegetation regrowth. GSV was 50% and GSE 35%. Clifflines were inspected for evidence of rockshelters but none were found (Plate 37 to 42). The valley below the cliffline was predominantly natural or regrowth vegetation in areas where the access tracks, power line or pipelines were evident. There were formed drainage channels and numerous felled trees in this area in the lower slopes. There was evidence of inundation and uprooted trees in the drainage line. Mature trees in this area were inspected but no culturally modified trees were identified. Soils were predominantly A and B horizon soils in the undisturbed areas and exposed B horizon in the disturbed areas along access tracks and in cleared areas.

▲No Aboriginal cultural material or items of historical significance were identified within the proposed disturbance footprint for this part of the Study Area.

7.2.7 Alternative Northern Pipeline Route

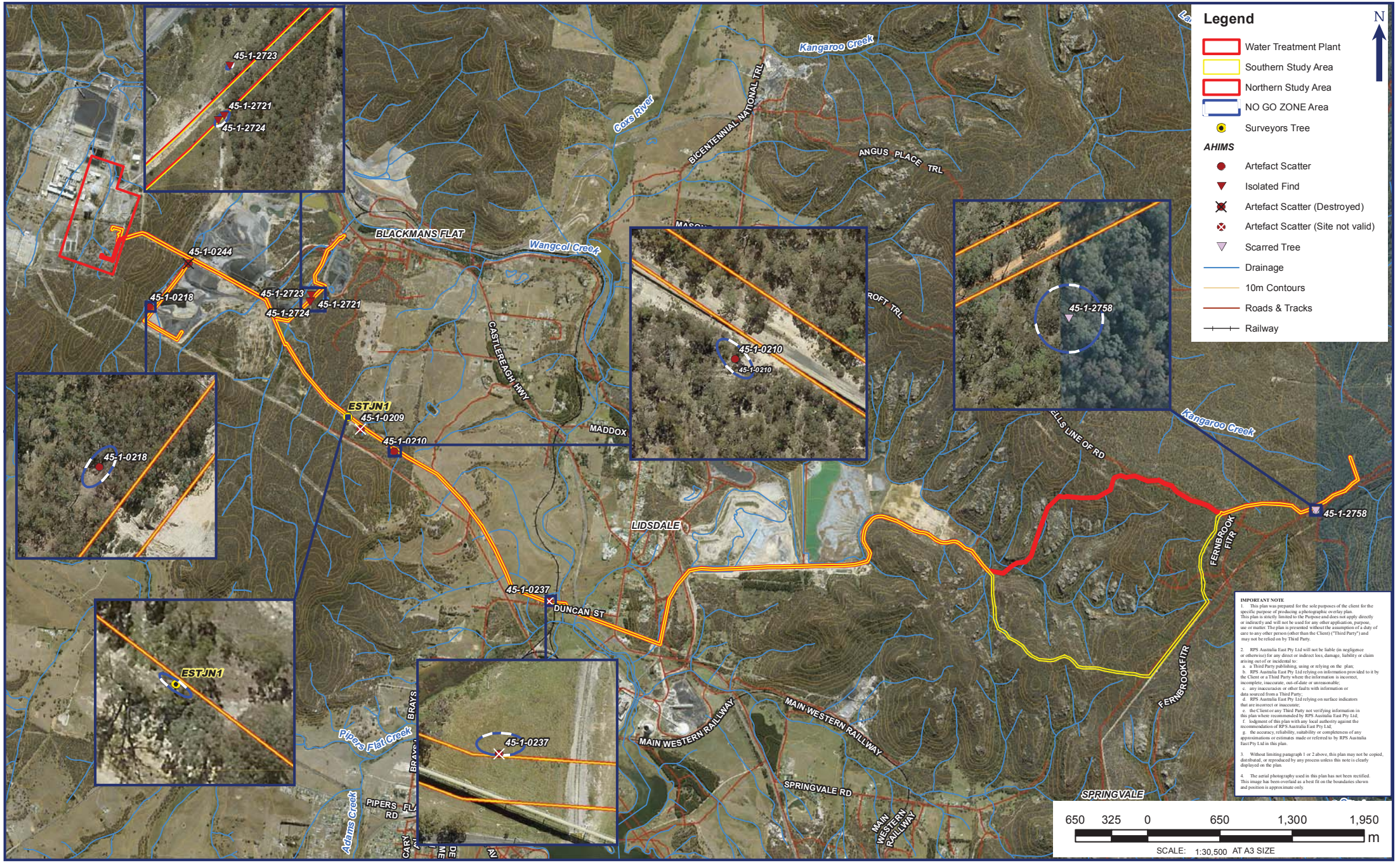
This area was predominantly natural or regrowth vegetation although there were formed drainage channels access tracks and numerous felled trees in this area. There was evidence of inundation and uprooted trees in the drainage line. Soils were predominantly A and B horizon soils in the undisturbed areas and exposed B horizon in the disturbed areas along access tracks and in cleared areas (Plate 43 to 48). GSV was 50% and GSE 35%.The unnamed track extension north of Beecroft Track offered lower GSV (≈20%) as it had been unused for a period of time and vegetation rejuvenation had taken place. Mature trees in this area were inspected but no culturally modified trees were identified. No other sites were identified.

▲No Aboriginal cultural material or items of historical significance were identified within the proposed disturbance footprint for this part of the Study Area.

7.2.8 Gravity Tank Compound

The Gravity Tank Compound was adjacent to the Beecroft Track and was cleared of vegetation. The surrounding area is flanked on either side by juvenile and mature eucalyptus sp. trees with an understorey of shrubs and leaf litter. Ground surface visibility along the length of the east-west trending route was excellent (≈80%), and was used for vehicle access. This area was is predominantly natural or regrowth vegetation although there were formed drainage channels access tracks and numerous felled trees in this area. Soils were predominantly A and B horizon soils in the undisturbed areas and exposed B horizon in the disturbed areas at the Gravity Tank Compound. GSV was 30% and GSE 35%. There was evidence of inundation and uprooted trees in the drainage line. Mature trees in this area were inspected but no culturally modified trees were identified. No other sites were identified.

▲No Aboriginal cultural material or items of historical significance were identified within the proposed disturbance footprint for this part of the Study Area. However there was scar tree #45-1-2758, located approximately 28 metres from the Study Area boundary, and not within the disturbance footprint.



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TITLE : **FIGURE 6: NO GO ZONE AREAS AROUND ABORIGINAL AND HISTORIC HERITAGE SITES**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **15/08/2016**

PURPOSE: **HERITAGE**

VERSION (PLAN BY): BA3 (Natalie.Wood)

PATH: J:\JOBS\Centennial\All Jobs\131758 JV Energy Australia Springvale\10 - Drafting\Arcgis Map Documents\Arch\Report Figures\131758 Figure 6 NGZ B A3 20160812.mxd

CLIENT: **CENTENNIAL COAL**

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7.3 Summary

There were no new Aboriginal sites identified during the survey. There were eleven previously recorded sites of which four are no longer extant (**Table 11**).

Table 11 Previously recorded sites in vicinity of Study Area.

AHIMS Site Number		Zone 56 MGA Easting	Zone 56 MGA Northing	Site Type	Site Type	Survey Area
45-1-0209	S4; Wallerawang	226405	6302740	Artefact Scatter	Not Valid	Overland Conveyor
45-1-0210	S3; Wallerawang	226705	6302540	Artefact Scatter	Valid	Overland Conveyor
45-1-0218	57 Blackmans Flat	224505	6303840	Artefact Scatter	Valid	Residuals Transfer Pipeline
45-1-0237	Springvale Colliery	228105	6301190	Artefact Scatter	Valid – Partially Salvaged	Overland Conveyor
45-1-0243	S13; Springvale Colliery	224970	6303900	Artefact Scatter	Not Valid	Overland Conveyor
45-1-0244	S13; Springvale Colliery	224855	6304230	Artefact Scatter	Not Valid	Overland Conveyor
45-1-2721	CS SU4 – A4	225953	6303887	Isolated Find	Valid	New Treated Water Pipeline
45-1-2723	CS SU4 – A2	225959	6303943	Isolated Find	Valid	New Treated Water Pipeline
45-1-2724	CS SU4 – A1	225946	6303882	Isolated Find	Valid	New Treated Water Pipeline
45-1-2758	RPS SV ST1	235004	6302002	Scar Tree	Valid	Newnes Plateau
45-6-2354	Lamberts Creek 6	225530	6303350	Artefact Scatter	Not Valid	Overland Conveyor

7.4 Interpretation of Survey Results

While artefact sites have previously been identified in close proximity to the Study Area, the compilation of previous survey data and recent surveys has not identified additional artefact sites. These results are consistent with the predictive model. The Newnes Plateau above also contained no areas that exhibited the features for a PAD within the twenty metre survey area and ten metre footprint.

The survey coverage table is required as part of OEH requirements (DECCW 2010) and its purpose is to give an indication of the level of probable detection of artefact sites.

Table 12 Survey coverage data of proposed surface impact footprint (PSIF)

Survey Unit (SU)	Landform	Centennial Proposed Modification	Survey Unit Area (Square metres)	Exposure (%)	Visibility (%)	Auto calculated Effective Coverage (square metres)	Enter Effective Coverage (percent)
SU 1	Modified Slope	Mt Piper Power Station	435,709 m²	80%	75%	217855	50
SU2	Modified Slope	Northern Study Area	356898 m²	50%	75%	285518	80
SU 3	Steep Slope	Southern Study Area	76250 m²	35%	50%	15250	20

8.0 Heritage Significance Assessment

8.1 Aboriginal Heritage Significance

In order to develop appropriate heritage management outcomes, it is necessary for the significance of Aboriginal sites or areas of archaeological sensitivity to be assessed. Aboriginal heritage sites can have a number of values that make them significant. Four values for identification and assessment of significance have been outlined in the Burra charter (Australia ICOMOS 1999) and have been used for this assessment according to the guidelines (OEH 2011). The four values outlined in the Burra charter are: scientific, social, historical and aesthetic. Scientific value, also referred to as archaeological value, has been assessed by RPS archaeologists (**Table 13**).

8.1.1 Scientific (Archaeological) Significance Criteria

Scientific significance, also referred to as archaeological significance, is determined by assessing an Aboriginal heritage site or area according to archaeological criteria. The assessment of archaeological significance is used to develop appropriate heritage management and impact mitigation strategies. Criteria for archaeological significance have been developed in accordance OEH guidelines (OEH 2011).

Table 13 Archaeological significance criteria.

Criteria	Description
Research Potential	This criterion is used to identify whether a site has the potential to contribute new information to the interpretation of Aboriginal occupation.
Rarity	This criterion examines the frequency of the identified site types with others previously recorded in the local or regional landscape.
Representativeness	All sites are representative of a site type, however, some sites may be in better condition, or demonstrate more clearly a particular site type. Representativeness is based on the understanding of extant sites in the local or regional landscape and the purpose of this criterion is to ensure a representative sample of sites is conserved for future generations.
Education Potential	This refers to whether the site has the potential to contribute to the public understanding of Aboriginal cultural heritage. These sites are often well preserved and have recognisable features which would assist in teaching.

The archaeological significance criteria are usually assessed on two scales: local and regional; in exceptional circumstances, however, state significance may also be identified. Archaeological significance criteria is assessed in three levels to which scores are assigned; low (score=1), moderate (score=2) and high (score=3).

A combination of these scores then enables an overall significance ranking of the site to be determined.

- Low significance 3-6
- Moderate significance 7-9
- High significance 10-12

8.1.2 Assessment of Archaeological Significance

The archaeological significance of the identified Aboriginal site(s) has been assessed and is summarised in **Table 14**.

Table 14 Assessed levels of significance (Scientific) for Aboriginal Sites

Site	Site Type	Significance scale	Research Potential	Representativeness	Rarity	Education Potential	Rank (Total Score)	Overall Archaeological Significance
#45-1-0210	Artefact Scatter	Local	1	1	1	1	4	Low
		Regional	1	1	1	1	4	Low
#45-1-0218	Artefact Scatter	Local	1	1	1	1	4	Low
		Regional	1	1	1	1	4	Low
#45-1-0237	Artefact Scatter	Local	1	1	1	1	4	Low
		Regional	1	1	1	1	4	Low
#45-1-2721	Artefact Scatter	Local	1	1	1	1	4	Low
		Regional	1	1	1	1	4	Low
#45-1-2723	Artefact Scatter	Local	1	1	1	1	4	Low
		Regional	1	1	1	1	4	Low
#45-1-2724	Artefact Scatter	Local	1	1	1	1	4	Low
		Regional	1	1	1	1	4	Low
#45-1-2758	Scarred Tree	Local	1	2	1	1	5	Low
		Regional	1	1	1	1	4	Low

8.1.3 Cultural (Aboriginal) Significance Criteria

The Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW (OEH 2011:3) recognises that Aboriginal cultural heritage significance is equal in importance to the context in which the object or place was found. The registered Aboriginal parties for this Project were given the opportunity to consider the sites in terms of the following values:

- Social Values (spiritual, political and cultural aspects of the site);
- Aesthetic Values (visual aspect of the site); and
- Historic Values (aesthetic and social value combined).

Social value encompasses the spiritual, political, national or other associations to a majority or minority group. Aesthetic value encompasses aspects of sensory perception including form, scale, colour, texture and material of the fabric. Historic value is the history of the place, its association with historic figure and/or its role in a historical event.

8.2 Historic Heritage Significance

There are two historic heritage items identified in or abutting the Study Area: “the Cottage” (I191) and the European Surveyor’s Tree (EST JN1).

The Cottage (I191) has been identified as having local significance listed in the Lithgow LEP.

The European Surveyor’s Tree (EST JN1) while representing past surveying activity in the region is not unique and there are other examples of this kind of marking elsewhere in the region. It does not meet the heritage criteria for local listing.

9.0 Impact Assessment

The proposed works is the installation of a water transfer pipeline. This will include construction, limited vegetation clearance and track clearance and as a result there will be some ground surface disturbance.

The curtilage of one historic item, the Cottage (I191) extends into the Study Area, but the built heritage items associated with this listing are not in the Study Area. One unlisted historic heritage item abuts the Study Area, European Surveyor's Tree (EST JN1).

There are seven extant Aboriginal AHIMS sites which are within 30 metres of the Study Area. These areas will need to be marked as No Go Zones to prevent harm to the Aboriginal objects at the sites.

