29 May 2018

Matt Johnson
Senior Planner
Habitat Planning
1/622 Macauley Street
Albury NSW 2640

Dear Matt

Re: Biodiversity assessment for the Rockwood Quarry expansion, Table Top

Project no. 27296

Biosis Pty Ltd was commissioned by Habitat Planning on behalf of A.P. Delaney & Co. to complete a biodiversity assessment to describe the ecological values and constraints associated with the proposed Rockwood Quarry expansion in Table Top, NSW (Figure 1; Appendix 1).

Biosis understands that A.P. Delaney & Co proposes to expand Rockwood Quarry to the north and east from an existing excavation pit (Pit 3) in a number of staged expansions over the next 30 years (the project).

We understand that in response to the Environmental Impact Statement (EIS) prepared by Habitat Planning (2017), both Albury City Council and the Office of Environment and Heritage (OEH) have requested further information regarding the potential biodiversity values present at the site. Specifically, the potential for the expansion to impact on areas that may meet the listing criteria for White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Woodlands) critically endangered ecological community, listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The site is located wholly within Biodiversity Certified land under the *Albury Local Environmental Plan 2010* (LEP). Under the Albury LEP, development on biodiversity certified land is taken to be development that is not likely to significantly affect any threatened species, populations or ecological communities or its habitat. A consent authority is not required to take into consideration the likely impact of the development on biodiversity values. Therefore, no further assessment of impacts to threatened species, populations or ecological communities is required under the *Biodiversity Conservation Act 2016* (BC Act). However, the Albury LEP does not cover matters listed under the EPBC Act.

The objective of this flora and fauna assessment is to determine the presence of any threatened ecological communities (TECs) within the study area and, where applicable, assess the impacts of the project on any threatened species, populations and/or ecological communities (biota), or their habitat, listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Background

The expansion area covers approximately 14 hectares, some of which has been significantly disturbed by previous quarry activities and livestock grazing. The expansion includes areas north and east of the existing Rockwood Quarry Pit 3 (Figure 4; Appendix 1) (the study area).

The study area is within the Albury Local Government Area (LGA) and is zoned RU2 – Rural Landscape, and some areas are zones E3 – Environmental Management, under the Albury LEP.

The study area is within an agricultural and light residential area where native vegetation has been modified by past land uses and lot developments. Notwithstanding the above, native vegetation is still present in the landscape as large patches, isolated paddock trees and unimproved pasture on private properties and within road reserves and nature reserves in the broader landscape.

Method

Database and literature review

Prior to completing the field investigation key information was reviewed, including:

- Commonwealth Department of the Environment and Energy (DEE) Protected Matters Search Tool for matters protected by the EPBC Act.
- NSW Office of Environment and Heritage (OEH) BioNet Atlas of NSW Wildlife, for items listed under the BC Act.
- NSW DPI *Biosecurity Act, 2015* for Priority listed weeds for the Murray Local Land Services (LLS) area within the Murray region.
- OEH Vegetation Information System (VIS) mapping through the Spatial Information eXchange (SIX) Vegetation Map Viewer, Defining the legislative framework for assessment.

The implications for the project were assessed in relation to key biodiversity legislation and policy including:

- *Environment Protection and Biodiversity Conservation Act 1999*.
- *Environmental Planning and Assessment Act 1979* (EP&A Act).
- *Biodiversity Conservation Act 2016 (BC Act)*.
- *Native Vegetation Act 2003* (NV Act).
- *National Parks and Wildlife Act 1974* (NPW Act).
- *Water Management Act 2000.*
- *Biosecurity Act 2015*

Field investigation

A field investigation of the study area was undertaken on 18 April 2018 by Ewan Kelly. Vegetation within the study area was surveyed using the random meander technique (Cropper 1993) over eight person hours.

A habitat-based assessment was completed to determine the presence of suitable habitat for threatened species previously recorded (OEH 2018) or predicted to occur (Commonwealth of Australia 2018) within 10 kilometres. This list was filtered according to species descriptions, life history, habitat preference and soil preference to determine those species most likely to be present within the study area.

Results

The study area contains native vegetation, some of which is contiguous with native vegetation on adjacent properties and road reserves. The condition of native vegetation within the study area is a function of past land uses. The entirety of the site has had some modification to the canopy with historical tree removal occurring for timber harvesting or pasture improvement. Higher quality woodland remnants occur on hilltops and rocky rises where the canopy remains relatively intact and the understorey is predominantly native. Derived grasslands occur on the slopes and valley floors where the canopy has been predominantly removed but the understorey remains native. The eastern portion of the site has been grazed extensively by cattle while the western and northern sections have been excluded from grazing, with the exception of minor native grazing by Eastern Grey Kangaroo *Macropus giganteus*. A section of the study area to the northeast of Pit 3 has been impacted by past quarry activities and now contains predominantly introduced vegetation.

Native vegetation within the study area consists of Plant Community Type (PCT) 266: *White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion* where the canopy remains and PCT 1000: *Speargrass – Redleg Grass derived grassland on hills in the Jindera to Holbrook region, southern NSW South Western Slopes bioregion* where the canopy has been historically removed (Appendix 1; Figure 2; Plates 1 – 7; Appendix 2).

Woodland areas contain a relatively sparse canopy dominated by White Box *Eucalyptus albens* with some Blakely's Red-gum *Eucalyptus blakelyi* and Apple Box *Eucalyptus bridgesiana* present. The midstorey is sparse to absent but where present includes Kurrajong *Brachychiton populneus* subsp. *populneus* and Hickory Wattle *Acacia implexa*. The groundcover consists predominantly of grazing tolerant native grasses including Red-leg Grass *Bothriochloa macra,* Lobed Wallaby-grass *Rytidosperma auriculata,* Common Wheatgrass *Elymus scaber* var. *scaber* and Umbrella Grass *Digitaria divaricatissima*. A sparse herb layer is present and includes Cranesbill Geranium *Geranium retrorsum*, Rock Isotome *Isotoma axillaris* and Rock Fern *Cheilanthes sieberi* subsp. *sieberi*.

Plant Community Type 266 was found to meet the listing criteria as the Box Gum Woodlands TEC, listed as critically endangered under the EPBC Act (see Appendix 5 for significant impact assessment). The study area was found to contain suitable habitat for Pink-tailed Worm Lizard *Aprasia parapulchella,* listed as Vulnerable under the EPBC Act, and Swift Parrot *Lathamus discolor,* listed as Critically Endangered under the EPBC Act (see Appendix 5 for significant impact assessment). Sixteen bird species listed under the BC Act where recorded or predicted to occur within the study area.

Threatened species

Background searches identified five threatened flora species and 47 threatened fauna species recorded (OEH 2018) or predicted to occur (CoA 2018) within 10 kilometres of the study area. Those species considered most likely to have habitat within the study area based on the background research are as follows:

- Fauna
  - Swift Parrot *Lathamus discolor* (Critically Endangered, EPBC Act Endangered, BC Act).
  - Pink-tailed Worm Lizard *Aprasia parapulchella* (Vulnerable, EPBC Act Endangered, BC Act).
  - Gang-gang Cockatoo *Callocephalon fimbriatum* (Vulnerable BC Act).
  - Pied Honeyeater *Certhionyx variegatus* (Vulnerable, BC Act).
  - Speckled Warbler *Chthonicola sagittata* (Vulnerable, BC Act).
  - Spotted Harrier *Circus assimilis* (Vulnerable, BC Act).
  - Brown Treecreeper (eastern subspecies) *Climacteris picumnus victoriae* (vulnerable, BC Act).
  - Varied Sittella *Daphoenositta chrysoptera* (Vulnerable, BC Act).
  - Black Falcon *Falco subniger* (Vulnerable, BC Act).
  - Purple-crowned Lorikeet *Glossopsitta porphyrocephala* (Vulnerable, BC Act).
  - Little Lorikeet *Glossopsitta pusilla* (Vulnerable, BC Act).
  - Little Eagle *Hieraaetus morphnoides* (Vulnerable, BC Act).
  - White-winged Triller *Lalage sueurii* (Vulnerable, BC Act).
  - Hooded Robin (south-eastern form) *Melanodryas cucullata cucullata* (Vulnerable, BC Act).
  - Barking Owl *Ninox connivens* (Vulnerable, BC Act).
  - Scarlet Robin *Petroica boodang* (Vulnerable, BC Act).
  - Flame Robin *Petroica phoenicea* (Vulnerable, BC Act).
  - Diamond Firetail *Stagonopleura guttata* (Vulnerable, BC Act).

Threatened flora species were considered to have a low or negligible likelihood of occurring in the study area. This is predominantly due to ongoing grazing pressures and historical disturbance associated with the quarry development.

The presence of a native canopy and predominantly native grass understorey is likely to provide suitable habitat features for a range of threatened woodland birds including Flame Robin, Diamond Firetail and Brown Treecreeper which were all recorded during the site assessment. However, an assessment of significance under the BC Act is not required as the proposed development is located wholly within biodiversity certified land

An assessment against the Significant Impact Criteria has been undertaken for threatened species listed under the EPBC Act, and provided in Appendix 5.

Vegetation communities

A key focus of the field investigation was to assess the vegetation likely to be impacted by the expansion to determine whether it qualifies as the threatened ecological community as outlined in Commonwealth of Australia (CoA 2006), and to assess the proposed development against the Significant Impact Criteria (CoA 2013).

Plant Community Type (PCT) 266 was found to qualify as the Box Gum Woodlands TEC. This community is discussed further in Table 5, of Appendix 5.

Priority weeds

The *Biosecurity Act 2015* (Biosecurity Act) came into effect as of 1 July 2017 and repeals the *Noxious Weeds Act 1993*. The Biosecurity Act outlines biosecurity risks and impacts, which in relation to the current assessment includes those risks and impacts associated with weeds. A biosecurity risk is defined as the risk of a biosecurity impact occurring, which for weeds includes:

- The introduction, presence, spread or increase of a pest into or within the State or any part of the State.
- A pest plant has the potential to:
  - Out-compete other organisms for resources, including food, water, nutrients, habitat and sunlight.
  - Harm or reduce biodiversity.

The Biosecurity Act introduces the concept of Priority Weeds. A priority weed is any weed identified in a local strategic plan, for a region that includes that land or area, as a weed that is or should be prevented, managed, controlled or eradicated in the region. Where a local strategic plan means a local strategic plan approved by the Minister under Division 2 of Part 4 of the *Local Land Services Act 2013*.

The Biosecurity Act also introduces the General Biosecurity Duty, which states:

- *All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.*

No Priority Weeds for Murray LLS region, which includes the Albury Council LGA, that have been recorded in the study area.

Impact assessment

The proposed expansion works involve the following impacts to ecological features:

- The permanent removal of 7.41 hectares of native vegetation consisting of 1.74 hectares of PCT 266 and 5.67 hectares of PCT 1000.
- The removal of 1.74 hectares of vegetation that meets the listing criteria as the Box Gum Woodlands threatened ecological community.
- Removal of vegetation that may constitute habitat for the Pink-tailed Worm Lizard, listed as vulnerable under the EPBC Act.
- Removal of vegetation that may constitute an occasional foraging resource for Swift Parrot, listed as critically endangered under the EPBC Act.