9.1 The Cottage (I191)

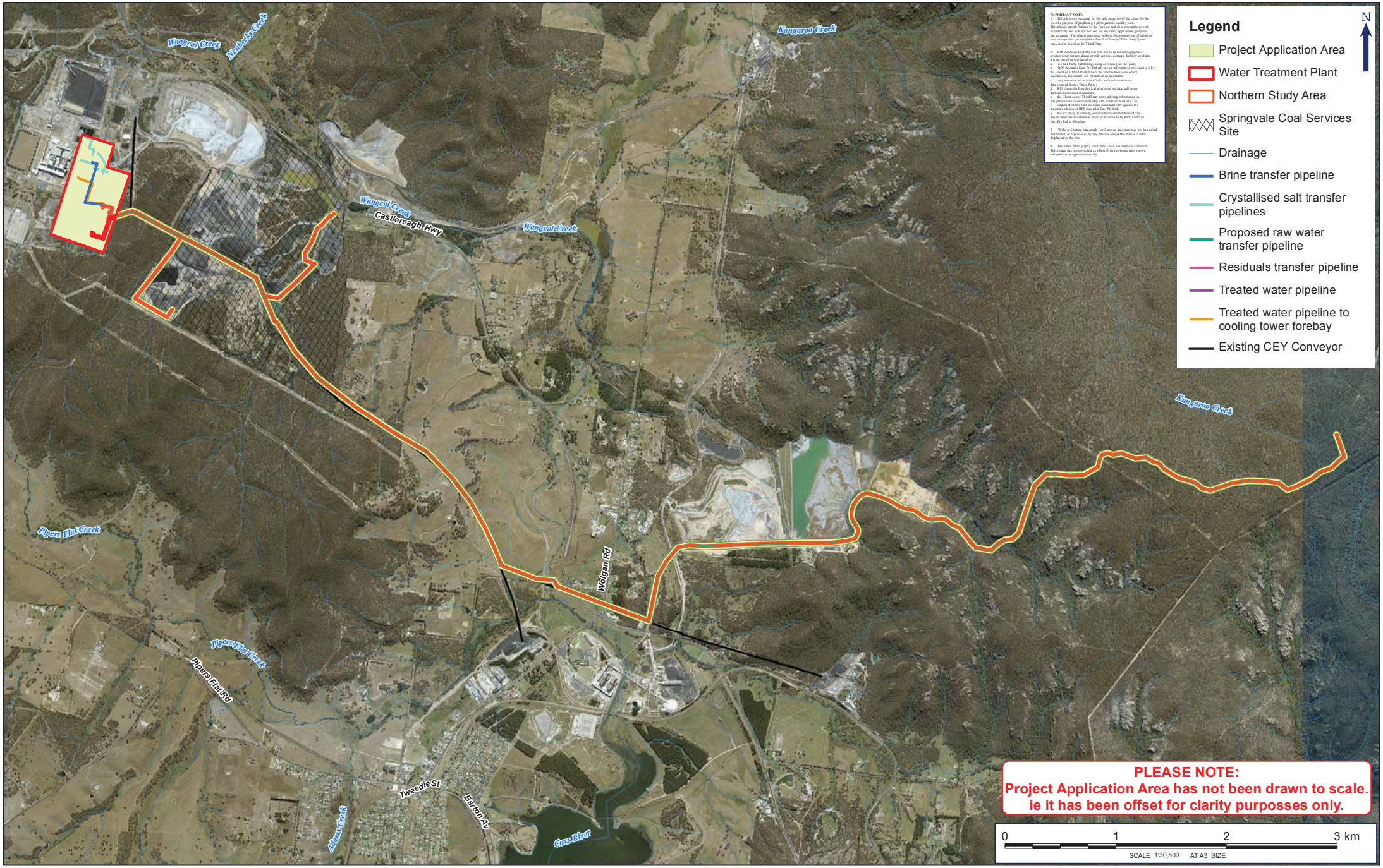
The built heritage associated with the item does not extend into the Study Area. The Study Area encapsulates a 10 x 10 metre section of the curtilage. The proposed works will have minor visual impact on this heritage item, but will not impact any built heritage. Works should be limited to the 10 metre x 10 metre area identified, but no additional mitigation measures required.

9.2 European Surveyor's Tree (EST JN1)

This unlisted heritage item abuts the Study Area and thus is unlikely to be directly impacted by works. This area will need to be marked as a NO GO ZONE to prevent harm to the item and to prevent access during construction.

9.3 AHIMS Sites (AHIMS #45-1-0210, AHIMS #45-1-0218, AHIMS #45-1-0237, #45-1-2721, 45-1-2723, #45-1-2724, AHIMS #45-1-2758)

AHIMS #45-1-0210, AHIMS #45-1-0218, AHIMS #45-1-0237 are artefact scatters, #45-1-2721, #45-1-2723, #45-1-2724 are isolated finds and AHIMS #45-1-2758 is a scarred tree. None are in the Study Area, but are within 30 metres of the disturbance footprint and Study Area boundary. Prior to any works being undertaken in these areas the sites should be protected and clearly marked as NO GO ZONES to prevent harm to the artefacts at these sites.



TITLE : **FIGURE 7: PROJECT APPLICATION AREA**

LOCATION : **SPRINGVALE**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **12/08/2016**

PURPOSE: **HERITAGE**

VERSION (PLAN BY): A A3 (Natalie.Wood)

PATH: J:\JOBS\Centennial\All Jobs\131758 JV Energy Australia Springvale\10 - Drafting\Arcgis Map Documents\Arch\Report Figures\131758 Figure 7 A A3 20160812.mxd

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10.0 Conclusions and Recommendations

This CHIA has undertaken the necessary background research and visual inspections required to identify historic and Aboriginal heritage and assessed the potential impact of the proposed works in relation to the installation of the pipeline.

This assessment has identified that the curtilage of The Cottage (Item Number I191) on Lot 101, DP829410 Castlereagh Highway, a historic heritage item listed on the Lithgow LEP, extends into the Study Area, but the heritage buildings associated with this item are located approximately 200 metres east of the Study Area. The Study Area encapsulates a 10 metre x 10 metre section of the curtilage. The proposed works will have minor visual impact on this heritage item, but will not harm any built heritage and thus satisfies the Section 121S (2) of the EP&A Act 1979. Works should be limited to the 10 metre x 10 metre area identified.

One unlisted heritage item, European Surveyor's Tree (EST JN1) abuts the Study Area. As such, this area should be clearly marked as a NO GO ZONE to prevent access during construction and thus prevent harm to the heritage item by the proposed works.

There are seven extant Aboriginal sites: AHIMS #45-1-0210, AHIMS #45-1-0218, AHIMS #45-1-0237 are artefact scatters, #45-1-2721, #45-1-2723, #45-1-2724 are isolated finds and AHIMS #45-1-2758 is a scarred tree. None of these Aboriginal sites are in the Study Area, but are within 30 metres of the Study Area boundary. These areas should be clearly marked as NO GO ZONEs to prevent access during construction works.

Recommendation 1

The proposed works within the curtilage of The Cottage (I191) must be limited to the 10 metre x 10 metre section of the Project Application Area and not further encroach on the curtilage of this item **(Figure 4**).

Recommendation 2

The proposed works must be limited to the defined Project Application Area. NO GO ZONE areas should be marked prior to and during construction for: European Surveyor's Tree (EST JN1), AHIMS #45-1-0210, AHIMS #45-1-0218, AHIMS #45-1-0237 (artefact scatters), AHIMS #45-1-2721, #45-1-2723, #45-1-2724 (isolated finds) and AHIMS #45-1-2758 (scarred tree) (**Figure 6**).

Recommendation 3

If during works suspected Aboriginal or skeletal material is identified then procedures outlined in Centennial's *Western Holdings Aboriginal Cultural Heritage Management Plan 2014* (ACHMP) (Centennial Coal 2014) must be followed.

Recommendation 4

If during works suspected historic material is identified then procedures outlined in Centennial's *Historic Heritage Management Plan Western Holdings 2014* (HHMP) (Centennial Coal 2016) must be followed.

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12.0 Plates

Plate 1 MPPS - view to north

Plate 2 View north west showing culvert

Plate 3 Formed roads in MPPS - view to west

Plate 4 Modified mid slope area at MPPS

Plate 5 View east close to conveyor belt

Plate 6 Vegetation to east of MPPS

Plate 7 View east to Surveyor's Tree EST JN1

Plate 8 Scars on Surveyor's Tree EST JN1

Plate 9 Top scar

Plate 10 Modified mid slope area at MPPS

Plate 11 Track close to conveyor - view to east

Plate 12 Modified area to south of conveyor

Plate 13 View to east along overland conveyor

Plate 14 Cleared area adjacent to conveyor

Plate 15 Track adjacent to conveyor view to east

Plate 16 View south -clearing mid slope area

Plate 17 View north - treed area close to track

Plate 18 Conveyor area view south

Table 15 Clearing to north of overland conveyor

Plate 19 View to south to overland conveyor

Plate 20 Access track to north of conveyor

Plate 21 Track to east of overland conveyor

Plate 22 Paddock to north east of conveyor

Plate 23 Overland conveyor area view east

Plate 24 Modified land surface near conveyor

Plate 25 View north east from conveyor

Plate 26 Track to west of overland conveyor

Plate 27 View west along top of conveyor tunnel

Plate 28 Conveyor Tunnel – view north

Plate 29 Conveyor area - view east

Plate 30 View east near Wolgan Road

Plate 31 Conveyor near Wolgan & Skelly Roads

Plate 32 Existing pipeline Skelly Rd view north

Plate 33 Existing pipeline Skelly Rd view north

Plate 34 West of LDP009 pipeline & access road

Plate 35 Modified pipeline area view north

Plate 36 Track Southern Route view east

Plate 37 Vegetation mid slope view south

Plate 38 Rock outcrop below Newnes Plateau

Plate 39 Rock outcrop south of Newnes Plateau

Plate 40 Southern Route view north east

Plate 41 View east along Southern Route

Plate 42 Track Northern Route view north east

Plate 43 View north - vegetation Northern Route

Plate 44 View along North Route modified area

Plate 45 Rock outcrop to north of North Route

Plate 46 Cliffs to north of Northern Route

Plate 47 Creekline to north of Northern Route

Appendix 1

Legislative Requirements

Summary of Statutory Controls

The following overview of the legal framework is provided solely for information purposes for the client, it should not be interpreted as legal advice. RPS will not be liable for any actions taken by any person, body or group as a result of this general overview, and recommends that specific legal advice be obtained from a qualified legal practitioner prior to any action being taken as a result of the summary below.

COMMONWEALTH

Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (ATSIHIP Act Amendment 2006)

The purpose of this Act is to preserve and protect all heritage places of particular significance to Aboriginal and Torres Strait Islander people. This Act applies to all sites and objects across Australia and in Australian waters (s4).

It would appear that the intention of this Act is to provide national baseline protection for Aboriginal places and objects where State legislation is absent. It is not to exclude or limit State laws (s7(1)). Should State legislation cover a matter already covered in the Commonwealth legislation, and a person contravenes that matter, that person may be prosecuted under either Act, but not both (s7(3)).

The Act provides for the preservation and protection of all Aboriginal objects and places from injury and/or desecration. A place is construed to be injured or desecrated if it is not treated consistently with the manner of Aboriginal tradition or is or likely to be adversely affected (s3).

STATE

It is incumbent on any land manager to adhere to state legislative requirements that protect Aboriginal Cultural heritage. The relevant legislation is NSW includes but is not limited to the summary below.

National Parks and Wildlife Act 1974 (NPW ACT)

The NPW Act provides statutory protection for all Aboriginal heritage, places and objects (not being a handicraft made for sale), with penalties levied for breaches of the Act. This legislation is overseen by the Office of Environment and Heritage (OEH), and specifically the Director-General of OEH. Part 6 of this Act is the relevant part concerned with Aboriginal objects and places, with Section 86 and Section 90 being the most pertinent. In 2010, this Act was substantially amended, particularly with respect to Aboriginal cultural heritage requirements. Relevant sections include:

Section 86

This section now lists four major offences:

(1) A person must not harm an object that the person knows is an Aboriginal object;
(2) A person must not harm and Aboriginal object;
(3) For the purposes of s86, “circumstances of aggravation” include:
    (a) The offence being committed during the course of a commercial activity; or
    (b) That the offence was the second or subsequent offence committed by the person;
(4) A person must not harm or desecrate an Aboriginal place.

Offences under s86 (2) and (4) are now strict liability offences, ie, knowledge that the object or place harmed was an Aboriginal object or place needs to be proven. Penalties for all offences under Part 6 of this Act have also been substantially increased, depending on the nature and severity of the offence.

Section 87

This section now provides defences to the offences of s86. These offences chiefly consist of having an appropriate Aboriginal Heritage Impact Permit (AHIP), not contravening the conditions of the AHIP or demonstrating that due diligence was exercised prior to the alleged offence.

Section 87A & 87B

These sections provide exemptions from the operation of s86; Section 87A for authorities such as the Rural Fire Service, State Emergency Services and officers of the National Parks & Wildlife Service in the performance of their duties, and s87B for Aboriginal people performing traditional activities.

Section 89A

If a person knows of the location of an Aboriginal object or place that has not been previously registered and does not advise the Director-General of that object or place within a reasonable period of time, then that person is guilty of an offence under this Section of the Act.

Section 90

This section authorises the Director-General to issue and AHIP.

Section 90A-90R

These sections govern the requirements relating to applying for an AHIP. In addition to the amendments to the Act, OEH have issued three new policy documents clarifying OEH's requirements with regards to Aboriginal archaeological investigations: *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010, Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW and Code of Practice for Archaeological Investigations in NSW*. The Consultation Requirements formalise the consultation with Aboriginal community groups into four main stages, and includes details regarding the parties required to be consulted, advertisements inviting Aboriginal community groups to participate in the consultation process, requirements regarding the provision of methodologies, draft and final reports to the Aboriginal stakeholders and timetables for the four stages. The Due Diligence Code of Practice sets out the minimum requirements for investigation, with particular regard as to whether an AHIP is required. The Code of Practice for Archaeological Investigation sets out the minimum requirements for archaeological investigation of Aboriginal sites.

Aboriginal Heritage Impact Permits (AHIP)

OEH encourages consultation with relevant Aboriginal stakeholders for all Aboriginal Heritage Assessments. However, if an Aboriginal Heritage Impact Permit (AHIP) is required for an Aboriginal site, then specific OEH guidelines are triggered for Aboriginal consultation.

Aboriginal Cultural Heritage Consultation Requirements for Proponents

In 2010, the Aboriginal Cultural Heritage Consultation Requirements for Proponents (ACHCR's) were issued by OEH (12th April 2010). These consultation requirements replace the previously issued Interim Community Consultation Requirements (ICCR) for Applicants (Dec 2004). These guidelines apply to all AHIP applications prepared after 12th April 2010; for projects commenced prior to 12th April 2010, transitional arrangements have been stipulated in a supporting document, Questions and Answers 2: Transitional Arrangements.

The ACHCR's 2010 include a four stage Aboriginal consultation process and stipulate specific timeframes for each state. Stage 1 requires that Aboriginal people who hold cultural information are identified, notified and invited to register an expression of interest in the assessment. Stage 1 includes the identification of Aboriginal people who may have an interest in the Project Area and hold information relevant to determining the cultural significance of Aboriginal objects or places. This identification process should draw on reasonable sources of information including: the relevant OEH EPRG regional office, the relevant Local Aboriginal Land Council(s), the Registrar of Aboriginal Owners, Aboriginal Land Rights Act (1983), the Native Title Tribunal, Native Title Services Corporation Limited, the relevant local council(s), and the relevant catchment management authority. The identification process should also include an advertisement placed in a local newspaper circulating in the general location of the Project Area. Aboriginal organisations and/or individuals identified should be notified of the project and invited to register an Expression of Interest (EoI) for Aboriginal consultation. Once a list of Aboriginal stakeholders has been compiled from the EoI's, they need to be consulted in accordance with ACHCR's Stages 2, 3 and 4.

Environmental Planning & Assessment Act 1979 (EP&A Act)

This Act regulates a system of environmental planning and assessment for New South Wales. Land use planning requires that environmental impacts are considered, including the impact on cultural heritage and specifically Aboriginal heritage. Within the *EP&A Act*, Parts 3, 4 and 5 relate to Aboriginal heritage.

Part 3 regulates the preparation of planning policies and plans. Part 4 governs the manner in which consent authorities determine development applications and outlines those that require an environmental impact statement. Part 5 regulates government agencies that act as determining authorities for activities conducted by that agency or by authority from the agency. The National Parks & Wildlife Service is a Part 5 authority under the *EP&A Act*.

In brief, the NPW Act provides protection for Aboriginal objects or places, while the *EP&A Act* ensures that Aboriginal cultural heritage is properly assessed in land use planning and development.

The Heritage Act 1977

This Act protects the natural and cultural history of NSW with emphasis on non-indigenous cultural heritage through protection provisions and the establishment of a Heritage Council. Although Aboriginal heritage sites and objects are primarily protected by the *National Parks & Wildlife Act* (1974, as amended), if an Aboriginal site, object or place is of great significance, it may be protected by a heritage order issued by the Minister subject to advice by the Heritage Council.

Other legislation of relevance to Aboriginal cultural heritage in NSW includes the *NSW Local Government Act (1993)*. Local planning instruments also contain provisions relating to indigenous heritage and development conditions of consent.

Appendix 2

AHIMS Search

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : PR131 758 SUA JN

Client Service ID : 224344

RPS Australia East Pty Ltd -Hamilton

Date: 09 May 2016

Accounts Payable Fortitude Valley PO Box 237
BRISBANE Queensland 4001

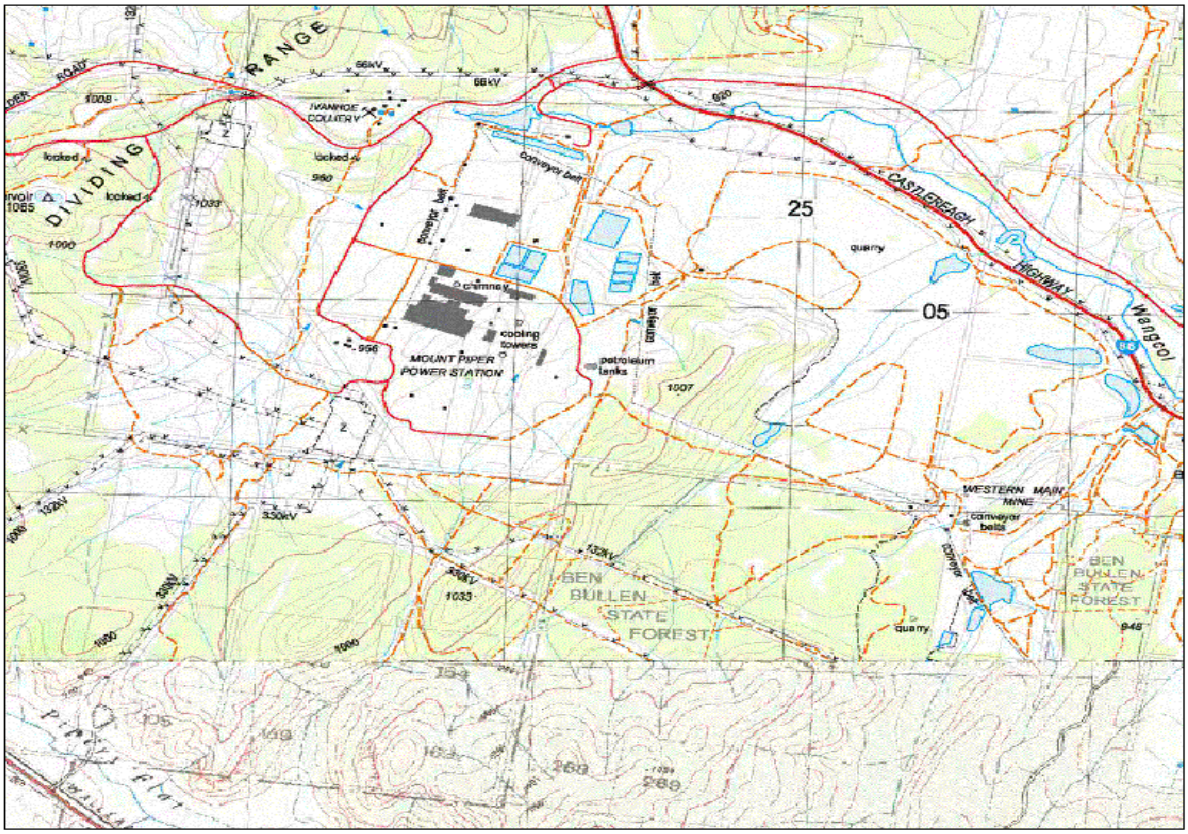
Attention: Jo Nelson

Email: jo.nelson@rpsgroup.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Datum :GDA, Zone : 56, Eastings : 222286 - 226286, Northings : 6302441 - 6306441 with a Buffer of 0 meters, conducted by Jo Nelson on 09 May 2016.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

44	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

3 Marist Place, Parramatta NSW 2150
Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : PR131 758 SUC JN

Client Service ID : 224346

RPS Australia East Pty Ltd -Hamilton

Date: 09 May 2016

Accounts Payable Fortitude Valley PO Box 237
BRISBANE Queensland 4001

Attention: Jo Nelson

Email: jo.nelson@rpsgroup.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Datum :GDA, Zone : 56, Eastings : 225096 - 229096, Northings : 6300332 - 6304332 with a Buffer of 0 meters, conducted by Jo Nelson on 09 May 2016.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

39	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
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- This search can form part of your due diligence and remains valid for 12 months.

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Web: www.environment.nsw.gov.au

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : PR131 758 SUD JN

Client Service ID : 224347

RPS Australia East Pty Ltd -Hamilton

Date: 09 May 2016

Accounts Payable Fortitude Valley PO Box 237
BRISBANE Queensland 4001

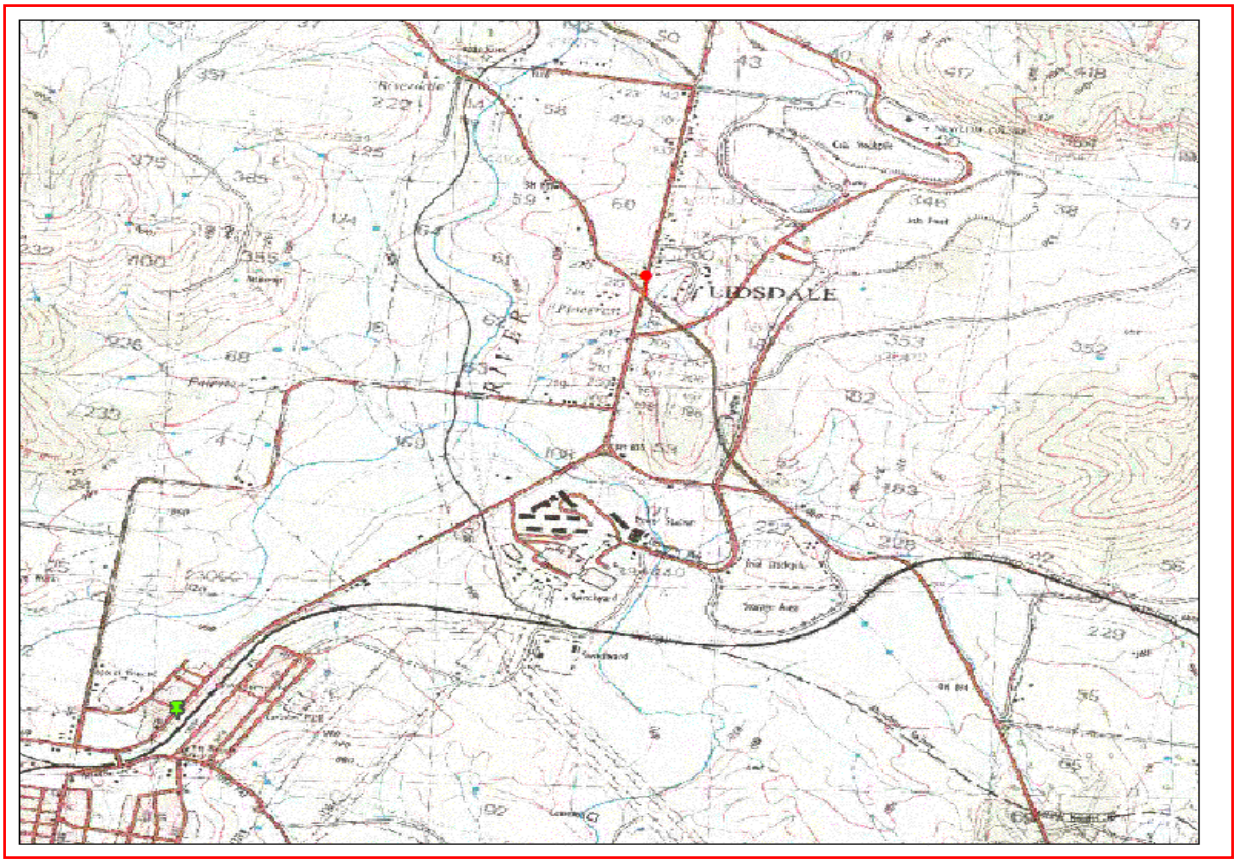
Attention: Jo Nelson

Email: jo.nelson@rpsgroup.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Datum :GDA, Zone : 56, Eastings : 226690 - 230690, Northings : 6298955 - 6302955 with a Buffer of 0 meters, conducted by Jo Nelson on 09 May 2016.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

18	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
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- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

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ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : PR131 758 SUE JN

Client Service ID : 224349

RPS Australia East Pty Ltd -Hamilton

Accounts Payable Fortitude Valley PO Box 237
BRISBANE Queensland 4001

Attention: Jo Nelson

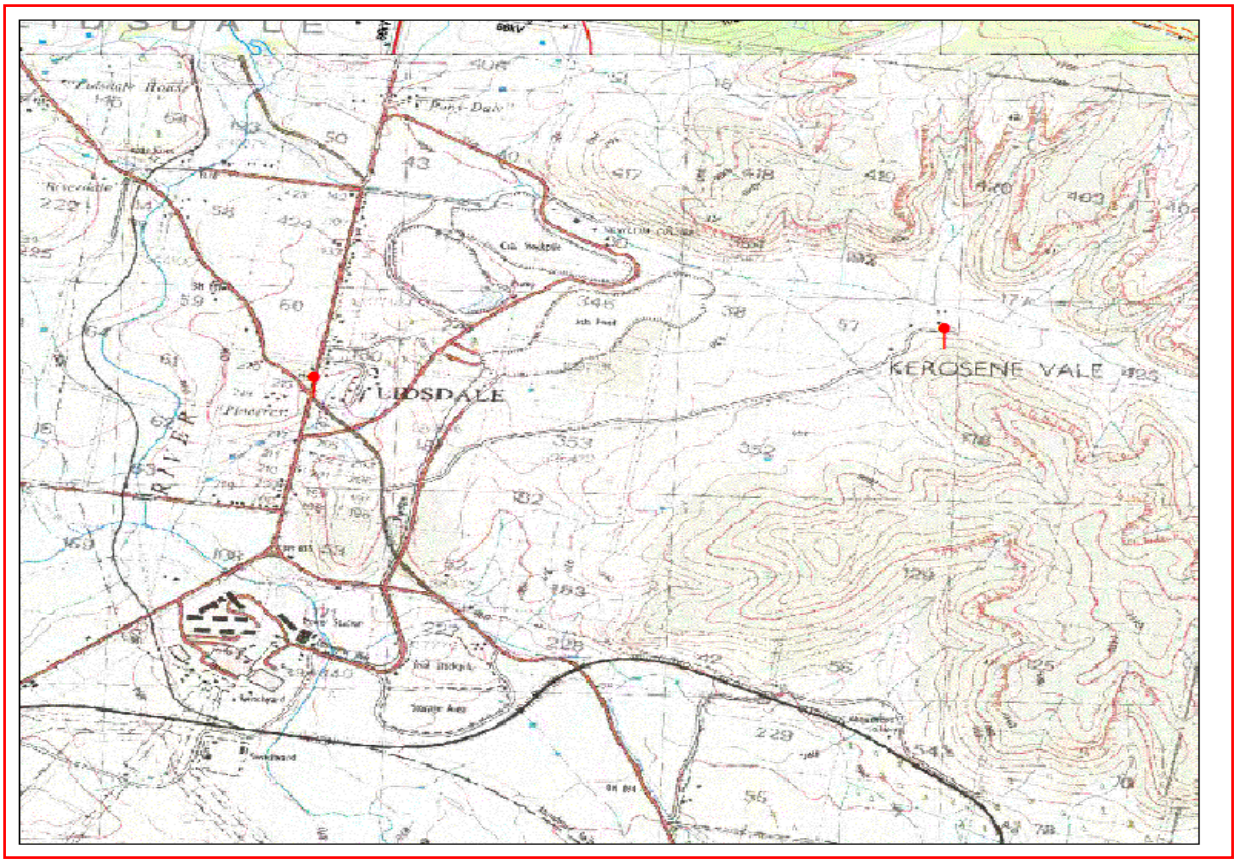
Email: jo.nelson@rpsgroup.com.au

Date: 09 May 2016

Dear Sir or Madam:

AHIMS Web Service search for the following area at Datum :GDA, Zone : 56, Eastings : 227863 - 231863, Northings : 6299493 - 6303493 with a Buffer of 0 meters, conducted by Jo Nelson on 09 May 2016.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

13	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

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- This search can form part of your due diligence and remains valid for 12 months.