- Removal of vegetation that provides a foraging and nesting resource for a range of state listed avian species.
- Loss of 21 hollow-bearing trees.

Vegetation adjacent to the intersection of Winchester Lane and Gerogery Road has also been cited as an existing safety issue in the expansions updated traffic management plan. This vegetation consists of a dense area of Blakely's Red-gum regrowth (Plate 8; Appendix 2). This vegetation occurs within the Gerogery Road reserve. Works to alleviate this existing safety issue should be undertaken by Albury City Council or the Road Maintenance Authority as the responsible authority. These works are permitted without consent as existing safety issues under the State Environment Planning Policy (Infrastructure) (SEPP) 2007.

Recommendations

Recommendations to mitigate impacts on MNES are contained within Appendix 5. These mitigation measures include:

- Reduce the impact to areas that qualify as the Box Gum Woodlands ecological community by refining the expansion area or relocating expansion activities where possible.
- Consider targeted surveys for Pink-tailed Worm Lizard to relieve some of the ambiguity surrounding impacts to this cryptic species.
- Avoid disturbance to any native vegetation surrounding the expansion area by fencing off all retained vegetation.
- Where possible, any trees to be retained should be protected in accordance with Australian Standard AS4970 – 2009 Protection of trees on development sites, during construction, operation and decommissioning of the site compound.
- In the unlikely event that unexpected threatened species are identified during the project, works should cease and an ecologist contacted.
- Appropriate erosion and sediment control measures should be installed at all sites to avoid sedimentation of receiving water bodies or other indirect impacts to surrounding biodiversity values.
- Hollow-bearing trees to be removed in a two-stage process.
  - Stage 1: All surrounding vegetation to be cleared and grubbed.
  - Stage 2: 24 to 48 hours later (or in accordance with approval docs) the hollow-bearing trees to be inspected by an ecologist. If resident fauna is observed, the hollow section is to be lowered to the ground and the animal allowed to move on of its own volition. If injured, the fauna to be taken to a WIRES carer or appropriate veterinarian for care.

As the project definitions currently stand and due to multiple MNES being potentially effected, we consider there to be a sufficient level of risk to warrant referral of the project to the Minister of the Environment and Energy for determination. This would provide the proponent with legal clarity moving forward. We also recognise that there is an opportunity to mitigate impacts within the study area through further re-defining the scope of the expansion to avoid as much Box Gum Woodlands as possible and by conducting targeted surveys to determine Pink-tailed Worm Lizard presence / absence. Ultimately, the decision to conduct further work or to refer the project sits with A.P. Delaney & Co. If A.P. Delaney & Co judges the actions associated with the project to be low risk, and unlikely to lead to a significant impact on Matters of National Environmental Significance based on advice provided herein, then a referral may also be deemed unnecessary. However, as

indicated in EPBC Act policy guidelines, a referral under provisions of the Act can be made to provide legal certainty for the project (CoA 2013).

I trust that this advice is of assistance to you however please contact me if you would like to discuss any elements of this ecological advice further.

Yours sincerely

Ewan Kelly
Ecologist, Wangaratta, mob. 0438 210 030

References

Brown GW (2010) 'National Recovery Plan for the Pink-tailed Worm-lizard Aprasia parapulchella' (Draft for comment May 2010).

Commonwealth of Australia 2018. Protected Matters Search Tool. Australian Government Department of the Environment, Water, Heritage & the Arts, Canberra. Accessed 4/11/2018 at https://www.environment.gov.au/epbc/protected-matters-search-tool

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Higgins P. (ed) 1999. *Handbook of Australian, New Zealand & Antarctic Birds.* Vol.4: Parrots to Dollar Birds. Swift Parrot pp. 412 -425. Oxford University Press, Melbourne.

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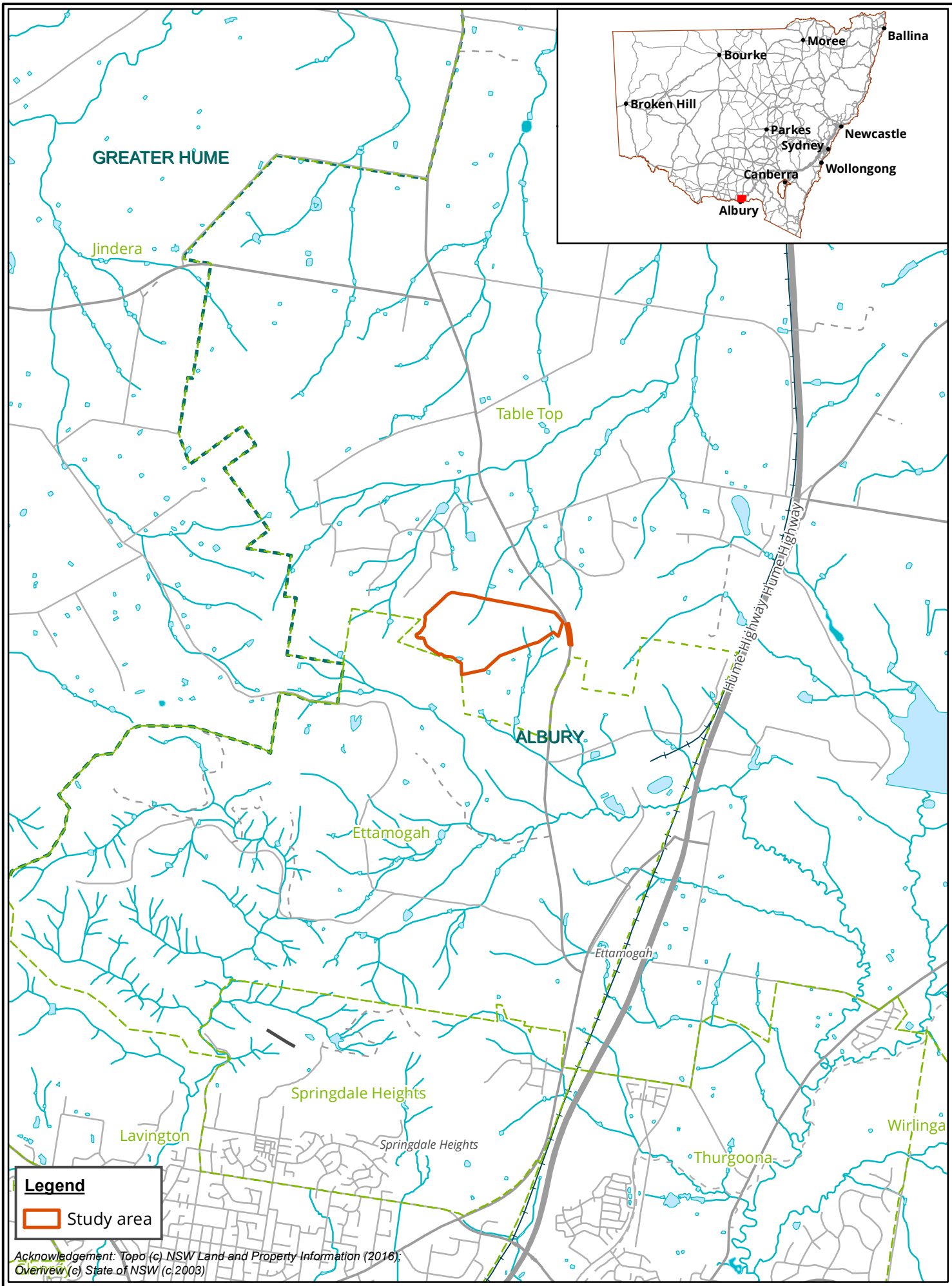
Osborne WS and Jones SR (1995) 'Recovery plan for the Pink-tailed Worm Lizard *Aprasia parapulchella.* Technical Report No.10.' ACT Parks and Conservation Service.

Saunders D. L. & Tzaros C. L. 2011. National Recovery Plan for the Swift Parrot *Lathamus discolor*, Birds Australia, Melbourne.

Appendices

Appendix 1 Figures



Acknowledgement: Topo (c) NSW Land and Property Information (2016); Overview (c) State of NSW (c.2003)

Figure 1: Location of the study area

Biosis Pty Ltd
Albury, Ballarat, Melbourne,
Newcastle, Sydney, Wangaratta & Wollongong

Matter: 27296
Date: 14 May 2018,
Checked by: EK, Drawn by: LW, Last edited by: lwilson
Location:P:\27200s\27296\Mapping\

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Metres
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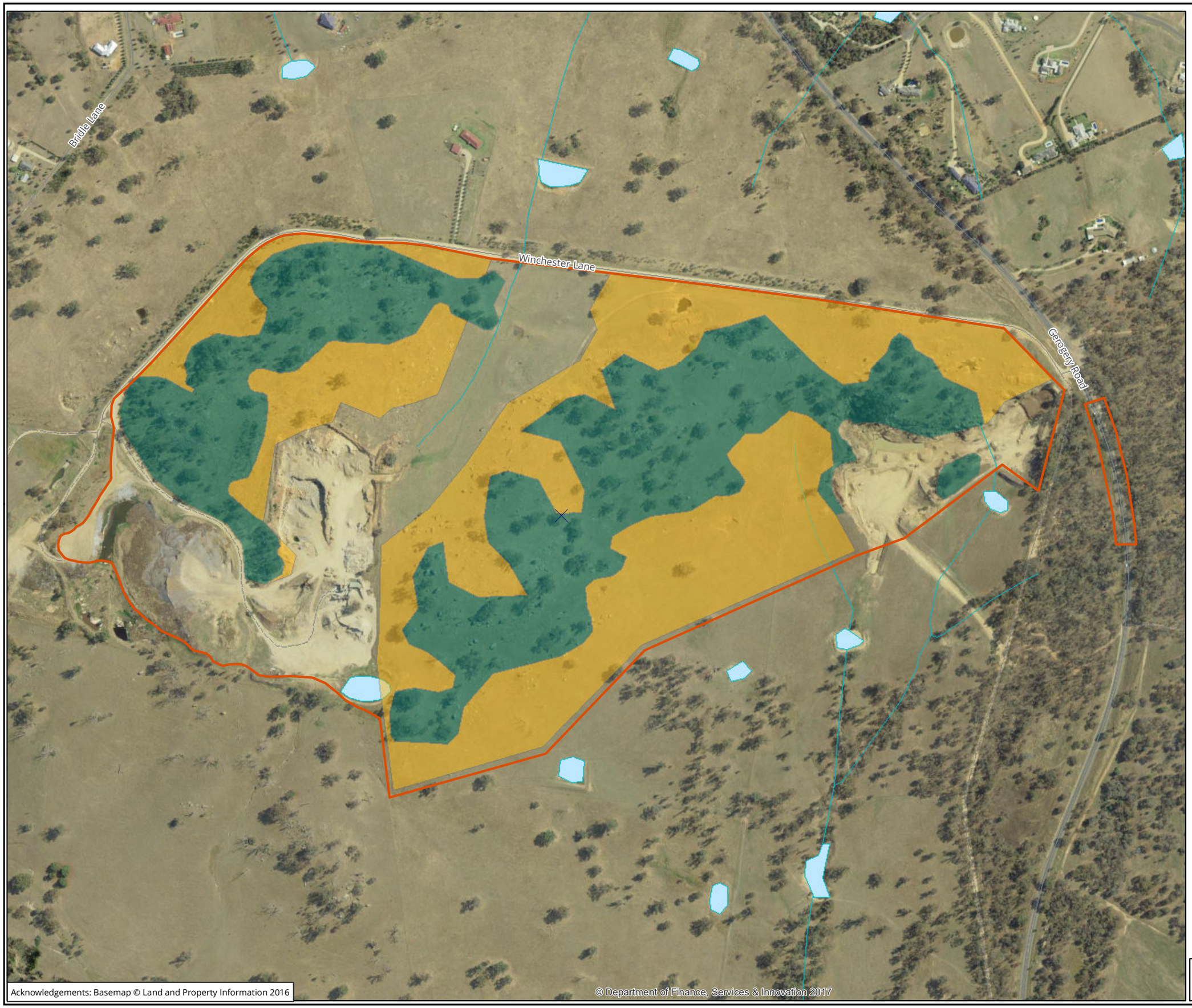