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Web: www.environment.nsw.gov.au

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : PR131 758 SUF JN

Client Service ID : 224350

RPS Australia East Pty Ltd -Hamilton

Date: 09 May 2016

Accounts Payable Fortitude Valley PO Box 237
BRISBANE Queensland 4001

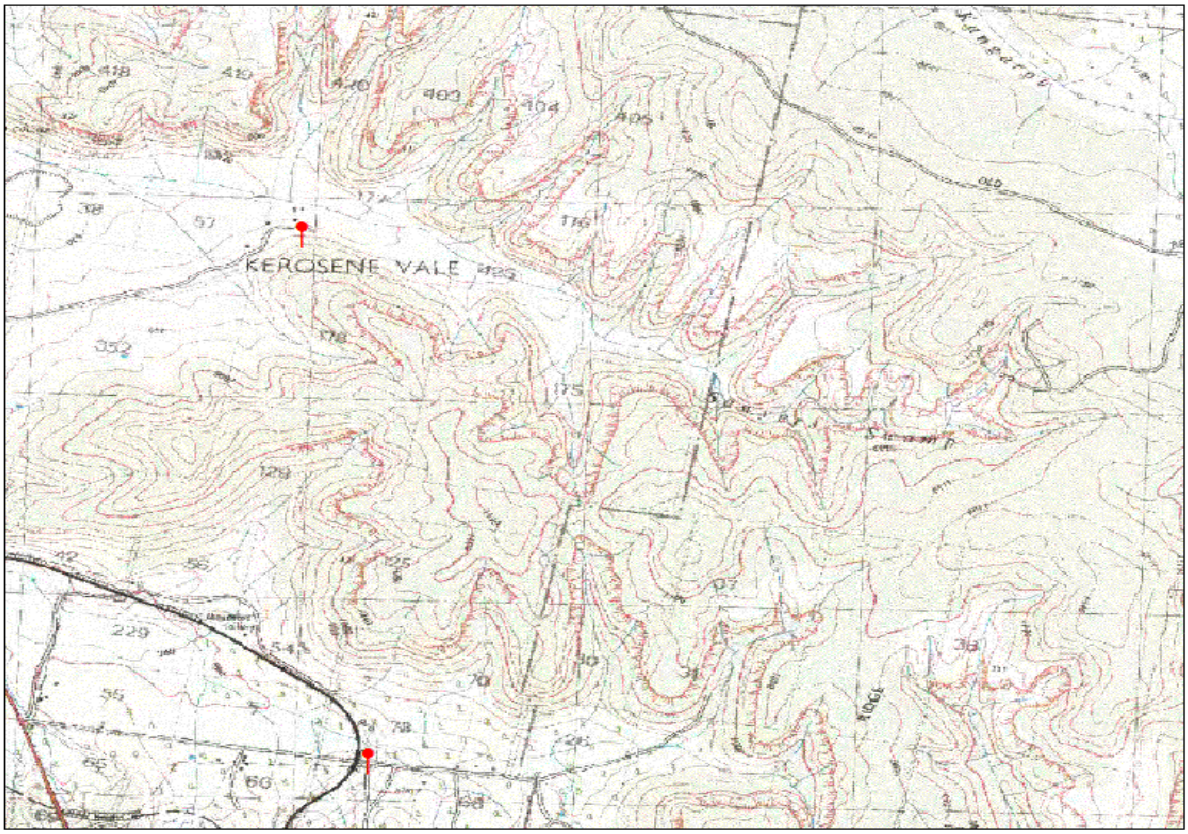
Attention: Jo Nelson

Email: jo.nelson@rpsgroup.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Datum :GDA, Zone : 56, Eastings : 230121 - 234121, Northings : 6299119 - 6303119 with a Buffer of 0 meters, conducted by Jo Nelson on 09 May 2016.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

7	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

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- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

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Locked Bag 5020 Parramatta NSW 2220
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ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : PR131 758 SUG JN

Client Service ID : 224914

RPS Australia East Pty Ltd -Hamilton

Date: 12 May 2016

Accounts Payable Fortitude Valley PO Box 237
BRISBANE Queensland 4001

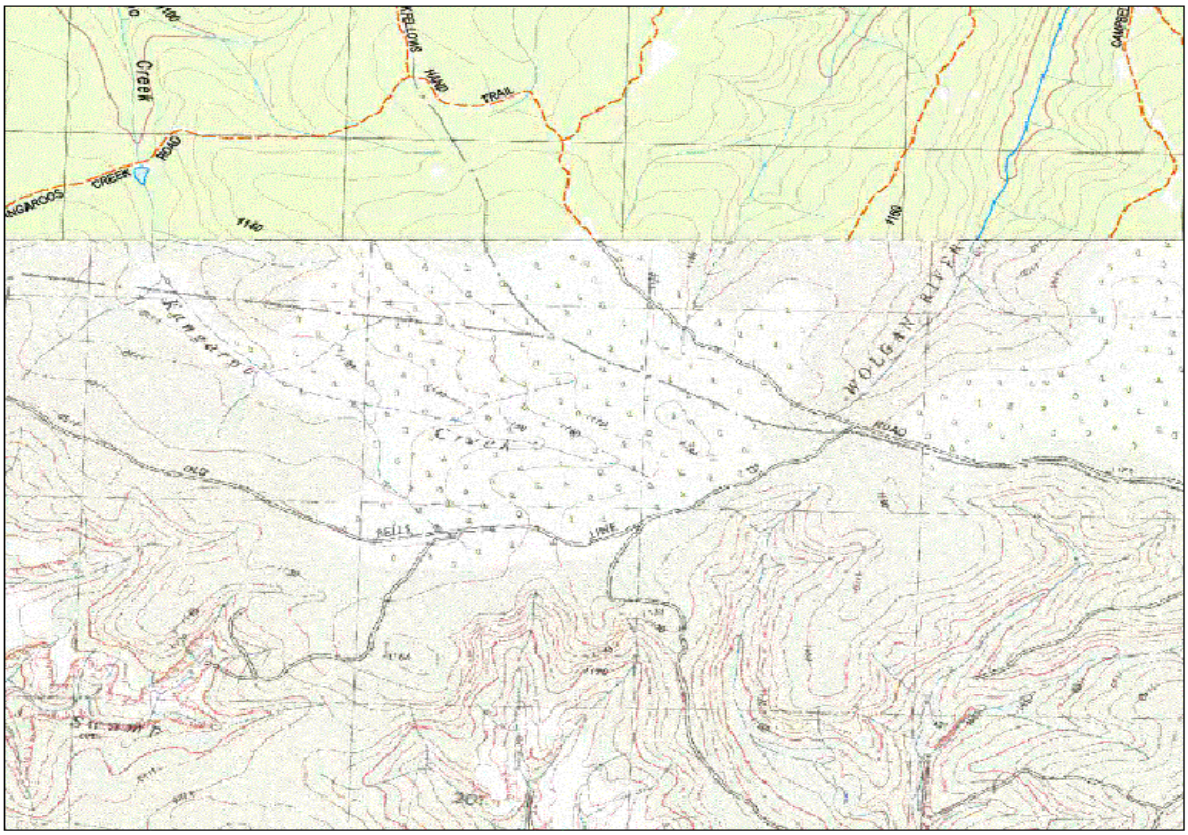
Attention: Jo Nelson

Email: jo.nelson@rpsgroup.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Datum :GDA, Zone : 56, Eastings : 232921 - 236921, Northings : 6300629 - 6304629 with a Buffer of 0 meters, conducted by Jo Nelson on 12 May 2016.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

4	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

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Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

Appendix 3

Aboriginal Consultation Log

TRADING POST .COM.AU

Contact the Lithgow Mercury to advertise
6352 2700
www.lithgowmercury.com.au
classifieds.lithgow@ruralpress.com
fax 6351 4866

DEATH NOTICES

The family of the late Tom Batcheldor wish to thank our family and friends for their many acts of kindness, words of comfort, messages of sympathy, and flowers in our bereavement.
Judy, Dianne and Ian Batcheldor.

DEATH NOTICE

WILKINSON: Keith Allan
3 October, 2011 peacefully at Lithgow Community Private Hospital. Of Tweed Road, Lithgow and formerly of Maple Crescent, Lithgow. Beloved partner of Helen, dearly loved husband of Loretta (deceased), loved father and father-in-law of Mark and Peta, Katrina and Michael Kable, Theresa and Melissa, Nathan and Renay, Stephen Hall, Stephen and Julie, Sharon and Elwin, much loved 'Poppy' of Joshua, Brendan, Rochelle, Matthew, Ethan, Benjamin, Hannah, Lily, Lyla, Stephen and Patsy, loving brother, brother-in-law and uncle of his family.
Aged 64 years.
"Told you I was sick"
Fond memories.
Kerry Linegar Funerals FDA - NSW
(David & Michael Brown)
157 Mort Street, Lithgow
Telephone: 6351 2661

FUNERAL NOTICES

FUNERAL NOTICE

WILKINSON: Prayers for the repose of the soul of the late **KEITH ALLAN WILKINSON** of Tweed Road, Lithgow and formerly of Maple Crescent, Lithgow will be offered in St. Patrick's Catholic Church, Mort Street, Lithgow **TODAY, THURSDAY AT 11.00AM.**
At the conclusion of the prayers private cremation will take place.
Members of Club Lithgow and Hornets Hockey Club are invited to attend.
No flowers by request and in lieu donations could be considered to the Lithgow Cancer Support Group and may be left at the church.
Kerry Linegar Funerals FDA - NSW
(David & Michael Brown)
157 Mort Street, Lithgow
Telephone: 6351 2661

BIRTH NOTICES

Muir
David & Susan are thrilled to announce the birth of a beautiful baby girl:
Eliza Grace Ruby Muir
Born 9/9/2011 at Bathurst Hospital.
A little sister for Connor and second Grandchild for Barbara Thomas and the late Thelma & Laurie Muir.

ENGAGEMENTS

WITHERSPOON & WHITELOCK
Portland
Brooke to Ben
Son of Gary and Leoann Whitelock of Portland
Love and best wishes for a happy life together

MARRIAGES

A MARRIAGE CELEBRANT
for you, available for weddings, baby namings & renewal of vows. Located in Lithgow and available Central West, Blue Mountains and coastal areas. Phone Maureen 0418610379, 63514774.www.lithgowmarriagecelebrant.com

WEDDING SERVICES

Call Cheryl Whiting
An experienced and professional celebrant for personally written marriage and naming ceremonies.
Heartfelt Celebrations
0407 427 266 or 02 6355 5241

PUBLIC NOTICES

APPLICATION FOR POSSESSORY TITLE TO LAND
APPLICATION No. AG184389 by David Harris pursuant to part 6A of the Real Property Act 1900 in respect of the undermentioned land.
Property being lot 40 in Deposited Plan 1146950 in Parish of Hartley county of Cook and surrounded by Virginia, Hume, Paul and Felix Streets, Hartley.
The Applicant is claiming by possession adverse to Patrick Phillips and his heirs.
It is not proposed to grant the application

PUBLIC NOTICES

Centennial Coal

Registration of Interest
for Aboriginal Cultural Knowledge Holders
Centennial Coal Western Region

Centennial Coal is requesting registrations of interest from Aboriginal Stakeholders for projects in the Capertee, Blackmans Flat, Lidsdale and Newnes Plateau localities.
The purpose of this community consultation with Aboriginal people is to assist the proposed applicant in the potential preparation of applications for Aboriginal Heritage Impact Permits and to assist the Director General of Office of Environment and Heritage in his or her consideration and determination of the applications.
As per Department of Environment Climate Change and Water (now Office of Environment and Heritage) 2010 Aboriginal Cultural Heritage Consultation Requirements for Proponents responses are to be received before **Friday 21 October 2010.** *Written applications* should be forwarded to:
Tony Seibel-Barnes
Centennial Coal Company
Locked Bag 1002
Wallerawang NSW 2845
Mobile: 0448 443864
tony.seibel-barnes@centennialcoal.com.au
Further information will be provided upon registration.
6352-121

Donny brook Fish and Social Club A.G.M. Sunday 9-10-11 all members please attend 1.00pm start.

HYPNOTHERAPY

ANXIETY, stress, panic attacks, phobias, smoking, low confidence. Ring Anthony Taylor MA, Dip. Hpyth, 4751-4224, available Saturdays.

Wallerawang/Lidsdale Progress Association Inc will hold their AGM on Tuesday 11th October 2011 at the Wallerawang Bowling Club commencing 6.30pm. All welcome.

PROBATE NOTICES

IN THE SUPREME COURT OF NEW SOUTH WALES EQUITY DIVISION - PROBATE LIST
After 14 days from publication of this notice an application for probate of the will dated 3 May 2004 of MARY CAIRNS BRUCE late of LIDSDALE in the State of New South Wales, will be made by Ian Robert Bruce and Judith Anne Jenkins the executors of the Will.
Creditors are required to send particulars of their claims upon her estate to:
LE FEVRE & CO., Solicitors
108 Main Street
Lithgow NSW 2790
DX 3151 LITHGOW

TRADES & SERVICES

Handyman. Carpentry, lawns mowed, rubbish removed. Licence number 85036C. Ph 0414 621 104

MARK O'Toole Electrician. All types electrical work. No jobs too small. 0409-582526. 6355-2488.

"I'LL Paint It" - Painting and Decorating Service. Lic 224658c. Ring Sam for a quote 0434 016 031 "All you do is watch it dry!".

PLUMBER Mick Linhart residential - rural-commercial. P.h 0417 045 105 or (02) 6355 22 5

Tractor Slashing, ride on mowing, spraying and firewood.
Rob Jolly 0415 292 102

GARAGE SALES

HUGE garage sale! Inc upright piano, lounges, lamps, new clothes & more. Rear lane 36 Rifle Pde. Sat 8th Oct.

Today 9am 64 Main Street Wallerawang. Lots of bargains.

FOR SALE

BATHS RE-SURFACED
ULTRA-GLAZE. Established Blue Mountains 26 yrs, 7 years guarantee. Free quotes. 6352-4748.

DIRT Cheap Topsoil $30 per ton. Plus delivery 1-3 ton deliveries. Ph 6355-1066.

PICTON PANELSPAN LITHGOW
Next week. Free Quotes. Glassed/Screen Rooms. Patios, Carports, Cladding
Ph:6353-1377, www.panelspan.com.au
Lic No:BL837375C

SHIPPING CONTAINERS (USED) for sale 20' & 40'. Totally wind & water tight. Del. avail. www.containers4sale.com.au, 0421 084 054

STAFFY PUPS
5 males - 1 female $500.00
Also 1 Golden Lab male 15 months $300.00
o.n.o.P.h 0420 733 003

TOMATO JIM
HAS RETIRED
Thank You Lithgow.

LA WARDROBES ORANGE
"The Built-in Storage Specialists"
New wardrobes or upgrade existing. We also specialise in laundry and office design and fitout.
For a free measure and quote phone 6362 4900.

WANTED TO BUY

ANTIQUES old wares, estates cleared. Phone Peter 4758-6919.

ACHCR Stage 1 & Stage 2 (Centennial Western Holdings)

Date	Consultation Description	Method of Contact	Outcomes
6/10/2011	Advertisement placed in Lithgow Mercury for Registration of Interest from Aboriginal Cultural Knowledge Holders.	Phone	Received phone call from Sharon Riley indicating that Mingaan Aboriginal Corporation would be interested in all areas specified in the advert (Capertee, Blackmans Flat, Lidsdale and Newnes Plateau localities)
10/10/2011		Email	Received email from Helen Riley indicating that Mingaan Aboriginal Corporation would be interested in all areas specified in the advert (Capertee, Blackmans Flat, Lidsdale and Newnes Plateau localities)
7/10/2011	Letters sent to the following organisations/ departments: Office of Environment and Heritage-Planning and Aboriginal Heritage Lithgow City Council Office of the Registrar-Aboriginal Land Rights Act National Native Title Tribunal Native Title Services Corporation Limited Hawkesbury-Nepean Catchment Management Authority Bathurst Local Aboriginal Land Council (in accordance with the DECCW Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010).	Letter	Received letter (dated 10.10.2011) from the 'Office of the Registrar Registered Aboriginal Owners. None identified.
18/10/2011	Received letter(via Email) (dated 18.10.2011) from the 'Native Title Tribunal' re Registered Aboriginal Owners. Identified: Wellington Valley Wiradjuri, Wiray-dyuraa Ngumbaay-dyil, Wiray-dyuraa Maying-gu, Warrabinga-Wiradjuri, Gundungurra (GTCAC)	Letter	
19/10/2011	Received letter (dated 14.10.2011) from the 'OEH' re Registered Aboriginal Owners. Identified: Bill Allen, Dhuuluu-Yala, Warrabinga-Wiradjuri, Gundungurra (GTCAC), Gundungurra (GAHA), Hawkesbury-Nepean CMA, Lyn Syme, Mingaan, Mooka, Nth-East Wiradjuri, Wiradjuri Elders, Wiradjuri Traditional Owners.	Letter	
4/11/2011	Received email (dated 04.11.2011) from Tonilee (BLALC) stating Bathurst Local aboriginal Land Council would like to register an Interest for the Archaeological investigation	Email	
4/11/2011	Received email (dated 04.11.2011) from John Lennis (CMA) stating that the Hawkesbury-Nepean Catchment Management Authority has no interest in	Email	

Date	Consultation Description	Method of Contact	Outcomes
	the Archaeological investigation and they would pass the letter on to their Advisory Committee (who may respond).		
7/11/2011	Received email (dated 07.11.2011) from Anupam Sharma (Native Title Services Corporation Limited - 'NTS Corp'). She stated that they had notified all relevant parties regarding on the 17th of October. I have replied requesting more information\correspondence.	Email	
8/11/2011	Received email (dated 08.11.2011) from Anupam Sharma (Native Title Services Corporation Limited - 'NTS Corp'). She responded to my email (07/11/2011) stating that due to privacy regulations, they do not provide contact details of clients (Aboriginal groups/individuals) to any organisation (but confirmed that they had notified all relevant parties directly and requested they contact us if interested).	Email	
8/11/2011	Letters sent to the following Aboriginal Individuals\Groups: Dhuuluu-Yala Aboriginal Corporation Wiradjuri Council of Elders Wiradjuri Council of Elders (Robert Clegg) Wiradjuri Traditional Owners Central West Aboriginal Corporation Wiray-dyuraa Ngumbaay-dyil (Bill Allen) Gundungurra Tribal Council Aboriginal Corporation (GTCAC) Gundungurra Aboriginal Heritage Association Inc (GAHA) Mingaan (Sharon Riley) Hawkesbury-Nepean Catchment Management Authority (Aboriginal Reference Group) Bathurst Local Aboriginal Land Council (Tonilee Scott) Warrabinga Native Title Claimants Aboriginal Corporation (Wendy Lewis) North-East Wiradjuri (Lyn Syme) Mooka Traditional Owners (Neville Williams) Blackshield Lawyers (Simon Blackshield, on behalf of the Warrabinga-Wirdjuri People represented by: Ms Wendy Lewis, Ms Mavia Agnew, Mr Martin de Launey) Eddy Neumann Lawyers (Eddy Neumann, on behalf of the Gundungurra Tribal Council Aboriginal Corporation represented by: Mr Mervyn Trindall, Ms Elsie Stockwell, Ms Pamela Stockwell) Teitzel & Partners (Philip Teitzel, on behalf of the Wiray-dyuraa Ngumbaay-dyil & Wiray-dyuraa Maying-gu represented by: Mr William (Bill) Allen, Mr Joe Bugg, Mr Stephen Riley, Mr John Brasher) Teitzel & Partners (Philip Teitzel, on behalf of the Wellington Valley Wiradjuri represented by: Mrs Joyce Williams, Mrs Violet Carr, Mrs Elizabeth Ferguson) (in accordance with the DECCW Aboriginal Cultural	Phone	Phoned Blackshield Lawyers to follow up on letter sent 08/11/11 (only able to leave message - with message service).

Date	Consultation Description	Method of Contact	Outcomes
	Heritage Consultation Requirements for Proponents 2010).		
16/11/2011	Phoned Wendy Lewis (Warrabinga) to follow up on letter sent 08/11/11. She said she had not received the letter (she has moved and the letter was sent to her old address - address details now updated). The contents of the letter were explained to Wendy over the phone. She stated that she wished to register interest.	Phone	
16/11/2011	Phoned Lyn Syme (North-East Wiradjuri) to follow up on letter sent 08/11/11. She said she was not certain that she had received the letter. The contents of the letter were explained to Lyn over the phone. She stated that she wished to register interest.	Phone	
16/11/2011	Phoned Sharon Riley (Mingaan) to follow up on letter sent 08/11/11. Left message on her phone.	Phone	
16/11/2011	Phoned Teitzel Lawyers (representing Wiray-dyuraa Ngumbaay-dyil & Wiray-dyuraa Maying-gu) to follow up on letter sent 08/11/11 (only able to leave a message). Sent follow up email.	Phone/Email	
16/11/2011	Sent follow up email (with letter attached) to Eddy Neumann Lawyers (representing Gundungurra Tribal Council Aboriginal Corporation) to follow up on letter sent 08/11/11.	Phone	
18/11/2011	Email received from Sharon Brown (Gundungurra - GTCAC) registering interest (and requesting a soft copy of the round 2 letter). Copy of letter sent again to Sharon via email.	Email	
18/11/2011	Phoned Helen Riley (Mingaan) to follow up on letter sent 08/11/11. She confirmed that they wish to register interest.	Phone	
21/11/2011	Phoned Eddy Neumann Lawyers (representing Gundungurra Tribal Council Aboriginal Corporation) to follow up on letter sent 08/11/11. Eddy said that Gundungurra would be interested in registering and he would send an email to state this in writing. Email was received later in the day (registering interest).	Phone	
21/11/2011	Phoned Teitzel Lawyers (representing Wiray-dyuraa Ngumbaay-dyil & Wiray-dyuraa Maying-gu & Wellington Valley Wiradjuri People) to follow up on letter sent 08/11/11. He stated that he was unable to respond in writing until Wednesday 23/11/2011, however, he said the following parties would be interested: Wiray-dyuraa Ngumbaay-dyil & Wiray-dyuraa Maying-gu (Bill Allen, Tim Lucas, John Brasher, Stephen Riley). He also stated there may be interest from Wellington Valley Wiradjuri People (Wayne Carr, Brian Doherty), but said he would confirm this on Wednesday (23/11/2011).	Phone	
21/11/2011	Phoned Blackshield Lawyers to follow up on letter sent 08/11/11 (only able to leave message for them to contact us - with message service). He returned the call but not available to take it. Called Simon back again, left message on his mobile.	Phone	
21/11/2011	Emailed Wiradjuri Council of Elders (Rob Clegg) to follow up on letter sent 08/11/11. Sent copy of letter and requested a response ASAP.	Email	

Date	Consultation Description	Method of Contact	Outcomes
21/11/2011	Emailed Dhuuluu-Yala Aboriginal Corporation to follow up on letter sent 08/11/11. Sent copy of letter and requested a response ASAP.	Email	
21/11/2011	Phoned Rochelle from Dhuuluu-Yala Aboriginal Corporation to follow up on letter sent 08/11/11. She mentioned she did not specifically recall the letter and stated they may not have a sites officer available. However, she would check the email sent through and respond this evening.	Phone	
21/11/2011	Searched internet for Wiray-dyuraa Ngumbaay-dyil (and Bill\William Allen) alternate contact methods\details. No other contact details found.	-	
21/11/2011	Emailed Mooka Traditional Owners (Neville Williams) to follow up on letter sent 08/11/11. Sent copy of letter and requested a response ASAP.	Email	
21/11/2011	Phoned Neville Williams from Mooka Traditional owners to follow up on letter sent 08/11/11. He mentioned he did not recall receiving the letter. However, he would check the email sent through and respond. Email was received later in the evening registering interest (for Sharon Williams).	Phone	
21/11/2011	Emailed Wiradjuri Traditional Owners Central West Aboriginal Corporation (Rob Clegg) to follow up on letter sent 08/11/11. Sent copy of letter and requested a response ASAP.	Email	
21/11/2011	Phoned Brian Grant from Wiradjuri Traditional Owners Central West Aboriginal Corporation to follow up on letter sent 08/11/11. He was not at home and his mobile phone was engaged.	Phone	
21/11/2011	Attempted to follow up with Gundungurra Aboriginal Heritage Association Inc (GAHA) regarding letter sent 08/11/11. Informed that this group may no longer exist(?).	-	
22/11/2011	Phoned Rochelle from Dhuuluu-Yala Aboriginal Corporation to follow up on letter sent 08/11/11. She said she had sent an email last night stating that they did not have a sites officer available thus did not wish to register interest.	Phone	
23/11/2011	Phoned Brian Grant from Wiradjuri Traditional Owners Central West Aboriginal Corporation to follow up on letter sent 08/11/11. He was not at home (left message) and his mobile phone was still engaged.	Phone	
23/11/2011	Methodology letters sent to the following groups (who responded to the invitations for expression of interest): Wiradjuri Council of Elders (Robert Clegg) Wiray-dyuraa Ngumbaay-dyil (Bill Allen) Gundungurra Tribal Council Aboriginal Corporation (GTCAC) Mingaan (Sharon Riley) Bathurst Local Aboriginal Land Council (Tonilee Scott) Warrabinga Native Title Claimants Aboriginal Corporation (Wendy Lewis)	Mail	Responses to methodology due 20 December 2011

Date	Consultation Description	Method of Contact	Outcomes
	North-East Wiradjuri (Lyn Syme) Mooka Traditional Owners (Neville Williams) Blackshield Lawyers (Simon Blackshield, on behalf of the Warrabinga-Wirdjuri People represented by: Ms Wendy Lewis, Ms Mavia Agnew, Mr Martin de Launey) Eddy Neumann Lawyers (Eddy Neumann, on behalf of the Gundungurra Tribal Council Aboriginal Corporation represented by: Mr Mervyn Trindall, Ms Elsie Stockwell, Ms Pamela Stockwell) Teitzel & Partners (Philip Teitzel, on behalf of the Wiray-dyuraa Ngumbaay-dyil & Wiray-dyuraa Maying-gu represented by: Mr William (Bill) Allen, Mr Joe Bugg, Mr Stephen Riley, Mr John Brasher) Teitzel & Partners (Philip Teitzel, on behalf of the Wellington Valley Wiradjuri represented by: Mrs Joyce Williams, Mrs Violet Carr, Mrs Elizabeth Ferguson) (in accordance with the DECCW Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010).		
28/11/2011	Received email from Robert Clegg (Wiradjuri Council of Elders) to propose that Sharon or Helen Riley be their representatives for registration.	Email	
7/12/2011	Community Meeting for interested stakeholder groups: Black Gold Cabins. Methodology overview was provided and Tender Agreement Form.	Community Meeting	Following groups expressed interest in Lidsdale Siding Project: Wiray – dyuraa Ngumbaay-Dyil. Wiradjuri Council of Elders Mingaan North – East Wiradjuri Warrabinga Gundungurra
7/12/2011	Receive response to methodology form from Elwin Wolfenden & Helen Riley of Mingaan	At Community Meeting	Mr Wolfenden and Ms Riley stated that Mingaan “endorse the proposed methodology proposed for site work”. NB form received is dated 7/11/11 but should have been dated 7/12/11.
7/12/2011	Tender Agreement received from Warrabinga (Wendy Lewis)	At Community Meeting	
7/12/2011	Tender Agreement received from Mingaan (Helen Riley)	At Community Meeting	
7/12/2011	Tender Agreement received from Gunungurra (Jason Brown)	At Community Meeting	
7/12/2011	Receive response to methodology form from Wendy Lewis of Warrabinga	At Community Meeting	Ms Lewis signed the form with no additional comments from Warrabinga
14/12/2011	Received phone call from John Lennis (Hawkesbury-	Phone	