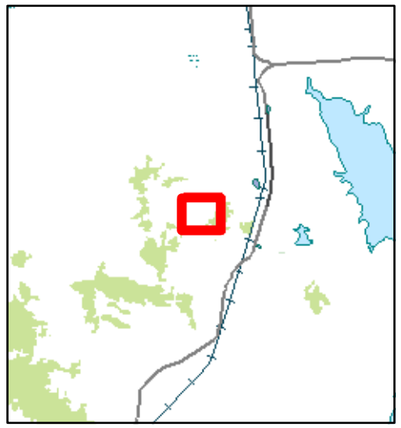

Legend

Study area

Vegetation type

PCT 1000: Speargrass – Redleg Grass derived grassland on hills in the Jindera to Holbrook region, southern NSW South Western Slopes Bioregion

PCT 266: White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

Figure 2: Ecological features of the study area

0 50 100 150 200 250

Metres

Scale: 1:5,200 @ A3

Coordinate System: GDA 1994 MGA Zone 56

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Matter: 27296
Date: 14 May 2018,
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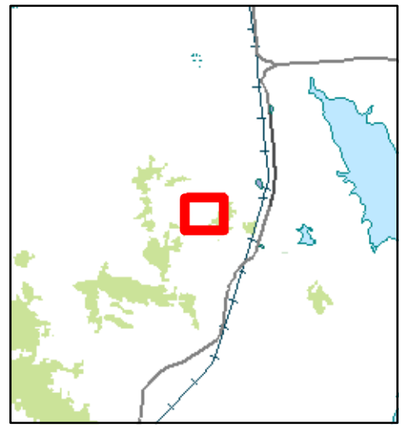

Legend

- Study area
- EPBC Act listed Box Gum Community

Figure 3: EPBA Act listed woodland in the study area

0 50 100 150 200 250

Metres
Scale: 1:5,200 @ A3
Coordinate System: GDA 1994 MGA Zone 56

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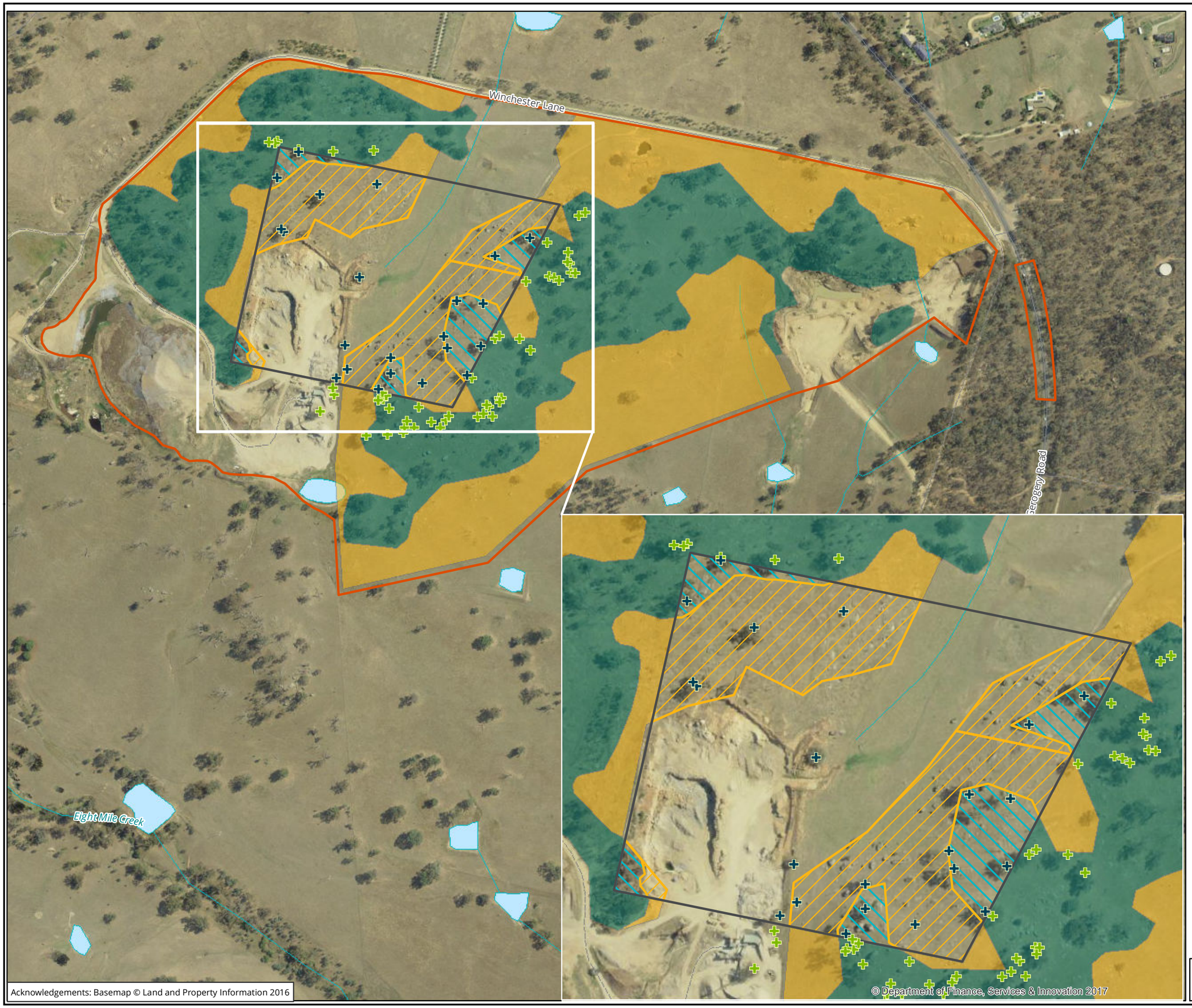

Legend

- Study area
- Works footprint
- Trees to be removed
- Trees to be retained

Vegetation to be removed

- PCT 1000: Speargrass – Redleg Grass derived grassland on hills in the Jindera to Holbrook region, southern NSW South Western Slopes Bioregion
- PCT 266: White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

Vegetation to be retained

- PCT 1000: Speargrass – Redleg Grass derived grassland on hills in the Jindera to Holbrook region, southern NSW South Western Slopes Bioregion
- PCT 266: White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

Figure 4: Proposed vegetation removal

0 50 100 150 200 250

Metres

Scale: 1:5,500 @ A3

Coordinate System: GDA 1994 MGA Zone 55

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Matter: 27296
Date: 14 May 2018,
Checked by: EK, Drawn by: LW, Last edited by: lwilson
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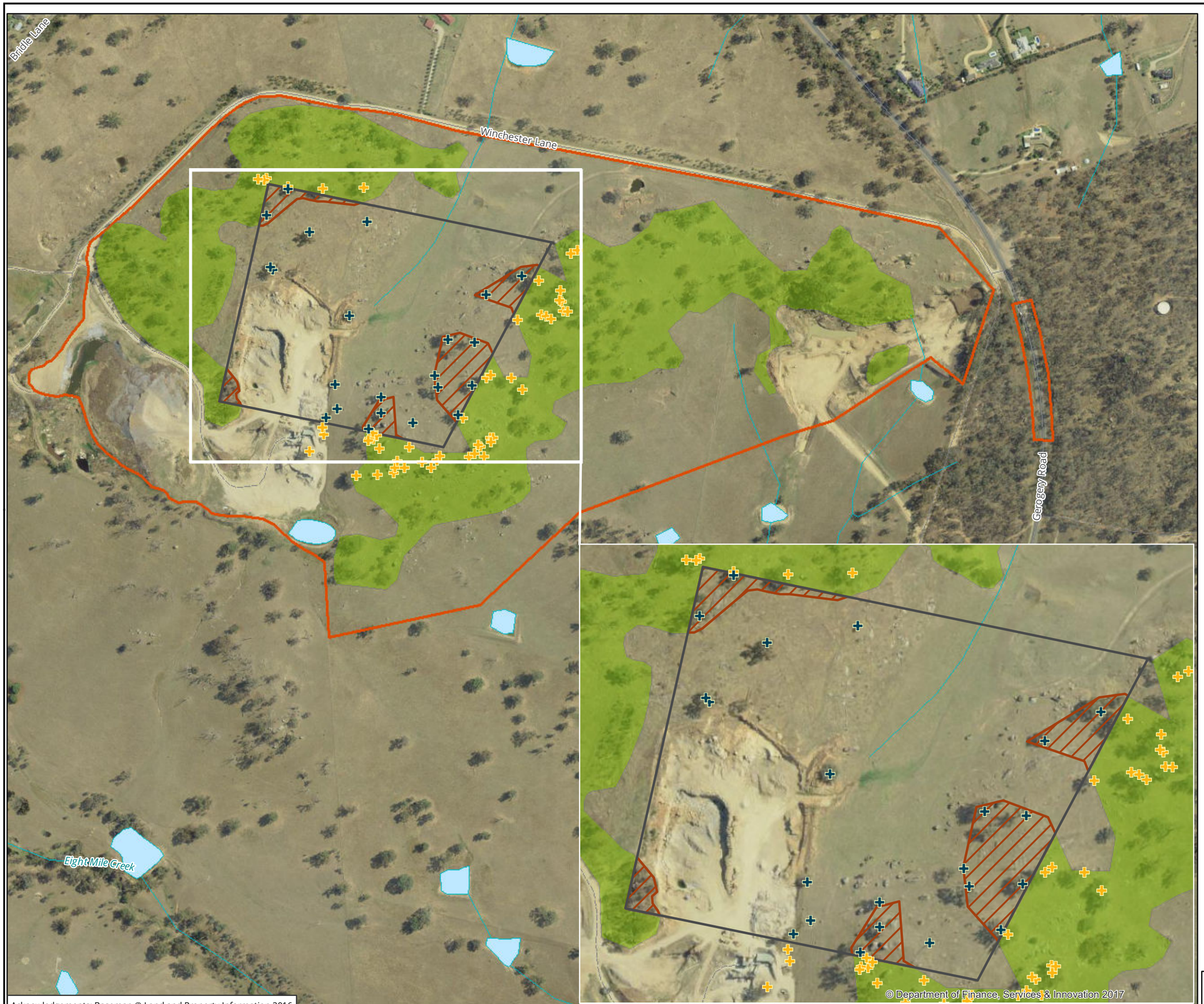
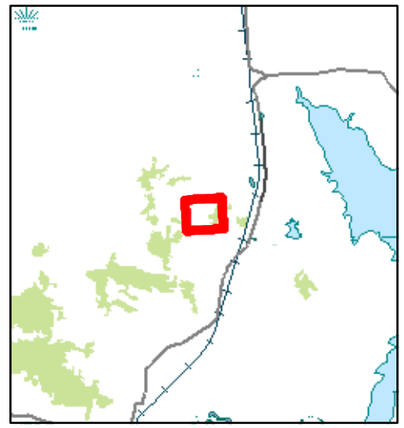
27296_F4_VegRemoval