Date	Consultation Description	Method of Contact	Outcomes
	Nepean Catchment Management Authority) to confirm that they did not wish to register interest in any of the projects.		
20/12/2011	Receive response to methodology form from Sharon Riley representing both Wiray – dyuraa Ngumbaay-Dyil and Wiray – dyuraa Maying - gu.	Email	Ms Riley stated that Wiray – dyuraa Ngumbaay-Dyil and Wiray – dyuraa Maying – gu "endorsed proposed methodology".
20/12/2011	Tender Agreement received from Sharon Riley representing both Wiray – dyuraa Ngumbaay-Dyil and Wiray – dyuraa Maying - gu.	Fax	
21/12/2011	Receive response to methodology form from Jason Brown of Gunungurra	Fax	Mr Brown signed the form with no additional comments from Gundungurra.
21/12/2011	Receive response to methodology form from Lyn Syme of North-East Wiradjuri	Fax	Ms Syme signed the form in agreeance with the methodlogy and with the outcomes of the meeting on 7/12/11.
21/12/2011	Receive response to methodology form from Tonilee Scott of Bathurst LALC	Fax	Ms Scott stated that Bathurst LALC were "satisfied everything has been covered in methodology".
21/12/2011	Tender Agreement received from Bathurst	Fax	
21/12/2011	Tender Agreement received from North-East Wiradjuri		

ACHCR – Stage 3 to 4 for Springvale Water Treatment Project – consultation undertaken as part of the Springvale Mine Extension Project Modification 2 [SVMEP MOD 2]

Date	Consultation Description	Method of Contact	Outcomes
16/12/2015	Methodology letter for SVMEP MOD 2 Project sent out to Eddy Newmann Lawyers, Gundungurra Aboriginal Heritage Association Incorpoated, Gundungarra Tribal Council Aboriginal Corporation, Mingaan Aboriginal Corporation, Mooka Traditional Owners, North-East Wiradjuri Corporation, Tietzel and Partners, Warrabinga/Wiradjuri People Native Title Claimants, Warrabinga Native Title Claimants, Warrabinga Native Title Claimants Aboriginal Corporation, Wiradjuri Council of Elders, Wiray-dyuraa Maying-gu, Wiray-dyuraa Ngumbaay-dyil, Bathurst Local Aboriginal Land Council	Mail/Email	
8/1/2016	Called Gundungarra Triba Council of Elders re: feedback and methodoklogy	Phone	Called landline and mobile, phone rang out on both. Sharon called back later in the day and requested we send through the methodology as she can't remember receiving it. Emailed to her 3:45pm on the 8th.
8/1/2016	Called Mingaan Aboriginal Corporation, re: feedback to methodology	Phone	Called landline, no answer. Got though on mobile and spoke to Helen Riley, haven't had a chance to review the methodology as offices have been closed, had the report on her and were going to review today. Will get back to us soon as she has read it.
8/1/2016	Called North-East Wiradjuri Corporation, reL feedback to methodology	Phone	Called landline and mobile, phone rang out on both
8/1/2016	Called Wiradjuri Council of Elders re feedback to methodology	Phone	Called landline, no answer. Spoke to Helen Riley however who is a contact for, Wiradjuri Council of Elders, Mingaan, Wiray-dyuraa Mating-gu & Wiray-dyuraa Ngumbaay-dyil
8/1/2016	Called Warrabinga Native Title Claimants Aboriginal Corporation re feedback to methodology	Phone	Called landline, wendy not in the office, left a message with the receptionist for her to call me back
8/1/2016	Called Tietzel & Partners	Phone	Called landline, no dial tone

Date	Consultation Description	Method of Contact	Outcomes
8/1/2016	Called Eddy Neumann Lawyers	Phone	Called Landline, Eddy Neumann not available, left message to call back.
12/1/2016	Called Gundungarra Tribal Council Aboriginal Corp re feedback to methodology (Sharon Brown)	Phone	Landline rang out, called mobile and spoke to her daughter who said they were reviewing this afternoon and will call back then.
12/1/2016	Called Mingaan Aborginal Corp re feedback to methodology (Helen Riley)	Phone	Can't review till Thursday as office is closed, will also be free on the 28th and 29th of January for field survey
12/1/2016	Called Warrabinga Native Title Claimants re feedback to methodology (Wendy Lewis	Phone	Spoke to receptionist at the landline location, Wendy was not in office and wasn't sure when she'll be in. She will pass the message on to get the review in by this afternoon but wasn't making any promises. She also couldn't verify if Wendy was free on the 28th and 29th for field work.
12/1/2016	Called Eddy Neuman Lawyers re feedback to methodology	Phone	Unavailable, contact details left to call back.
12/1/2016	Called North-East Wiradjuri Corporation re feedback to Methodology	Phone	Landline and Mobile rang out
14/1/2016	Invitation for site survey sent to Eddy Newmann Lawyers, Gundungurra Aboriginal Heritage Association Incorpoated, Gundungarra Tribal Council Aboriginal Corporation, Mingaan Aboriginal Corporation, Mooka Traditional Owners, North-East Wiradjuri Corporation, Tietzel and Partners, Warrabinga/Wiradjuri People Native Title Claimants, Warrabinga Native Title Claimants, Warrabinga Native Title Claimants Aboriginal Corporation, Wiradjuri Council of Elders, Wiray-dyuraa Maying-gu, Wiray-dyuraa Ngumbaay-dyil, Bathurst Local Aboriginal Land Council	Mail	
15/1/2016	Invitation for site survey scheduled on the 28th and 29th January 2016 was sent to Eddy Newmann Lawyers, Gundungurra Aboriginal Heritage Association Incorpoated, Gundungarra Tribal Council Aboriginal Corporation, Mingaan Aboriginal Corporation, Mooka Traditional Owners, North-East Wiradjuri Corporation, Tietzel and Partners, Warrabinga/Wiradjuri People Native Title Claimants, Warrabinga Native Title Claimants, Warrabinga Native Title Claimants Aboriginal Corporation, Wiradjuri Council of Elders, Wiray-dyuraa Maying-gu, Wiray-dyuraa Ngumbaay-dyil, Bathurst Local Aboriginal Land Council	Email	
18/1/2016	Lynn Syme of North-East Wiradjuri Corporation provided a representative	Email	Kelli Whillock/Menzies will be their representative for the site survey

Date	Consultation Description	Method of Contact	Outcomes
19/1/2016	Helen Riley Called from Mingaan Aboriginal Corporation	Phone	Calling to say she would like to be a part of the survey but will call back on Thursday after she has had a better look at the methodology.
21/1/2016	Called Helen Riley representing (Mingaan / Wiray-dyuraa Maying-gu/ Wiray-dyuraa Ngumbaay-dyil)	Phone	Called to identify who was attending and who they were representing. Helen indicated Patsy Riley was representing Mingaan and Sharon Riley was representing Wiray-dyuraa Ngumbaay-dyil. Helen will not be attending
21/1/2016	Called Lyn Syme (North-East Wiradjuri)	Phone	No answer. Attempting to find out who their representative would be
21/1/2016	Called Helen Riley (Mingaan / Wiray-dyuraa Maying-gu/ Wiray-dyuraa Ngumbaay-dyil)	Phone	Spoke to Helen to request the methodology feedback form be returned to RPS ASAP in addition to the insurance form and verification of names/phone number of site officers.
21/1/2016	Contact Lyn Syme (North-East Wiradjuri)	Phone/Email	sent another email to obtain methodology feedback form, verification of site officer (name and phone number), and updated phone number
21/1/2016	Helen Riley representing Mingaan and Wiray-Dyuraa Maying-gu	Email/Fax	Helen provided the feedback methodology form, site rep names/phone numbers and insurances to RPS today
22/1/2016	Helen Riley was unable to produce ABN number for Wiray-dyuraa Ngumbaay-dyil. Conversations between Helen and Nagindar Singh of Centennial were had.	Phone	Wiray-dyuraa Ngumbaay-dyil were unable to participate in paid field work unless ABN could be provided for payment processing.
25/1/2016	Lyn Symes (North-East Wiradjuri)	Email	Lyn Symes provided email verification that North-East Wiradjuri is happy with the proposed survey methodology. Lyn also provided the name and contact phone number

Date	Consultation Description	Method of Contact	Outcomes
			of their nominated site officer
25/1/2016	At 4.48 pm Robyn Williams calls RPS to inform that they will be sending a representative out onsite	Phone	Phone call noted down.
27/1/2016	At 9 am CYL contacted Robyn Williams of Warrabinga/Wiradjuri People NTC that we will need to receive the methodology feedback form, name and phone number of site rep and insurance details. CYL also informed Warrabinga that EoI for survey was due on the 21.1.2016	Email/Phone	
27/1/2016	10.03 am Kirsten Kerr on behalf of Warrabinga/Wiradjuri People NTC provided insurances and acceptance of methodology to RPS	Email	Information sent to RPS
27/1/2016	Sharon Brown of Gundungurra Tribal Council sent RPS an email a day before commencement of field work that they would be sending a representative out.	Email	RPS informed Sharon that she has provided notification after the closing date for receiving EoI and that she was yet to provide feedback for comments on methodology and issue copies of insurances.
27/1/2016	RPS attempted to call Sharon Brown 4 times in a final attempt to obtain the required information the day the field team was scheduled to depart for field work	Phone	Phone dials out three times. On fourth attempt Sharon Brown answered the phone
27/1/2016	Sharon Brown sent email to RPS to inform that Gundungurra had no concern about the methodology. She notified RPS of who the site officer would attend and that she would forward insurance details in a separate email	Email	insurances were not received on the 27.1.2016
27/1/2016	Sharon Brown sent a follow up email to RPS enquiry who to forward the invoice to for field work payment and travel expenses.	Email	RPS informed Sharon that we would require copies of her insurances (Public Liability and Personal Indemnity insurances)
27/1/2016	RPS waited until 1.30pm to receive copies of Gundungurra insurances. She was unable to produce the insurances and the RPS field team needed to depart Newcastle for Springvale. RPS issued an email to Sharon that she failed to contact RPS to provide her EoI within the prescribed timeframe, and was unable to produce the insurances she said would be issued in a separate email. Due to the lack of documentation needed and that the RPS needed to leave for the field, RPS informed Sharon that on this occasion Gundungurra could not participate in the paid work. Further to this RPS had attempted to call Sharon three times following her email on the 27.1.2016 expressing interest in participating in field work on the 28.1.2016 and 29.1.2016	Email	Sharon Brown proceeded to contact Alanna Ryan to discuss.
27/1/2016	Sharon Brown informed RPS that her site officer Mr Thomas Brown will have a copy of the insurances upon		

Date	Consultation Description	Method of Contact	Outcomes
	arrival at site work on the 28.1.2016		
27/1/2016	Alanna Ryan of Centennial Coal informed RPS and Nagindar Singh (Centennial Coal) that she had since checked GIO to confirm that Gundungurra insurances were currect and that the cover note from GIO would likely to be available on the first day of field work.	Email	
27/1/2016	Alanna Ryan of Centennial Coal called RPS to assure RPS that Centennial gives approval for Gundungurra to participate in the field survey on the 28.1.2016 and 29.1.2016 following a conversation she had with Sharon Brown and GIO.	Phone	
28/1/2016	Gundungurra insurance cover were not produced on the first day of field work		
28/1/2016	Field Work for SVMEP MOD 2 Project	In Person	Kellie Menzie (North-East Wiradjuri), Patsy Riley Wolfenden (Mingaan), Coral Williams (Warrabinga/Wiradjuri People NTC) participated in survey with RPS. Kellie Menzie (North-East Wiradjuri),Coral Williams Field Work for SVMEP MOD 2 Project (Warrabinga/Wiradjuri People NTC) participated in survey In Person with RPS.
29/1/2016	Field Work for SVMEP MOD 2 Project	In Person	Kellie Menzie (North-East Wiradjuri),Coral Williams (Warrabinga/Wiradjuri People NTC) participated in survey with RPS.