Legend

- Study area
- Works footprint
- Trees to be removed
- Trees to be retained
- EPBC Act listed Box Gum Community to be removed
- EPBC Act listed Box Gum Community

Figure 5: EPBC act woodland removal

0 50 100 150 200 250

Metres
Scale: 1:5,500 @ A3
Coordinate System: GDA 1994 MGA Zone 55

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Matter: 27296
Date: 20 April 2018,
Checked by: EK, Drawn by: LW, Last edited by: lwilson
Location:P:\27200s\27296\Mapping
27296_F5_WoodlandRemoval

Appendix 2 Plates

Plate 1 **PCT 266, north of existing Pit 3, looking south (photo taken 18 April 2018).**

Plate 2 **PCT266, east of existing Pit 3, looking northeast (photo taken 18 April 2018).**

Plate 3 **PCT266, east of existing Pit 3, looking north (photo taken 4 April 2018).**

Plate 4 **PCT100 in the foreground, east of Pit 3, looking east (photo taken 4 April 2018).**

Plate 5 **PCT1000 in the foreground, north of Pit 3, facing north (photo taken 4 April 2018).**

Plate 6 **PCT1000 in the foreground, north of Pit 3, facing west (photo taken 4 April 2018).**

Plate 7 **Predominantly introduced vegetation, northeast of Pit 3, looking north (photo taken 4 April 2018).**

Plate 8 **Regrowth adjacent to the Winchester Lane - Gerogery Road intersection, looking east (photo taken 4 April 2018).**

Appendix 3 Flora

Flora species recorded from the study area

Flora species recorded by Biosis, 18/04/2018

Status	Scientific Name	Common Name
Native species		
	Acacia implexa	Hickory Wattle
	Acacia pycnantha	Golden Wattle
	Austrostipa scabra	Speargrass
	Bothriochloa macra	Red Grass
	Brachychiton populneus	Kurrajong
	Carex appressa	Tall Sedge
	Cheilanthes sieberi	Rock Fern
	Chloris truncata	Windmill Grass
	Elymus scaber	Common Wheatgrass
	Enteropogon acicularis	Curly Windmill Grass
	Epilobium billardiereanum	
	Eragrostis brownii	Brown's Lovegrass
	Euphorbia dallachyana	
	Geranium potentilloides	
	Isotoma axillaris	Showy Isotome
	Juncus flavidus	
	Lachnagrostis filiformis	
	Lythrum hyssopifolia	Hyssop Loosestrife
	Oxalis perennans	
	Portulaca oleracea	Pigweed
	Rumex brownii	Swamp Dock
	Rytidosperma auriculata	Lobed Wallaby Grass
	Rytidosperma fulvum	Wallaby Grass
	Rytidosperma setacea var. *setacea*	Bristly Wallaby-grass
	Walwhalleya proluta	
Exotic species		
	Acetosella vulgaris	Sheep Sorrel
	Avena barbata	Bearded Oats
	Bromus catharticus	Prairie Grass
	Bromus hordeaceus	Soft Brome
	Carthamus lanatus	Saffron Thistle
	Chondrilla juncea	Skeleton Weed
	Cirsium vulgare	Spear Thistle
	Cynodon dactylon var. *dactylon*	

Status	Scientific Name	Common Name
	Cyperus eragrostis	Umbrella Sedge
	Dittrichia graveolens	Stinkwort
	Dysphania pumilio	
	Echium plantagineum	Patterson's Curse
	Eragrostis cilianensis	Stinkgrass
	Erodium botrys	Long Storksbill
	Hordeum sp	Bulbous Barley
	Hypericum perforatum	St. Johns Wort
	Hypochaeris radicata	Catsear
	Lactuca serriola	Prickly Lettuce
	Lycium ferocissimum	African Boxthorn
	Marrubium vulgare	White Horehound
	Panicum capillare	Witchgrass
	Paspalum dilatatum	Paspalum
	Plantago lanceolata	Lamb's Tongues
	Polygonum aviculare	Wireweed
	Rosa rubiginosa	Sweet Briar
	Rubus anglocandicans	Blackberry
	Rumex crispus	Curled Dock
	Schinus molle	
	Setaria parviflora	
	Sonchus oleraceus	Common Sowthistle
	Trifolium angustifolium	Narrow-leaved Clover
	Vulpia bromoides	Squirrel Tail Fesque
	Xanthium spinosum	Bathurst Burr

A3.1 Threatened flora species and ecological communities

The following table includes a list of the threatened flora species and ecological communities that have potential to occur within the study area. The list of species is sourced from the NSW BioNet Wildlife Atlas and the Protected Matters Search Tool (DEE; accessed on 11/04/2018).

Examples of criteria for determining the likelihood of occurrence for threatened biota as a guide for writing the rationale for likelihood have been listed below.

Likelihood of occurrence	Potential criteria
High	• Species/ecological communities recorded in study area during current or previous assessment/s. • Aquatic species recorded from connected waterbodies in close proximity to the study area during current or previous assessment/s. • Sufficient good quality habitat is present in study area or in connected waterbodies in close proximity to the study area (aquatic species). • Study area is within species natural distributional range (if known). • Species has been recorded within <five kilometres or 10 kilometres> or from the relevant catchment/basin.
Medium	• Records of terrestrial biota within <five kilometres or 10 kilometres> of the study area or of aquatic species in the relevant basin/neighbouring basin. • Habitat limited in its capacity to support the species due to extent, quality, or isolation.
Low	• No records within <five kilometres or 10 kilometres> of the study area or for aquatic species, the relevant basin/neighbouring basin. • Marginal habitat present (low quality & extent). • Substantial loss of habitat since any previous record(s).
Negligible	• Habitat not present in study area • Habitat for aquatic species not present in connected waterbodies in close proximity to the study area. • Habitat present but sufficient targeted survey has been conducted at an optimal time of year and species wasn't recorded.
Other	•

Table A.3.2 Threatened flora species recorded / predicted to occur within 10 kilometres of the study area

Scientific name	Common name	Conservation status		Most recent record	Other sources	Likely occurrence in study area	Rationale for likelihood ranking	Habitat description*
		EPBC	BC					
Amphibromus fluitans	Floating Swamp Wallaby-grass	VU	V	2005		**Negligible**	No suitable habitat	Perennial grass growing throughout the Murray Region between Cooks Lagoon and Mathoura, with isolated populations in Upper Lachlan Shire. Grows in permanent swamps and wetlands in Temperate Montane Grasslands, Inland Riverine Forests, Inland Floodplain Shrublands, and Inland Floodplain Swamps. Grows along swamp margins in mud and hard clay soils.
Caladenia concolor	Crimson Spider Orchid	VU	E1	2009		**Low**	Habitat and grazing regime unlikely to be suitable for this species.	Small orchid, recorded from two populations at Bethungra and Burrinjuck Nature reserve with the other at Nail Can Hill Crown Reserve near Albury. Grows in regrowth woodland on granite ridge country in Upper Riverina Dry Sclerophyll Forest and Western Slopes Grassy Woodlands. Grows in clay loams and gravel beds.
Cullen parvum	Small Scurf-pea		E1	1967		**Low**	Rare and restricted species.	Small shrub recorded from two locations, once in 1884 in Wagga Wagga and the other in 1967 in Jinderra near Albury. Found in grassland or understorey in areas that experience between 450 - 700mm of rainfall per year such as Inland Riverine Forests, Riverine Plain Grasslands, Floodplain Transition Woodlands and Western Slopes Grassy Woodlands.
Senecio garlandii	Woolly Ragwort		V	2004		**Low**	Habitat and grazing regime unlikely to be suitable for this species.	Small many branched perennial herb or shrub, distributed between Temora, Bethungra and Albury and possibly Burrinjuck near Yass. Found growing on sheltered slopes of rocky outcrops in Southern Tableland Dry Sclerophyll Forests, Upper Riverina Dry Sclerophyll Forests, Western Slopes Dry Sclerophyll Forests, Western Slopes Grassy Woodlands and Inland Rocky Hill Woodlands.

Scientific name	Common name	Conservation status		Most recent record	Other sources	Likely occurrence in study area	Rationale for likelihood ranking	Habitat description*
		EPBC	BC					
Swainsona recta	Small Purple-pea	E	E1	#		**Low**	Habitat and grazing regime unlikely to be suitable for this species.	Small erect perennial herb with a scattered distribution at Carcoar, Culcairn and Wagga Wagga from which it is possibly extinct and from Queanbeyan and Wellington - Mudgee areas where it is still extant. Found growing on stony hillsides and in the grassy understorey of Upper Riverina Dry Sclerophyll Forests, Western Slopes Dry Sclerophyll Forests, Temperate Montane Grasslands, Floodplain Transition Woodlands, Southern Tableland Grassy Woodlands and Western Slopes Grassy Woodlands.

* - habitat descriptions have been adapted by qualified ecologists from the DEE Species Profile and Threats (SPRAT) Database, OEH Threatened Species online profiles and the NSW Scientific Committee final determinations for listed species, references within the above table are provided within the report reference list.

Appendix 4 Fauna

Fauna species recorded from the study area

Fauna species recorded by Biosis, 18/04/2018

Scientific Name	Common Name	EPBC Act status	NSW status
Birds			
Acanthiza nana	Yellow Thornbill		
Accipiter fasciatus	Brown Goshawk		
Anthochaera carunculata	Red Wattlebird		
Aquila audax	Wedge-tailed Eagle		
Artamus cyanopterus	Dusky Woodswallow		
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)		V
Colluricincla harmonica	Grey Shrike-thrush		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus coronoides	Australian Raven		
Cracticus tibicen	Australian Magpie		
Falcunculus frontatus frontatus	Eastern Shrike-tit		
Hirundo neoxena	Welcome Swallow		
Malurus cyaneus	Superb Fairy-wren		
Manorina melanocephala	Noisy Miner		
Melithreptus lunatus	White-naped Honeyeater		
Ocyphaps lophotes	Crested Pigeon		
Passer domesticus	House Sparrow		
Petroica phoenicea	Flame Robin		V
Platycercus eximius	Eastern Rosella		
Psephotus haematonotus	Red-rumped Parrot		
Rhipidura leucophrys	Willie Wagtail		
Stagonopleura guttata	Diamond Firetail		V
Sturnus vulgaris	Common Starling		
Mammals			
Macropus giganteus	Eastern Grey Kangaroo		
Oryctolagus cuniculus	Rabbit		

O = observed, W = heard call, F = scratchings.

A4.2 Threatened fauna species

The following table includes a list of the significant fauna species that have potential to occur within the study area. The list of species is sourced from the NSW BioNet Wildlife Atlas, BirdLife Australia data search and the Protected Matters Search Tool (DEE; accessed on 11/04/2018).

Notes to table:

#	species predicted to occur by the DEE database (not recorded on other databases)
##	species predicted to occur based on natural distributional range and suitable habitat despite lack of records in the databases searched
Year	recorded on databases listed above
2018	recorded during current survey

Likelihood of occurrence	Potential criteria
High	• Species recorded in study area during current or previous assessment/s. • Aquatic species recorded from connected waterbodies in close proximity to the study area during current or previous assessment/s. • Sufficient good quality habitat is present in study area or in connected waterbodies in close proximity to the study area (aquatic species). • Study area is within species natural distributional range (if known). • Species has been recorded within <5 or 10 km> or from the relevant catchment/basin.
Medium	• Records of terrestrial species within <5 or 10 kilometres> of the study area or of aquatic species in the relevant basin/neighbouring basin. • Habitat limited in its capacity to support the species due to extent, quality, or isolation.
Low	• No records within <5 or 10 km> of the study area or for aquatic species, the relevant basin/neighbouring basin. • Marginal habitat present (low quality & extent). • Substantial loss of habitat since any previous record(s).
Negligible	• Habitat not present in study area • Habitat for aquatic species not present in connected waterbodies in close proximity to the study area. • Habitat present but sufficient targeted survey has been conducted at an optimal time of year and species wasn't recorded.
other	•

Table A.4.3 Threatened fauna species recorded, or predicted to occur, within 10 kilometres of the study area

Scientific name	Common name	Conservation status		Most recent record	Likely occurrence in study area	Rationale for likelihood ranking	Habitat description*
		EPBC	BC				
Mammals							
Dasyurus maculatus	Spotted-tailed Quoll	EN	V	2002	**Low**	Habitat on site is very marginal.	Occurs along the east coast of Australia and the Great Dividing Range. Uses a range of habitats including sclerophyll forests and woodlands, coastal heathlands and rainforests. Occasional sightings have been made in open country, grazing lands, rocky outcrops and other treeless areas. Habitat requirements include suitable den sites, including hollow logs, rock crevices and caves, an abundance of food and an area of intact vegetation in which to forage. Seventy per cent of the diet is medium-sized mammals, and also feeds on invertebrates, reptiles and birds. Individuals require large areas of relatively intact vegetation through which to forage. The home range of a female is between 180 and 1000 ha, while males have larger home ranges of between 2000 and 5000 ha. Breeding occurs from May to August.
Nyctophilus corbeni	Corben's Long-eared Bat	VU	V	#	**Low**	No records from the search area and unsuitable habitat.	Restricted to the Murray-Darling basin and western slopes. Found in a range of habitats including tall Eucalypt forests, mallee, open savanna and Black Box woodland, preferring habitats with a distinct canopy and cluttered, dense

Scientific name	Common name	Conservation status		Most recent record	Likely occurrence in study area	Rationale for likelihood ranking	Habitat description*
		EPBC	BC				
							understorey. Roost in tree hollows and fissures and under exfoliating bark.
Petaurus norfolcensis	Squirrel Glider		V, E2	2015	**Low**	Lacking vegetation understorey structure and where present canopy is very open and individual trees and patches are beyond the maximum gliding distance for this species to move between.	Generally occurs in dry sclerophyll forests and woodlands but is absent from dense coastal ranges in the southern part of its range. Requires abundant hollow-bearing trees and a mix of eucalypts, banksias and acacias. Within a suitable vegetation community at least one species should flower heavily in winter and one species of eucalypt should be smooth barked.
Phascolarctos cinereus	Koala	VU	V	2006	**Low**	Lacking suitable feed trees and canopy connectivity.	In NSW the Koala mainly occurs on the central and north coasts with some populations in the western region. Koalas feed almost exclusively on eucalypt foliage, and their preferences vary regionally. Primary feed trees include Eucalyptus robusta, E. tereticornis, E. punctata, E. haemostoma and E. signata. They are solitary with varying home ranges.
Pteropus poliocephalus	Grey-headed Flying-fox	VU	V	#	**Low**	Lacking suitable habitat.	Occurs along the NSW coast, extending further inland in the north. This species is a canopy-feeding frugivore and nectarivore of rainforests, open forests, woodlands, melaleuca swamps and banksia woodlands. Roosts in large

Scientific name	Common name	Conservation status		Most recent record	Likely occurrence in study area	Rationale for likelihood ranking	Habitat description*
		EPBC	BC				
							colonies, commonly in dense riparian vegetation.
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat		V	2001	**Low**	No recent records and habitat is marginal	Found throughout NSW in habitats including wet and dry sclerophyll forest, open woodland, acacia shrubland, mallee, grasslands and desert. They roost in tree hollows in colonies and have also been observed roosting in animal burrows, abandoned Sugar Glider nests, cracks in dry clay, hanging from buildings and under slabs of rock. Forages for insects above the canopy in forests.
Birds							
Anseranas semipalmata	Magpie Goose		V	2015	**Negligible**	No suitable habitat.	Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges. They are often seen walking and grazing on land; feeds on grasses, bulbs and rhizomes. Breeding can occur in both summer and winter dominated rainfall areas and is strongly influenced by water level. Nests are formed in trees over deep water; breeding is unlikely in south-eastern NSW. Often seen in trios or flocks on shallow wetlands, dry ephemeral swamps, wet grasslands and floodplains; roosts in tall vegetation.

Scientific name	Common name	Conservation status		Most recent record	Likely occurrence in study area	Rationale for likelihood ranking	Habitat description*
		EPBC	BC				
Anthochaera phrygia	Regent Honeyeater	CE	E4	2013#	**Low**	Known populations in Chiltern – Mount Pilot National Park approximately 60 km south. Flowering White Box does attract a diverse range of honeyeaters but unlikely to occur based on rarity of this species.	Regent Honeyeaters are semi-nomadic, occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests. Nectar and fruit from mistletoes are also eaten. This species usually nest in tall mature eucalypts and sheoaks.
Artamus cyanopterus cyanopterus	Dusky Woodswallow		V	2014	**Recorded**	Recorded during site assessment.	Primarily inhabits dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland.
Botaurus poiciloptilus	Australasian Bittern	EN	E1	#	**Negligible**	No suitable habitat.	The Australasian Bittern is distributed across south-eastern Australia. Often found in terrestrial and estuarine wetlands, generally where there is permanent water with tall, dense vegetation including Typha spp. and *Eleocharis* spp.. Typically this bird forages at night on frogs, fish and invertebrates, and remains inconspicuous during the day. The

Scientific name	Common name	Conservation status		Most recent record	Likely occurrence in study area	Rationale for likelihood ranking	Habitat description*
		EPBC	BC				
							breeding season extends from October to January with nests being built amongst dense vegetation on a flattened platform of reeds.
Burhinus grallarius	Bush Stone-curlew		E1	2007	**Low**	Marginal habitat and no records from the subject site.	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. Occurs in lightly timbered open forest and woodland, or partly cleared farmland with remnants of woodland, with a ground cover of short sparse grass and few or no shrubs where fallen branches and leaf litter are present.
Calidris ferruginea	Curlew Sandpiper	CE	E1	##	**Negligible**	No suitable habitat.	Inhabits sheltered intertidal mudflats. Also non-tidal swamps, lagoons and lakes near the coast. Infrequently recorded inland.
Callocephalon fimbriatum	Gang-gang Cockatoo		V	2009	**Medium**	May forage within study area on occasion during winter months.	In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Also occur in subalpine Snow Gum woodland and occasionally in temperate or regenerating forest. In winter, occurs at lower altitudes in drier, more open

Scientific name	Common name	Conservation status		Most recent record	Likely occurrence in study area	Rationale for likelihood ranking	Habitat description*
		EPBC	BC				
							eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. It requires tree hollows in which to breed.
Certhionyx variegatus	Pied Honeyeater		V	2002	**Medium**	Flowering White Box could attract a range of honeyeaters.	Mainly inhabits shrublands, often dominated by or including Eremophila and grevilleas, and sometimes with an overstorey of eucalypt woodland (mallee or bloodwood) or mulga. They feed on nectar, predominately from Eremophila, but also from mistletoe and Brachysoma and Grevillea shrubs. Additionally, they eat saltbush fruit, berries, seed, flowers and some insects.
Chthonicola sagittata	Speckled Warbler		V	2014	**Medium**	Woodland birds could be present within the study area.	Occurs on the hills and tablelands of the Great Dividing Range. Found in eucalypt and cypress woodlands with a grassy understorey, often on ridges or gullies. The species nests on the ground in grass tussocks, dense litter and fallen branches. They forage on the ground for arthropods and seeds.
Circus assimilis	Spotted Harrier		V	2003	**Medium**	May forage over the study area on occasion.	The Spotted Harrier is found throughout Australia but rarely in densely forested and wooded habitat of the escarpment and coast. Preferred habitat consists of open and wooded country with grassland nearby for hunting. Habitat types include open

Scientific name	Common name	Conservation status		Most recent record	Likely occurrence in study area	Rationale for likelihood ranking	Habitat description*
		EPBC	BC				
							grasslands, acacia and mallee remnants, spinifex, open shrublands, saltbush, very open woodlands, crops and similar low vegetation. The Spotted Harrier is more common in drier inland areas, nomadic part migratory and dispersive, with movements linked to the abundance of prey species. Nesting occurs in open or remnant woodland and unlike other harriers, the Spotted Harrier nests in trees.
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)		V	2013	**Recorded**	Recorded during site assessment.	Lives in eucalypt woodlands, especially areas of relatively flat open woodland typically lacking a dense shrub layer, with short grass or bare ground and with fallen logs or dead trees present.
Daphoenositta chrysoptera	Varied Sittella		V	2014	**Medium**	Woodland birds could be present within the study area.	The Varied Sittella is a sedentary species which inhabits a wide variety of dry eucalypt forests and woodlands, usually with either shrubby understorey or grassy ground cover or both, in all climatic zones of Australia. Usually inhabit areas with rough-barked trees, such as stringybarks or ironbarks, but also in mallee and acacia woodlands, paperbarks or mature Eucalypts. The Varied Sittella feeds on arthropods gleaned from bark, small branches and twigs. It builds a cup-shaped nest of plant fibres and cobweb in an upright tree fork high in the living tree canopy,