ACHCR – Stage 3 to 4 for Western Coal Services CHIA

Date	Consultation Description	Method of Contact	Outcomes
23/11/2011	Methodology letters sent to the following groups (who responded to the invitations for expression of interest): ▪ Wiradjuri Council of Elders (Robert Clegg) ▪ Wiray-dyuraa Ngumbaay-dyil (Bill Allen) ▪ Gundungurra Tribal Council Aboriginal Corporation (GTCAC) ▪ Mingaan (Sharon Riley) ▪ Bathurst Local Aboriginal Land Council (Tonilee Scott) ▪ Warrabinga Native Title Claimants Aboriginal Corporation (Wendy Lewis) ▪ North-East Wiradjuri (Lyn Syme) ▪ Mooka Traditional Owners (Neville Williams) ▪ Blackshield Lawyers (Simon Blackshield, on behalf of the Warrabinga-Wirdjuri People represented by: Ms Wendy Lewis, Ms Mavia Agnew, Mr Martin de Launey) ▪ Eddy Neumann Lawyers (Eddy Neumann, on behalf of the Gundungurra Tribal Council Aboriginal Corporation represented by: Mr Mervyn Trindall, Ms Elsie Stockwell, Ms Pamela Stockwell) ▪ Teitzel & Partners (Philip Teitzel, on behalf of the Wiraydyuraa Ngumbaay-dyil & Wiray-dyuraa Maying-gu represented by: Mr William (Bill) Allen, Mr Joe Bugg, Mr Stephen Riley, Mr John Brasher) ▪ Teitzel & Partners (Philip Teitzel, on behalf of the Wellington Valley Wiradjuri represented by: Mrs Joyce Williams, Mrs Violet Carr, Mrs Elizabeth Ferguson) (in accordance with the DECCW Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010).	Mail	Responses to methodology due 20 December 2011
28/11/2011	Received email from Robert Clegg (Wiradjuri Council of Elders) 28/11/2011 Received email from Robert Clegg (Wiradjuri Council of Elders) to propose that Sharon or Helen Riley be their representatives for registration.	Mail	
7/12/2011	Community Meeting for interested stakeholder groups: Black Gold Cabins. Methodology overview was provided and Tender Agreement Form.	Community Meeting	Following groups expressed interest in Lidsdale Siding Project: 1. Wiray – dyuraa Ngumbaay-Dyil. 2. Wiradjuri Council of Elders 3. Mingaan 4. North – East Wiradjuri 5. Warrabinga 6. Gundungurra

Date	Consultation Description	Method of Contact	Outcomes
7/12/2011	Receive response to methodology form from Elwin Wolfenden & Helen Riley of Mingaan	At Community Meeting	Mr Wolfenden and Ms Riley stated that Mingaan "endorse the proposed methodology proposed for site work". NB form received is dated 7/11/11 but should have been dated 7/12/11.
7/12/2011	Tender Agreement received from Warrabinga (Wendy Lewis)	At Community Meeting	
7/12/2011	Tender Agreement received from Mingaan (Helen Riley)	At Community Meeting	
7/12/2011	Tender Agreement received from Gunungurra (Jason Brown)	At Community At Community Meeting	
7/12/2011	Receive response to methodology form from Wendy Lewis of Warrabinga	At Community Meeting	Ms Lewis signed the form with no additional comments from Warrabinga
14/12/2011	Received phone call from John Lennis (Hawkesbury-Nepean Catchment Management Authority) to confirm that they did not wish to register interest in any of the projects.	Phone	
16/12/2011	Letters of Invite sent out to Bathurst, Mingaan, Warrabinga, North-East Wiradjuri, Gundugurra for Lidsdale Siding Project.	Mail	
20/12/2011	Receive response to methodology form from Sharon Riley representing both Wiray – dyuraa Ngumbaay-Dyil and Wiray – dyuraa Maying - gu.	Email	Ms Riley stated that Wiray dyuraa Ngumbaay-Dyil and Wiray –dyuraa Maying – gu "endorsed proposed methodology
20/12/2011	Tender Agreement received from Sharon Riley representing both Wiray – dyuraa Ngumbaay-Dyil and Wiray – dyuraa Maying	Fax	
21/12/2011	Receive response to methodology form from Jason Brown of Gunungurra	Fax	Mr Brown signed the form with no additional comments from Gundungurra.
21/12/2011	Receive response to methodology form from Lyn Syme of North-East Wiradjuri	Fax	Ms Syme signed the form in agreeance with the methodology and with the outcomes of the meeting on 7/12/11.
21/12/2011	Receive response to methodology form from Tonilee Scott of Bathurst LALC	Fax	Ms Scott stated that Bathurst LALC were "satisfied everything has been covered in methodology".
21/12/2011	Tender Agreement received from Bathurst	Fax	
21/12/2011	Tender Agreement received from North-East Wiradjuri	Phone	
09/01/2012	Received response for field participation – Warrabinga (Wendy Lewis)	Phone	
09/01/2012	Received response for field participation – North – East Wiradjuri (Lyn Syme)	Phone	
09/01/2012	Received response for field participation – Mingaan (Elwin Wolfenden)	Phone	

Date	Consultation Description	Method of Contact	Outcomes
09/01/2012	Response from "Nita" on behalf of Helen Riley Wiray – dyuraa Ngumbaay-Dyil.	Phone	Will attend the following field work session
09/01/2012	Cheng Yen Loo contacted Sharon Brown (Gundungurra) via telephone to request valid public liability certificate.	Phone	Sharon informed that the information would be provided in time. Document was not delivered to RPS on the 09/01/2012.
10/01/2012	Cheng Yen Loo contacted Sharon Brown (Gundungurra) via telephone to request valid public liability certificate. Cheng Yen informed Sharon that we require a valid certificate before a field inspector can attend as per the Tender Agreement which was signed by Nathan Brown.	Phone	Sharon Brown did not provide the valid public liability certificate as per requested on the 10/1/2012
11/01/2012	Cheng Yen Loo attempted to contact Sharon Brown (Gundungurra) via telephone as per the 10 January 2012	Phone	Sharon Brown provided the valid certificate.
13/01/2012	Mr Jack Pennell of North-East Wiradjuri participated in the field survey	In Person	Participated in fieldwork
13/01/2012	Ms Chantel Peters Chapman of Bathurst LALC participated in the field survey	In Person	Participated in fieldwork
13/01/2012	Mr Kevin Williams of Warrabinga participated in the field survey	In Person	Participated in fieldwork
13/01/2012	Mr Elwin Wolfenden of Mingaan participated in the field survey	In Person	Participated in fieldwork
13/01/2012	Mr Nathan Brown of Gundungurra Tribal Council Aboriginal Corporation informed RPS he would attend field work.	In Person	Despite confirming he would participate in the field work, Mr Brown did not attend the site works
25/06/2012	Informed Gundungurra that RPS obtaining information about the final layout of the mine plan. Any news relevant will be related back to the community	In Person	Appreciated the update-said it was ok
25/06/2012	Informed Wiray-dyuraa Ngumbaay-dyil & Wiray-dyuraa Maying- Gu that RPS obtaining information about the final layout of the mine plan. Any news relevant will be related back to the community	In Person	Appreciated the update-said it was ok
25/06/2012	Informed Mingaan that RPS obtaining information about the final layout of the mine plan. Any news relevant will be related back to the community	In Person	Appreciated the update-said it was ok
25/06/2012	Informed North East Wiradjuri that RPS obtaining information about the final layout of the mine plan. Any news relevant will be related back to the community	In Person	Appreciated the update-said it was ok
25/06/2012	Informed Bathurst that RPS obtaining information about the final layout of the mine plan. Any news relevant will be related back to the community	In Person	Appreciated the update-said it was ok
25/06/2012	Informed Warrabinga that RPS obtaining information about the final layout of the mine plan. Any news relevant will be related back to the community	In Person	Appreciated the update-said it was ok
11/09/2012	Informed Bathurst that the report is in preparation soon available for review	Mail/Email	No Response
11/09/2012	Informed Wiradjuri Council of Elders that the report is in preparation soon available for review	Mail/Email	No Response
11/09/2012	Informed Wiray-dyuraa Ngumbaay-dyil & Wiray-dyuraa Maying- Gu that the report is soon available for review	Mail/Email	No Response

Date	Consultation Description	Method of Contact	Outcomes
11/09/2012	Informed Gundungurra that the report is soon available for review	Mail/Email	No Response
11/09/2012	Informed Mingaan that the report is soon available for review	Mail/Email	No Response
11/09/2012	Informed Mooka that the report is soon available for review	Mail/Email	No Response
11/09/2012	Informed North East Wiradjuri that the report is soon available for review	Mail/Email	No Response
11/09/2012	Informed Warrabinga that the report is soon available for review	Mail/Email	No Response
24/09/2012	Send a copy of the report for comment and review – Bathurst LALC	Mail	Due date for comments was the 23rd October 2012
24/09/2012	Sent a copy of the report for comment and review – Gundungurra Tribal Council	Mail	Due date for comments was the 23rd October 2012
24/09/2012	Sent a copy of the report for comment and review – Mingaan	Mail	Due date for comments was the 23rd October 2012
24/09/2012	Sent a copy of the report for comment and review – Mooka	Mail	Due date for comments was the 23rd October 2012
24/09/2012	Sent a copy of the report for comment and review – North/East Wiradjuri	Mail	Due date for comments was the 23rd October 2012
24/09/2012	Sent a copy of the report for comment and review – Warrabinga	Mail	Due date for comments was the 23rd October 2012
24/09/2012	Sent a copy of the report for comment and review – Wiradjuri Council of Elders	Mail	Due date for comments was the 23rd October 2012
24/09/2012	Sent a copy of the report for comment and review – Wiraydyuraa Ngumbaay-dyil & Wiray-dyuraa Maying-Gu	Mail	Due date for comments was the 23rd October 2012
25/09/2012	Send an electronic copy of the report for comment and review - Bathurst LALC	Email	Due date for comments was the 23rd October 2012
25/09/2012	Sent an electronic copy of the report for comment and review – Gundungurra Tribal Council	Email	Due date for comments was the 23rd October 2012
25/09/2012	Sent an electronic copy of the report for comment and review – Mingaan	Email	Due date for comments was the 23rd October 2012
25/09/2012	Sent an electronic copy of the report for comment and review – Mooka	Email	Due date for comments was the 23rd October 2012
25/09/2012	Sent an electronic copy of the report for comment and review – North/East Wiradjuri	Email	Due date for comments was the 23rd October 2012
25/09/2012	Sent a copy of the report for comment and review – Warrabinga	Email	Due date for comments was the 23rd October 2012
25/09/2012	Sent an electronic copy of the report for comment and review – Wiradjuri Council of Elders	Email	Due date for comments was the 23rd October 2012
25/09/2012	Sent an electronic copy of the report for comment and review - Wiray-dyuraa Ngumbaay-dyil & Wiray-dyuraa Maying-Gu	Email	Due date for comments was the 23rd October 2012
22/10/2012	Sent reminder that calls for comments was due on the 23/10/2012 – Bathurst LALC	Email	Due date for comments was the 23rd October 2012
22/10/2012	Sent reminder that calls for comments was due on the 23/10/2012 – Gundungurra LALC	Email	No comments provided from Gundungurra LALC
22/10/2012	Sent reminder that calls for comments was due on the 23/10/2012 – Mingaan	Email	No comments provided
22/10/2012	Sent reminder that calls for comments was due on the 23/10/2012 – North/East Wiradjuri	Email	No comments provided
22/10/2012	Sent reminder that calls for comments was due on the 23/10/2012 - Warrabinga	Email	No comments provided
22/10/2012	Sent reminder that calls for comments was due on the 23/10/2012 – Newmann Lawyers Tietzel	Email	No comments provided

Date	Consultation Description	Method of Contact	Outcomes
	(re Wiray-dyuraa Ngumbaay-dyil and Wiray-dyuraa Maying Gu)		
22/10/2012	Sent reminder that calls for comments was due on the 23/10/2012 – Wiradjuri Council of Elders	Email	No comments provided
22/10/2012	Sent reminder that calls for comments was due on the 23/10/2012 – Mooka	Email	No comments provided
14/6/2013	RPS contacted Bathurst LALC for comments/feedback, cultural input in the report	Phone	Tonilee Scott informed RPS that Bathurst LALC was happy with the outcome of the assessment and agreed with the recommendations provided.
14/6/2013	RPS contacted Wiradjuri Council of Elders for comments/feedback, cultural input in the report.	Phone	Robert Clegg informed RPS that the Wiradjuri Council of Elders are happy with the recommendations and outcome of the report. Robert requested that an additional recommendation be included being that if site salvage is to occur, Aboriginal stakeholders are to be invited to the salvage program.
14/6/2013	RPS contacted Mooka Traditional Owners (Neville Williams) for comments/feedback, cultural input in the report.	Phone	No response
14/6/2013	RPS contacted Wiray-dyuraa Ngumbaay-dyil (Bill Allen) for comments/feedback, cultural input in the report.	Phone	No response
14/6/2013	RPS contacted Wiray-dyuraa Maying-dyil for comments/feedback, cultural input in the report.	Phone	No response
14/6/2013	RPS contacted North East Wiradjuri for comments/feedback, cultural input in the report	Phone	Kevin Williams answered the telephone and informed RPS that Lyn Symes would contact RPS
14/6/2013	RPS contacted Mingaan Aboriginal Corporation for comments/feedback, cultural input in the report.	Phone	No response
14/6/2013	RPS contacted Warrabinga Aboriginal Corporation for comments/feedback, cultural input in the report.	Phone/Email	RPS requested comments and feedback by the 19th June 2013. A copy of the report was again sent out to Warrabinga Aboriginal Corporation.
14/6/2013	RPS contacted Gundungurra Tribal Council for comments/feedback, cultural input in the report.	Phone	No response
17/6/2013	RPS contacted North East Wiradjuri for comments/feedback, cultural input in the report.	Phone	RPS contacted Lyn Syme to seek comments and feedback. Lyn informed RPS that Kevin Williams has been nominated to provide comments.
17/6/2013	RPS contacted Mingaan Aboriginal Corporation for comments/feedback, cultural input in the report.	Phone	Elwin replied to phone message left by RPS on the 17/6/2013. Elwin informed RPS that Mingaan was happy with the report findings and the recommendations provided.
17/6/2013	RPS contacted Wiray-dyuraa Ngumbaay-dyil for comments/feedback, cultural input in the report.	Phone	No Response. Elwin informed RPS that Wiray-dyuraa Ngumbaaydyil is happy with the recommendations.
17/6/2013	RPS contacted Wiray-dyuraa Maying-dyil for	Phone	No Response. Elwin informed RPS that Wiray-dyuraa Maying-dyil

Date	Consultation Description	Method of Contact	Outcomes
	comments/feedback, cultural input in the report.		is happy with the recommendations.
17/6/2013	No Response. Elwin informed RPS that Gundungurra Tribal Council is happy with the recommendations.	Phone	No response
17/6/2013	RPS contacted Mooka Traditional Owners (Neville Williams) for comments/feedback, cultural input in the report.	Phone	No response
18/6/2013	Kevin Williams of North-East Wiradjuri sent his comments and feedback to RPS.	Email	Kevin provided comments on the report. Stated that North-East Wiradjuri was in general agreeance with the report. However, they would like to know more about the CHMP when developed. They would also like database of sites on mine land to have layers within the GIS program, and offered to prepare visual presentations if required to educate onsite mine staff on their legislative obligations. Also required the word “unlikely” removed from recommendation 5.
19/6/2013	RPS contacted Gundungurra Tribal Council for comments/feedback, cultural input in the report.	Phone	No response. Due date is today.
19/6/2013	RPS contacted Warrabinga Aboriginal Corporation for comments/feedback, cultural input in the report.	Phone	No response. Due date is today