Scientific name	Common name	Conservation status		Most recent record	Likely occurrence in study area	Rationale for likelihood ranking	Habitat description*
		EPBC	BC				
							and often re-uses the same fork or tree in successive years.
Falco hypoleucos	Grey Falcon		E1	2001	**Low**	Extremely rare species.	Found over open country and wooded lands of tropical and temperate Australia. Mainly found on sandy and stony plains of inland drainage systems with lightly timbered acacia scrub.
Falco subniger	Black Falcon		V	2006	**Medium**	Could forage within the study area on occasion.	Mainly occur in woodlands and open country where can hunt. Often associated with swamps, rivers and wetlands. Nest in tall trees along watercourses.
Glossopsitta porphyrocephala	Purple-crowned Lorikeet		V	2012	**Medium**	Flowering White Box would attract a range of nectivorous birds.	Occurs in dry open woodlands, shrublands and mallee scrub, generally in areas with a flowering vegetation canopy (NPWS 1996, Higgins 1999). This species forage on nectar, pollen and blossoms from eucalypts, Callistemon and Banskias, they may also feed on berries and small insects. They nest away from feeding areas in hollows or dense vegetation approximately 30 to 40 m high often near water (NPWS 1996, Higgins 1999).
Glossopsitta pusilla	Little Lorikeet		V	2012	**Medium**	Flowering White Box would attract a range of nectivorous birds.	Distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range in NSW, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri.

Scientific name	Common name	Conservation status		Most recent record	Likely occurrence in study area	Rationale for likelihood ranking	Habitat description*
		EPBC	BC				
							Mostly occur in dry, open eucalypt forests and woodlands. They feed primarily on nectar and pollen in the tree canopy. Nest hollows are located at heights of between 2 m and 15 m, mostly in living, smooth-barked eucalypts. Most breeding records come from the western slopes.
Grantiella picta	Painted Honeyeater	VU	V	2003#	**Low**	Study areas did not support a high enough abundance of mistletoe which this species relies on.	Found mainly in dry open woodlands and forests, where it is strongly associated with mistletoe. Often found on plains with scattered eucalypts and remnant trees on farmlands.
Grus rubicunda	Brolga		V	2006	**Negligible**	No suitable habitat.	The Brolga has been recorded on open wetlands, shallow swamps, floodplains, paddocks, farmland and salt flats. This species nest in shallow wetlands where there is shelter such as canegrass, lignum or sedge swamp. They feed in or near water and have often been observed foraging in grassland, dry wetlands and cultivated areas.
Haliaeetus leucogaster	White-bellied Sea-Eagle		V	2013	**Low**	Study area is too far from major rivers for this species to occur.	A migratory species that is generally sedentary in Australia, although immature individuals and some adults are dispersive. Found in terrestrial and coastal wetlands; favouring deep freshwater swamps, lakes and reservoirs; shallow coastal lagoons and saltmarshes. It hunts over open

Scientific name	Common name	Conservation status		Most recent record	Likely occurrence in study area	Rationale for likelihood ranking	Habitat description*
		EPBC	BC				
							terrestrial habitats. Feeds on birds, reptiles, fish, mammals, crustaceans and carrion. Roosts and makes nest in trees.
Hieraaetus morphnoides	Little Eagle		V	2006	**Medium**	May forage over study area on occasion.	The Little Eagle is most abundant in lightly timbered areas with open areas nearby providing an abundance of prey species. It has often been recorded foraging in grasslands, crops, treeless dune fields, and recently logged areas. The Little Eagle nests in tall living trees within farmland, woodland and forests.
Lathamus discolor	Swift Parrot	CE	E1	2005#	**Medium**	Flowering White Box in the study area is likely to attract a range of nectivorous species.	The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW. Favoured feed trees include winter flowering species. This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability.
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)		V	2010	**Medium**	Woodland birds could be present within the study area.	This species lives in a wide range of temperate woodland habitats, and a range of woodlands and shrublands in semi-arid areas.

Scientific name	Common name	Conservation status		Most recent record	Likely occurrence in study area	Rationale for likelihood ranking	Habitat description*
		EPBC	BC				
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)		V	2007	**Medium**	Flowering White Box in the study area is likely to attract a range of honeyeater species	Found mostly in open forests and woodlands dominated by box and ironbark eucalypts. It is rarely recorded east of the Great Dividing Range.
Neophema pulchella	Turquoise Parrot		V	2006	**Low**	Habitat lacks structural complexity.	Occurs in open woodlands and eucalypt forests with a ground cover of grasses and understorey of low shrubs. Generally found in the foothills of the Great Divide, including steep rocky ridges and gullies. Nest in hollow-bearing trees, either dead or alive; also in hollows in tree stumps. Prefer to breed in open grassy forests and woodlands, and gullies that are moist.
Ninox connivens	Barking Owl		V	2003	**Medium**	May forage over the study area on occasion.	Generally found in open forests, woodlands, swamp woodlands, farmlands and dense scrub. Can also be found in the foothills and timber along watercourses in otherwise open country. Territories are typically 2000 ha in NSW habitats. Hunts small arboreal mammals or birds and terrestrial mammals when tree hollows are absent.
Numenius madagascariensis	Eastern Curlew	CE		##	**Negligible**	No suitable habitat.	Occurs in sheltered coasts, especially estuaries, embayments, harbours, inlets and coastal lagoons with large intertidal mudflats or sandflats often with beds of seagrass.

Scientific name	Common name	Conservation status		Most recent record	Likely occurrence in study area	Rationale for likelihood ranking	Habitat description*
		EPBC	BC				
Oxyura australis	Blue-billed Duck		V	2006	**Negligible**	No suitable habitat.	The Blue-billed Duck is widespread in NSW, but most common in the southern Murray-Darling Basin area. Birds disperse during the breeding season to deep swamps up to 300 km away. It is generally only seen in coastal areas during summer. Prefers large permanent wetlands, feeding on the bottom of swaps.
Petroica boodang	Scarlet Robin		V	2014	**Medium**	Study area likely to support a range of woodland birds.	The Scarlet Robin inhabits dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. During autumn and winter it moves to more open and cleared areas. The Scarlet Robin forages amongst logs and woody debris for insects. The nest is an open cup of plant fibres and cobwebs, sited in the fork of a tree.
Petroica phoenicea	Flame Robin		V	2013	**Recorded**	Recorded during site assessment.	Flame Robins are found in a broad coastal band from southern Queensland to just west of the South Australian border. The preferred habitat in summer includes moist eucalyptus forests and open woodlands, in winter prefers open woodlands and farmlands. It is considered migratory. Diet consists mainly of invertebrates.
Polytelis swainsonii	Superb Parrot	VU	V	#	**Low**	No suitable habitat.	Found mainly in open, tall riparian River Red Gum forest or woodland. Often

Scientific name	Common name	Conservation status		Most recent record	Likely occurrence in study area	Rationale for likelihood ranking	Habitat description*
		EPBC	BC				
							found in farmland including grazing land with patches of remnant vegetation. Forages primarily in grassy box woodland, feeding in trees and understorey shrubs and on the ground and their diet consists mainly of grass seeds and herbaceous plants.
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)		V	1996	**Low**	No longer thought to occur in the area.	The eastern sub-species occurs on the western slopes of the Great Dividing Range, the western plains, woodlands in the Hunter Valley and locations on the north coast of NSW. Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine, open Box Woodlands on alluvial plains and woodlands on fertile soils in coastal regions. Feeds on invertebrates and builds dome-shaped nests.
Rostratula australis	Australian Painted Snipe	EN	E1	#	**Negligible**	No suitable habitat.	Usually found in shallow inland wetlands including farm dams, lakes, rice crops, swamps and waterlogged grassland. They prefer freshwater wetlands, but have been recorded in brackish waters. Forages on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.
Stagonopleura guttata	Diamond Firetail		V	2014	**Recorded**	Recorded during site assessment.	The Diamond Firetail is widely distributed, found in a range of habitat types including open eucalypt forest,

Scientific name	Common name	Conservation status		Most recent record	Likely occurrence in study area	Rationale for likelihood ranking	Habitat description*
		EPBC	BC				
							mallee and acacia scrubs. Often occur in vegetation along watercourses. Feeds exclusively on the ground on ripe grass and herb seeds, green leaves and insects.
Stictonetta naevosa	Freckled Duck		V	1999	**Negligible**	No suitable habitat.	The Freckled Duck breeds in permanent fresh swamps that are heavily vegetated. Found in fresh or salty permanent open lakes, especially during drought. Often seen in groups on fallen trees and sand spits.
Frogs							
Crinia sloanei	Sloane's Froglet		V	2013	**Negligible**	No suitable habitat	Sloane's Froglet is a cryptic species, usually found only after rain. This species has a widely scattered distribution throughout the floodplains of the Murray-Darling Basin in NSW and has been recorded mostly in the Darling Riverine Plains, NSW South Western Slopes, and the Riverina bioregions. It is typically associated with periodically inundated grassland, woodland and disturbed areas.
Litoria raniformis	Southern Bell Frog	VU	E1	1999#	**Negligible**	No suitable habitat.	In NSW the species is known to exist only in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain and around Lake Victoria. Usually found in or around permanent or ephemeral swamps or billabongs with an abundance of

Scientific name	Common name	Conservation status		Most recent record	Likely occurrence in study area	Rationale for likelihood ranking	Habitat description*
		EPBC	BC				
							bulrushes and other emergent vegetation along floodplains and river valleys. They are also found in irrigated rice crops, particularly where there is no available natural habitat. Outside the breeding season animals disperse away from the water and take shelter beneath ground debris such as fallen timber and bark, rocks, grass clumps and in deep soil cracks.
Fish							
Galaxias rostratus	Flat-headed Galaxias	CE		#	**Negligible**	No suitable habitat	Flathead Galaxias are found in still or slow moving water bodies such as wetlands and lowland streams. The species has been recorded forming shoals. They have been associated with a range of habitats including rock and sandy bottoms and aquatic vegetation. Flathead Galaxias spawn in spring and lay slightly adhesive demersal eggs.
Maccullochella peelii	Murray Cod	VU		#	**Negligible**	No suitable habitat	The Murray Cods natural distribution extends throughout the Murray-Darling basin ranging west of the divide from south east Queensland, through NSW into Victoria and South Australia. It is found in the waterways of the Murray–Darling Basin in a wide range of warm water habitats that range from clear, rocky streams to slow flowing turbid rivers, billabongs and large deep holes. Murray Cod is entirely a freshwater

Scientific name	Common name	Conservation status		Most recent record	Likely occurrence in study area	Rationale for likelihood ranking	Habitat description*
		EPBC	BC				
							species and will not tolerate high salinity levels.
Macquaria australasica	Macquarie perch	EN		#	**Negligible**	No suitable habitat	Macquarie Perch are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven catchments. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their tributaries
Reptiles							
Aprasia parapulchella	Pink-tailed Legless Lizard	VU	V	2008#	**Medium**	Suitable surface rock and native grass cover.	Fossorial species, which lives beneath surface rocks and occupies ant burrows. It feed on ants, particularly their eggs and larvae. Thought to lay eggs within the ant nests under rocks that it uses as a source of food and shelter. Key habitat features are a cover of native grasses, particularly Kangaroo Grass (Themeda australis), sparse or no tree cover, little or no leaf litter, and scattered small rock with shallow embedment in the soil surface.
Delma impar	Striped Legless Lizard	VU	V	#	**Low**	Not thought to occur in the area.	Generally occurs in lowland native grasslands occurring on gently undulating plains having soils of basaltic origin. Grasses are dominated b

Scientific name	Common name	Conservation status		Most recent record	Likely occurrence in study area	Rationale for likelihood ranking	Habitat description*
		EPBC	BC				
							perennial, tussock-forming grasses such as Themeda triandra, Austrostipa spp. and Austrodanothonia spp. Inhabits secondary grasslands only when they occur within 2km of primary grassland.

* - habitat descriptions have been adapted by qualified ecologists from the DEE Species Profile and Threats (SPRAT) Database, OEH Threatened Species online profiles and the NSW Scientific Committee final determinations for listed species, references within the above table are provided within the report reference list.

A4.5 Migratory species (EPBC Act listed)

Includes records from the following sources:

- NSW BioNet Wildlife Atlas (refer to Section **Error! Reference source not found.**)
- DEE database (accessed on 23/06/2017)
- BirdLife Australia data search
- Current survey

Bold denotes species recorded in the study area during the current assessment.

Table A.1 Migratory fauna species recorded or predicted to occur within 10 kilometres of the study area

Scientific name	Common name	Most recent record
Actitis hypoleucos	Common Sandpiper	#
Apus pacificus	Fork-tailed Swift	1996#
Ardea ibis	Cattle Egret	2002
Ardea modesta	Eastern Great Egret	2013
Calidris acuminata	Sharp-tailed Sandpiper	2013#
Calidris melanotos	Pectoral Sandpiper	#
Gallinago hardwickii	Latham's Snipe	2006#
Hirundapus caudacutus	White-throated Needletail	2013#
Hydroprogne caspia	Caspian Tern	2013
Merops ornatus	Rainbow Bee-eater	2014
Monarcha melanopsis	Black-faced Monarch	#
Motacilla flava	Yellow Wagtail	#
Myiagra cyanoleuca	Satin Flycatcher	2012#
Rhipidura rufifrons	Rufous Fantail	1996#

* - habitat descriptions have been adapted by qualified ecologists from the DSEWPaC Species Profile for listed migratory species, references within the above table are provided within the report reference list

Appendix 5 EPBC Act assessments

Swift Parrot *Lathamus discolor*

Status: Swift Parrot is listed as Critically Endangered under the EPBC Act, and is listed as Endangered under the BC Act.

Distribution: Their mainland distribution is centred on box-ironbark forests in the north-central region of Victoria and forests and woodlands of the coastal and western slopes regions in NSW, although they are often recorded around Melbourne, Geelong, Bairnsdale and Lakes Entrance (Emison *et al* 1987).

Habitat: This slim, medium-sized parrot, breeds in Tasmania from September to April and then migrates to the mainland during April (Higgins 1999). On mainland Australia, Swift Parrots prefer to inhabit dry open eucalypt forests and woodlands, especially box-ironbark forests. However, it is also often recorded in urban areas, including parks, gardens, street trees and golf courses (Higgins 1999).

Occurrence in study area: Swift Parrot has been recorded sporadically around the study area. The study area contains native woodlands dominated by White Box that would provide a foraging resource for this nectar and lerp dependent species. The Swift Parrot has the potential to be an occasional visitor to the study area during autumn and winter.

Table 2 Swift Parrot - assessment against Significant Impact Criteria

Significant Impact Criteria	Likelihood of significant impact	Justification
Lead to a long-term decrease in the size of a population	Highly unlikely	Swift Parrots are known to occur occasionally in the local area and may occasionally utilise flowering White Box as a foraging resource (Saunders & Tzaros 2011). The proposed action is expected to occur within suitable foraging habitat however given the local scale of removal (21 trees) and the extensive availability of similar tree resources across NSW western slopes, it is unlikely to lead to a long-term decrease in the size of a population of the species.
Reduce the area of occupancy of the species	Unlikely	Whilst up to 21 White Box trees may be removed the overall area of occupancy of this species will remain unchanged.
Fragment an existing population into two or more populations	Highly unlikely	Due to its complex movement patterns typified by migration and local nomadism, the Swift Parrot has what is effectively a single national population. Individuals move interchangeably between key wintering sites on the Australian mainland and can move freely through areas of unsuitable and marginal habitat to seek out and exploit favourable habitat patches.

Significant Impact Criteria	Likelihood of significant impact	Justification
Adversely affect habitat critical to the survival of the species	Highly unlikely	Critical habitat for Swift Parrot has not been defined, and is difficult to define given its reliance on a diversity of habitat types across its range and the dependence on these sites varies both spatially and temporally. Priority habitats for the species are defined in the National Recovery Plan (Saunders and Tzaros 2011) as habitats which are used: • for nesting • by large proportions of the Swift Parrot population • repeatedly between seasons (site fidelity), or • for prolonged periods of time (site persistence). Vegetation in the study area is not used for nesting (they breed only in Tasmania) and it is unlikely to be used by large numbers of birds repeatedly or for extended periods of time. It is therefore unlikely the proposal would adversely affect habitat critical to this species survival.
Disrupt the breeding cycle of a population	Unlikely	This species only breeds in Tasmania.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely	The removal of up to 21 White Box trees within the area is unlikely to cause the Swift Parrot to decline, especially as it does not constitute key or priority habitat.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Unlikely	The proposed action is unlikely to exacerbate the current level of invasive species threat operating within the study area to the point that they become harmful to the Swift Parrot.
Introduce disease that may cause the species to decline	Highly unlikely	The proposed action is unlikely to introduce a disease that causes the Swift Parrot to decline.
Interfere with the recovery of a species	Highly unlikely	A national recovery plan for the Swift Parrot has been produced (Saunders & Tzaros 2011) to minimise the probability of extinction of the Swift Parrot in the wild, and to increase the probability of important populations becoming self-sustaining in the long term. The proposal is unlikely to directly interfere with priority habitats that have been identified in the 2011 recovery plan or any Swift Parrot recovery actions in southern NSW.

Conclusion for Swift Parrot

The Swift Parrot's migratory nature means that it cannot be discounted from occurring anywhere there are suitable flowering resources in southern NSW. However, the availability of resources in the broader landscape means that tree removal associated with the quarry expansion will not lead to any decline in the species' overall abundance or area of occupancy. Furthermore, the vegetation within the study area is unlikely to constitute critical habitat for this species. On this basis, an EPBC referral is not considered necessary as a significant impact on this species is considered unlikely.

Pink Tailed Worm Lizard

Status: Pink-tailed Worm-lizard is listed as Vulnerable under the EPBC Act and the BC Act.

Distribution: Pink-tailed Worm-lizard occurs in south-eastern Australia, where it is widely but patchily distributed from Gunnedah in northern NSW through southern NSW and the ACT to Bendigo in central Victoria (Brown 2010). The species has been recorded from several widely separated locations between Gunnedah and Albury in NSW, from numerous localities in the ACT, while in Victoria the species has been recorded only from the Bendigo region (Brown 2010). Other locations within this geographic area include near Cooma, Yass, Albury, Cootamundra, Tarcutta and Queanbeyan (DEWHA 2008a; DECC 2009). Records cover a wide altitudinal range, from about 200 m altitude near Bendigo to over 800 m altitude in the ACT (Brown 2010).

Habitat: Pink-tailed Worm-lizard *Aprasia parapulchella* is a small fossorial reptile from the family Pygopodidae (legless lizards), which has a maximum snout vent length of 14 cm and a total length of about 24 cm. The species lives beneath surface rocks and occupies ant burrows where it feeds on ants, particularly their eggs and larvae (Osborne and Jones 1995). Key habitat features for the presence of Pink-tailed Worm-lizard are a cover of native grasses (particularly Kangaroo Grass), sparse or no tree cover, little or no leaf litter, and scattered small rocks with shallow embedment in the soil surface (Osborne and Jones 1995).

Occurrence in study area: Not recorded in the study area but Pink-tailed Worm Lizard have been recorded from the Albury Hills, west of Albury.

Table 3 Pink-tailed Worm Lizard - assessment against Significant Impact Criteria

Significant Impact Criteria	Likelihood of significant impact	Justification
Lead to a long-term decrease in the size of an important population of the species	Unknown	Important populations have not been defined for this species but given this species patchy distribution in southern NSW and more broadly across its range, any sustainable breeding population could be considered an important population. Ongoing quarry activity at the site of an important population may lead to a decrease in the population's abundance over time.
Reduce the area of occupancy of an important population	Unknown	As above regarding important populations. If a population is present at the site of the proposed action then development may lead to a decrease in the area of occupancy of this population.

Significant Impact Criteria	Likelihood of significant impact	Justification
Fragment an existing important population into two or more populations	Unlikely	Given the proposed action is only likely to remove the edges of available habitat at the site, any population that was present is unlikely to be fragmented to the point where individuals could no longer intermix with another portion of the same population.
Adversely affect habitat critical to the survival of the species	Highly unlikely	Given the spatially restricted nature of the proposed action it is unlikely that any development in the area would adversely impact habitat critical to the survival of the species as a whole.
Disrupt the breeding cycle of an important population	Unknown	Important populations have not been defined for this species but given this species patchy distribution in southern NSW and more broadly across its range, any sustainable breeding population could be considered an important population. Therefore, the proposed action may disrupt the breeding cycle, should a population be present. It is also unclear what the ongoing impacts of quarrying activity (noise, vibration, soil compaction) in the area would be on this species in the long-term.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely	Given the spatially restricted nature of the proposed action it is unlikely that any development in the area would lead to the species declining.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Unlikely	The proposed action is unlikely to exacerbate the current level of invasive species threat operating within the study area to the point that they become harmful to the Pink-tailed Worm Lizard.
Introduce disease that may cause the species to decline	Unlikely	The proposed action is unlikely to introduce a disease that causes the Pink-tailed Worm Lizard to decline.
Interfere with the recovery of a species	Unlikely	A recovery plan has not been adopted for Pink-tailed Worm Lizard. It is unlikely that the proposed action would interfere with the recovery of the species due to its spatially restricted impacts.