ACHCR – Stage 3 to 4 for Lidsdale Siding Upgrade Project CHIA

Date	Consultation Description	Method of Contact	Outcomes
27/07/2012	Sent Draft Report	Via email from Cheng-Yen Loo (CYL) RPS	
27/07/2012	Sent Draft Report	Via email from Cheng-Yen Loo (CYL) RPS	
27/07/2012	Sent Draft Report	Via email from Cheng-Yen Loo (CYL) RPS	
27/07/2012	Sent Draft Report	Via email from Cheng-Yen Loo (CYL) RPS	Robb Clegg??
27/07/2012	Sent Draft Report	Via email from Cheng-Yen Loo (CYL) RPS	Nita-Wiray-dyuraa Ngumbaau-dyil & Wiray-dyuraa Maiyingu
27/07/2012	Sent Draft Report	Via email from Cheng-Yen Loo (CYL) RPS	
27/07/2012	Sent Draft Report	Via email from Cheng-Yen Loo (CYL) RPS	min
27/07/2012	Sent Draft Report	Via email from Cheng-Yen Loo (CYL) RPS	
30/07/2012	Philippa Sokol (PS) reminded Warrabinga Native Title Claimants Aboriginal Corporation about comments to the draft report	Meeting/Fieldwork	
30/07/2012	Philippa Sokol (PS) reminded North-East Wiradjuri about comments to the draft report	Meeting/Fieldwork	
30/07/2012	Tessa Boer-Mah (TBM) RPS reminded Tonilee about draft report coments	Phone 6332 6835	Will send comments to RPS
30/07/2012	TBM rang to follow up on comments to the draft report	No answer on 4728 6578 or 0411 146 036	No answer
30/07/2012	Philippa Sokol (PS) reminded Mingaan Aboriginal Corporationabout comments to the draft report	Meeting/Fieldwork	
30/07/2012	TBM rang to follow up on comments to the draft report	Phoned 8922 9630	Will send comments to RPS
30/07/2012	TBM rang to follow up on comments to the draft report	Phoned 8922 9630	Will send comments to RPS
30/07/2012	TBM rang to follow up on comments to the draft report	Phoned 6341 2604 and 0402 642 687	No answer
15/08/2012	JH Rang to get feedback from report		Left Message
15/08/2012	JH Rang to get feedback from report		Did not get the report - JH will email today
15/08/2012	JH Rang to get feedback from report		JH called, but number was busy. Will try again
15/08/2012	JH Rang to get feedback from report		Left Message on 0411146063

Date	Consultation Description	Method of Contact	Outcomes
15/08/2012	JH Rang to get feedback from report		Rang both Helen and Elwin. Left a message with Elwin. Helen asked that I ring Elwin
15/08/2012	JH Rang to get feedback from report		Neville couldn't remember if he got the report. JH asked that if he did find it if he could ring us back with feedback
15/08/2012	JH sent report again to Helen	Email	Asked for feed back before 24/08/2012
16/08/2012	Lyn Syme to JH	Email	NEWCO fully support the recommendations in the report
16/08/2012	Elwyn Rang JH	Phone	JH was not in the office, JH will call back
17/08/2012	JH to Elwyn Wolfenden	Phone	Elwyn had no problems with the survey. He indicated that one of the Survey units could have PAD
21/08/2012	CYL to Tonilee Scott	Email	Sent a reminder to Bathurst that comments are due on the 24th August 2012.

ACHCR – Stage 3 to 4 for Springvale Extension of Mine CHIA

Date	Consultation Description	Method of Contact	Outcomes
17/05/2013	Telephone call from DF to Lyn Syme of North East Wiradjuri	Phone	Springvale Pipeline Additional Work: Brief outline of project and methodology; requesting availability for fieldwork
17/05/2013	Email to Sharon Brown of GTCAC	Email	Springvale Pipeline Additional Work: Brief outline of project and methodology; requesting availability for fieldwork
17/05/2013	Email to Helen Riley of Mingaan	Email	Springvale Pipeline Additional Work: Brief outline of project and methodology; requesting availability for fieldwork
17/05/2013	Email to Sharon Riley of Wiraydyuraa Ngambaay-dyil & Wiray-dyuraa Maying-gu	Email	Springvale Pipeline Additional Work: Brief outline of project and methodology; requesting availability for fieldwork
17/05/2013	Email to Glynis Moore of Warrabinga Native Title Claimants Aboriginal Group	Email	Springvale Pipeline Additional Work: Brief outline of project and methodology; requesting availability for fieldwork
17/05/2013	Email to Tonilee Scott of Bathurst Local Aboriginal Land Council	Email	Springvale Pipeline Additional Work: Brief outline of project and methodology; requesting availability for fieldwork
17/05/2013	Email to Lyn Syme of North East Wiradjuri	Email	Springvale Pipeline Additional Work: Confirming phone call; requesting availability
19/05/2013	Email from Lyn Syme of N E Wiradjuri	Email	Springvale Pipeline Additional Work: Confirming an officer will be available; requesting further details of project.
20/05/2013	Phone call from KV to Sharon Brown of GTCAC	Email	Springvale Pipeline Additional Work: General enquiry about fieldwork availability for 30/31st May - advised someone will be available on those dates, requested further info via email
20/05/2013	Phone call from KV to Helen Riley of Mingaan	Email	Springvale Pipeline Additional Work: General enquiry about fieldwork availability for 30/31st May - advised someone will be available on those dates, requested further info via email
20/05/2013	Phone call from KV to Sharon Riley of Wiraydyuraa Ngambaay-dyil & Wiray-dyuraa Maying-gu	Email	Springvale Pipeline Additional Work: General enquiry about fieldwork availability for 30/31st May

Date	Consultation Description	Method of Contact	Outcomes
			- advised someone will be available on those dates, requested further info via email
20/05/2013	Phone call from KV to Glynis Moore of Warrabinga Native Title Claimants Aboriginal Group	Email	Springvale Pipeline Additional Work: General enquiry about fieldwork availability for 30/31st May - advised someone will be available on those dates, requested further info via email
20/05/2013	Phone call from KV to Tonilee Scott of Bathurst Local Aboriginal Land Council	Email	Springvale Pipeline Additional Work: General enquiry about fieldwork availability for 30/31st May - advised someone will be available on those dates, requested further info via email
20/05/2013	Phone call from KV to Lyn Syme of North East Wiradjuri	Email	Springvale Pipeline Additional Work: General enquiry about fieldwork availability for 30/31st May - no answer, left a message
20/05/2013	Email from KV to Sharon Brown of GTCAC	Email	Springvale Pipeline Additional Work: Details of fieldwork; requesting availability for fieldwork
20/05/2013	Email from KV to Helen Riley of Mingaan	Email	Springvale Pipeline Additional Work: Details of fieldwork; requesting availability for fieldwork
20/05/2013	Email from KV to Sharon Riley of Wiraydyuraa Ngambaay-dyil & Wiray-dyuraa Maying-gu	Email	Springvale Pipeline Additional Work: Details of fieldwork; requesting availability for fieldwork
20/05/2013	Email from KV to Glynis Moore of Warrabinga Native Title Claimants Aboriginal Group	Email	Springvale Pipeline Additional Work: Details of fieldwork; requesting availability for fieldwork
20/05/2013	Email from KV to Tonilee Scott of Bathurst Local Aboriginal Land Council	Email	Springvale Pipeline Additional Work: Details of fieldwork; requesting availability for fieldwork
20/05/2013	Email from KV to Lyn Syme of North East Wiradjuri	Email	Springvale Pipeline Additional Work: Details of fieldwork; requesting availability for fieldwork
21/05/2013	Phone call from Sharon Riley of Wiraydyuraa Ngambaay-dyil & Wiray-dyuraa Maying-gu	Phone	Springvale Pipeline Additional Work: Patsy Wolfenden will be attending on 30/31, and Elwin Wolfenden for Mingaan - insurances come under Mingaan, best to ask Helen Riley.
21/05/2013	Email to DF from Sharon Brown of GTCAC	Email	Springvale Pipeline Additional Work: Confirmed a site officer is available, asked for more information. DF replied that the

Date	Consultation Description	Method of Contact	Outcomes
			fieldwork will be next week (30/31st)
23/05/2013	KV called Helen Riley (Mingaan) regarding insurances	Phone	Springvale Pipeline Additional Work: Insurances will be emailed through
23/05/2013	KV called Lyn Syme (NE Wiradjuri) regarding insurances and nominated site officer	Phone	Springvale Pipeline Additional Work: No answer, left a message
23/05/2013	KV emailed Lyn Syme (NE Wiradjuri) regarding insurances and nominated site officer	Email	Springvale Pipeline Additional Work: Awaiting response
23/05/2013	KV called Wendy Lewis (Warrabinga) regarding insurances and nominated site officer	Phone	Springvale Pipeline Additional Work: No answer, no message system
23/05/2013	Mingaan emailed insurances to KV	Email	Springvale Pipeline Additional Work: Insurances put on file
23/05/2013	KV emailed Glenys Moore (Warrabinga) regarding insurances and nominated site officer	Email	Springvale Pipeline Additional Work: Awaiting response
23/05/2013	Glenys Moore (Warrabinga) emailed KV regarding insurances and nominated site officer	Email	Springvale Pipeline Additional Work: Glenys advised that she had passed on the request and we should have a response tomorrow
23/05/2013	Lyn Syme (NE Wiradjuri) called and confirmed that she should email through the nominated site officer and insurances	Email	Springvale Pipeline Additional Work: Awaiting email
24/05/2013	KV emailed Warrabinga with details of survey and requesting insurances and site officer name	Email	Springvale Pipeline Additional Work: Awaiting response
24/05/2013	KV emailed Lyn Syme (NE Wiradjuri) with details of survey and requesting insurances and site officer name	Email	Springvale Pipeline Additional Work: Awaiting response
29/05/2013	KV emailed Robyn Williams and Glenys Moore (Warrabinga) to confirm dates and personnel for field work	Email	Springvale Pipeline Additional Work: Confirmed via email that Gail Ratcliffe would be the attending site officer
29/05/2013	KV emailed and called Lyn Syme (NE Wiradjuri) to confirm dates and personnel for field work	Phone and Email	Springvale Pipeline Additional Work: Donna Whillock confirmed as site officer
29/05/2013	KV emailed and called Sharon Brown (GTCAC) to confirm dates and personnel for field work	Phone and Email	Springvale Pipeline Additional Work: Nathan Brown confirmed as site officer
29/05/2013	KV emailed and called Helen Riley (Mingaan) to confirm dates and personnel for field work	Phone and Email	Springvale Pipeline Additional Work: Elwin Wolfenden confirmed as site officer
29/05/2013	KV emailed and called Sharon Riley (Wiraydyuraa Ngambaay-dyil & Wiray-dyuraa Maying-gu) to confirm dates and personnel for field work	Phone and Email	Springvale Pipeline Additional Work: Patsy Wolfenden confirmed as site officer
29/05/2013	KV emailed and called Bathurst LALC to	Phone and Email	Springvale Pipeline

Date	Consultation Description	Method of Contact	Outcomes
	confirm dates and personnel for field work		Additional Work: Chantel Peters confirmed as site officer
30/05/2013	Field work conducted with E. Wolfenden, P. Wolfenden, G. Ratcliffe, C. Peters, D. Whillock	Field Work	Springvale Pipeline Additional Work: N/A
31/05/2013	Helen Riley (Mingaan) called KV regarding Purchase Orders and invoicing.	Phone and Email	Springvale Pipeline Additional Work: KV gave Helen her PO number (via Iain Hornshaw) and also provided her with a mailing address
7/06/2013	PS sent a copy of the draft report to Wiradjuri Council of Elders, Bathurst LALC, Mooka Traditional Owners, Gundungarra Tribal Council Aboriginal Corporation, Mingaan Aboriginal Corporation, North-East Wiradjuri Company, Wiray-dyuraa Ngumbaay-dyil & Wiray-dyuraa Maying-gu, Warrabinga Native Title Claimants	Mail	Springvale Pipeline Additional Work: Awaiting reponse
17/06/2013	Tonilee Scott (Bathurst LALC) called KV regarding Purchase Orders and invoicing.	Phone and Email	Springvale Pipeline Additional Work: KV emailed Tonilee her PO and invoicing information
18/06/2013	KV emailed Tonilee Scott (Bathurst LALC) with Purchase Orders and invoicing details	Email	
19/06/2013	KV requested contact details for 'Warrabinga/Wiradjuri People Native Title Claimants'	Email	Email response from Robyn Williams advised that this group falls under the 'Warrabinga Native Title Claimants Aboriginal Corporation'
19/06/2013	KV requested contact details for 'Gundungarra Tribal Council Aboriginal Corporation Native Title Claimants'	Email	Sharon advised that the address for this group is 14 Oak Street, Katoomba (Mervyn Trindall and Elsie
20/06/2013	KV asked if a copy of the draft report addressed to 'Warrabinga/Wiradjuri People Native Title Claimants' could be sent to the address that is on file for 'Warrabinga Native Title Claimants Aboriginal Corporation', or if there are alternative contact details	Email	Awaiting response
26/06/2013	KV requested contact details for 'Warrabinga/Wiradjuri People Native Title Claimants', and asked if there were any comments on the Springvale draft report	Email	Awaiting response
26/06/2013	KV sent a copy of the draft report to Mervyn Trindall and Elsie Stockwell of Gundungarra Tribal Council Aboriginal Corporation Native Title Claimants	Mail	N/A
27/06/2013	The draft report that KV sent to Warrabinga/Wiradjuri People Native Title Claimants was sent back to the RPS office with a note explaining that the organisation was not affiliated with that address	Mail	N/A
11/07/2013	KV called GTCAC, Warrabinga, NE Wiradjuri, Wiray, Mingaan, and Bathurst LALC requesting comments on draft report	Phone	Left a message for GTCAC, NE Wiradjuri, Wiray, Mingaan and Bathurst LALC.

Date	Consultation Description	Method of Contact	Outcomes
11/07/2013	KV received a voicemail from Lyn Syme of NE Wiradjuri regarding comments on the draft report.	Phone	KV tried to return Lyn Syme's call, but got message bank again.
11/07/2013	KV emailed GTCAC, Warrabinga, NE Wiradjuri, Wiray, Warrabinga, Mingaan, Wiradjuri Council of Elders and Bathurst LALC requesting comments on draft report	Email	Awaiting responses. Mooki Traditional Owners could not be contacted as there is no available phone/email address for this organisation
11/07/2013	KV received an email from Lyn Syme of NE Wiradjuri, advising that Donna Whillock had received a copy of the draft report and will provide comments ASAP	Email	Awaiting response

Cover photos: Rock Formations on Newnes Plateau and Coxs River

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