Conclusion for Pink-tailed Worm Lizard

A targeted survey for Pink-tailed Worm Lizard should be undertaken during spring or early summer to alleviate the considerable level of ambiguity that remains around the possible impacts to this species. Further definition as to what constitutes an important population should also be sought from the relevant authority. If we assume species presence, and without further definitions of what constitutes an important population, then a significant impact as defined in the Significant Impact Guidelines cannot be discounted and an EPBC referral may be required.

White Box – Yellow Box – Blakely's Red-gum Grassy Woodlands and Derived Native Grasslands

Box Gum Woodlands is listed as a critically endangered ecological community under the EPBC Act. This community may occur on a range of substrates but typically occurs in landscapes of moderate relief on soils derived from sedimentary build up and erosional processes. It also occurs where the original tree canopy has been cleared but the native ground layer is intact resulting in a derived native grassland condition state. It is found along the western slopes and tablelands of the Great Dividing Range from southern Queensland though to central Victoria (DECCW 2011). The community is generally dominated by a mixture or at least one of White Box *Eucalyptus albens*, Yellow Box *Eucalyptus melliodora* or Blakely's Red-gum *Eucalyptus blakelyi* with a sparse shrub layer and a species rich ground layer of grasses and herbs.

The community provides valuable habitat for fauna including resident and transient visitors, particularly birds and small mammals. The main ongoing threats to this community are incremental clearing for a variety of purposes (residential, cropping, infrastructure and maintenance), inappropriate grazing regimes, inappropriate management, fragmentation into small remnants, loss or decline of mature trees, lack of natural regeneration, invasive exotic species, salinity, misuse of herbicides, firewood collection and addition of fertilisers to develop pastures (DECCW 2011). The *Department of Environment, Climate Change and Water, NSW* developed an adopted Recovery Plan for this ecological community in 2011.

Occurrence in the study area

The Box Gum Woodlands community was identified during the biodiversity assessment in 2018 and the extent of the community was mapped at this time (Figure 3). PCT266 was recorded on the slopes and hills to the north and east of the existing quarry where the canopy remains relatively intact, PCT1000 was recorded where the canopy has been historically removed but the understorey remains native (Figure 2).

Listing advice and the supporting policy statement describe this community in two condition states; an intact woodland form and a derived native grassland form where tree cover has been historically removed. The community was recorded only as a woodland (see Table 5 for justification). The decision process for attributing a patch of PCT266 or PCT1000 to the threatened community relies on the observed dominance of *Eucalyptus blakelyi*, *Eucalyptus melliodora* or *Eucalyptus albens*, patch size, weed cover and species diversity.

Table 4 Justification process for identifying White Box – Yellow Box – Blakely's Red-gum Grassy Woodlands and Derived Native Grasslands (criteria from COA 2006).

Criterion	Response	Justification
Is, or was, at least one of the overstorey species White Box, Yellow Box or Blakely's Red-gum?	Yes for derived and woodland areas.	White Box and Blakely's Red-gum are present on site and derived grasslands were likely to contain these species in the canopy.
Does the patch have a predominately native understorey? Requires 50% of the perennial vegetation ground cover to be made up of native species?	Yes for derived and woodland areas.	The majority of the perennial cover comprises native grasses. This cover is likely to increase during the growing season and if grazing pressures are removed.
Is the patch greater than 0.1 hectares?	Yes for derived and woodland areas.	Derived and woodland areas total an area of approximately 40 ha.

Criterion	Response	Justification
Are there ≥ 12 native understorey species (excluding grasses) and one 'important species?	No	At the time of assessment eight native herb species were recorded. This number is likely to increase during spring and if cattle were removed from the eastern areas.
Is the patch 2 hectares of greater in size?	Yes for derived and woodland areas	Derived and woodland areas total an area of approximately 40 ha.
Does the patch have an average of 20 or more mature trees per hectare, or is there natural regeneration of the dominant overstorey eucalypts?	Yes for woodland areas. No for derived areas.	Woodland areas have an average of 20 or more mature trees per hectare and have natural regeneration of the dominant overstorey eucalypts. These areas meet the qualification as the Box Gum Woodlands community. Derived areas do not contain 20 or more mature trees per hectare of contain natural eucalypt regeneration. These areas do not meet the qualification as the Box Gum Woodland community.

A total of 25.6 hectares of the Box Gum Woodlands community in the quarry study area was found to meet the listing criteria as set out in CoA (2012) (Figure 3; Appendix 1). Although the majority of this area has been impacted by livestock grazing and historic clearing, and is generally depauperate, the presence of a predominantly native understorey and White Box and Blakely's Red-gum at a density of greater than 20 trees per hectare on average and containing natural regeneration of the canopy, ensured these areas met the listing criteria. The understorey quality of these areas is also likely to increase if grazing pressures are removed. It should be noted that only the impact area was assessed in detail. Of this total, 1.74 hectares occurs within the quarry expansion footprint and is likely to be impacted (Figure 5; Appendix 1). These impact areas include lower quality vegetation to the east of the existing quarry and higher quality areas to the northeast and north.

The remaining areas of PCT1000 did not meet the listing criteria because these areas did not contain 12 herbaceous species in the understorey, were in a poor condition state and did not meet the mature tree densities required to meet the community listing criteria.

Significant impact assessment

Based on a reasonable understanding of the extent and condition of the Box Gum Woodlands community in the expansion areas, it is concluded that project impacts are unlikely to lead to a significant impact to the community. An assessment and justification is provided in Table 6 based on the existing disturbed condition of the vegetation, current levels of fragmentation, and the restricted nature of the impact.

Table 5 White Box – Yellow Box – Blakely's Red-gum Grassy Woodlands and Derived Native Grasslands, Critically Endangered - assessment against Significant Impact Criteria (CoA 2013)

Significant impact criteria (endangered community)	Likelihood of significant impact	Justification
Reduce the extent of an ecological community.	Unlikely	Box Gum Woodlands are widespread across central Victoria and NSW. The occurrences to be impacted are in the central part of the community's natural distribution. The removal of 1.74 hectares of woodland in a previously fragmented and disturbed landscape is unlikely to significantly reduce the extent of the Box Gum Woodlands community in NSW but will reduce the extent of patches of the community at the site.
Fragment or increase fragmentation of an ecological community.	Unlikely	Vegetation removal will occur from the edge of the existing quarry north and east. Impacts on patches of Box Gum Woodland will occur on the edges of existing disturbance and will not fragment or further fragment the ecological community.
Adversely affect habitat critical to the survival of an ecological community.	Unlikely	The adopted Recovery Plan for this ecological community broadly defines habitat critical to the survival of this ecological community as any area of Box Gum Woodlands that meets the minimum listing criteria as outlined above. While the area of occupancy of this habitat would decrease the viability of that habitat in the study area would remain unchanged due to the expansion.
Modify or destroy abiotic factors necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.	Unlikely	Construction is likely to result in disturbance to soil and topography and the permanent removal of canopy and understorey vegetation. It is unlikely that this level of disturbance will lead to a decline in the ecological community through changed abiotic interactions.

Significant impact criteria (endangered community)	Likelihood of significant impact	Justification
Cause a substantial change in the species composition of an occurrence of an ecological community, including a decline or loss of functionally important species, for example through regular burning or flora and fauna harvesting.	Unlikely	All Box Gum Woodland stands occur in a fragmented landscape where introduced vegetation cover is significant, grazing pressures are high and intensive land clearing has taken place over the past 150 years. Land use impacts from clearing, cropping and grazing have reduced community integrity and functionality in southern NSW (e.g. loss of small native mammals, reduced flora species richness, reduced genetic exchange across the community due to fragmentation). Clearing of the scale and extent required for the quarry expansion is unlikely to further reduce species diversity and simplify community structure. The adjacent areas of the community within the study area will remain intact and are unlikely to suffer substantial changes in species composition. Furthermore, the remaining communities' presence in an enclosed quarry is likely to increase its long-term chance of survival and recovery as this land is unlikely to be used for intensive agricultural practices, land clearing or housing development in the future.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including but not limited to: - ***Assisting invasive species establishment*** ***- Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.***	Unlikely	All locations where this community occurs are subject to existing weed invasion, pest animals, erosion and chemical inputs as a result of surrounding agricultural land use. Expansion activities can be managed through standard practices to avoid further sedimentation and pollution.
Interfere with the recovery of an ecological community.	Unlikely	The adopted Recovery Plan for this ecological community outlines land clearing and development as a key threatening process and achieving no net loss in the area of the ecological community as a recovery plan objective. The removal of 1.74 hectares of the community would be counter the intentions of the recovery plan. However, this level of vegetation removal would not interfere with the overall recovery of the ecological community to the extent that the recovery of the community would fail.

Conclusion for Box Gum Woodlands

Whilst the expansion is unlikely to trigger a significant impact as defined in the Significant Impact Guidelines, further refinement should be undertaken to the expansion footprint to avoid as much of the area that qualifies as the Box Gum Woodlands community as possible. Currently the level of clearing stands at 1.74 hectares which is not an insignificant amount in the local context. Discussions could be undertaken with the relevant authority about the possibility of offsetting vegetation removal on site through the protection or improvement of remaining Box Gum Woodlands within the quarry area.

EPBC Act conclusions

Swift Parrots ability to disperse through fragmented and unsuitable habitat means that a significant impact on this species is unlikely to occur as a result of the quarry expansion.

Due to the species cryptic nature and patchy distribution, some ambiguity remains around the level of impact, if any, that could occur should Pink-tailed Worm Lizard be present at the site. To alleviate some of this ambiguity we propose a Pink-tailed Worm Lizard targeted survey be carried out in late spring. The outcomes of this survey will help to inform an impact assessment for this species.

A depauperate example of Box Gum Woodlands was found to be present at the site and 1.74 hectares was found to occur within the expansion footprint. While not considered likely to trigger a significant impact, this level of clearing is not insignificant. Effort should be made to avoid as much of this vegetation as possible by reducing the expansion footprint or re-locating expansion areas.

As the project definitions currently stand and due to multiple MNES being potentially effected, we consider there to be a sufficient level of risk to warrant referral of the project to the Minister of the Environment and Energy for determination. This would provide the proponent with legal clarity moving forward. We also recognise that there is an opportunity to mitigate impacts within the study area through further redefining the scope of the expansion to avoid as much Box Gum Woodlands as possible and by conducting targeted surveys to determine Pink-tailed Worm Lizard presence / absence. Ultimately, the decision to conduct further work or to refer the project sits with A.P. Delaney & Co. If A.P. Delaney & Co judges the actions associated with the project to be low risk, and unlikely to lead to a significant impact on Matters of National Environmental Significance based on advice provided herein, then a referral may also be deemed unnecessary. However, as indicated in EPBC Act policy guidelines, a referral under provisions of the Act can be made to provide legal certainty for the project (CoA 2013).