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MODIFICATION 4 ENVIRONMENTAL ASSESSMENT

Project

Appendix G

Surface Water Extraction
Baseline Flora and Fauna Habitat Report

Syerston Project Modification 4 – Surface Water Extraction Baseline Flora and Fauna Habitat Report

Prepared by AMBS Ecology & Heritage Pty Ltd
for Clean TeQ Holdings Limited

Final

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Executive Summary

Scandium 21 Pty Ltd owns the rights to develop the approved "Syerston Project". The Syerston Project is situated approximately 350 kilometres (km) west-northwest of Sydney, near the village of Fifield, New South Wales (NSW), and includes the establishment and operation of a nickel, cobalt, scandium mine and the development of associated infrastructure (quarry, rail facilities, natural gas and water pipelines). Scandium 21 Pty Ltd is a wholly owned subsidiary of Clean TeQ Holdings Limited. AMBS Ecology & Heritage Pty Ltd was commissioned to prepare a baseline flora, and fauna habitat report for the proposed surface water extraction site (the study area) located 40 km east of Condobolin on the Lachlan River and approximately 50 km south of the Syerston Mine Site.

The study area is 6.2 hectares in size, accessed via North Condobolin Road, and located on the northern side of the Lachlan River 4.5 km north-west of the town of Warroo.

The scope and objectives of this study were to undertake:

- flora surveys in the study area;
- fauna habitat surveys in the study area;
- map and describe plant communities and their condition;
- map and describe threatened ecological communities (if present) according to the relevant State and Commonwealth listings;
- describe how targeted surveys were undertaken for threatened flora species in consideration of the relevant State and Commonwealth guidelines;
- review the vegetation against relevant tree species listed in the *State Environment Planning Policy 44 - Koala Habitat Protection* and *Recovery Plan for the Koala (Phascolarctos cinereus)*; and
- prepare a survey report documenting the survey methods and findings and how surveys were adequate in consideration of the relevant State and Commonwealth guidelines.

Two vegetation types were mapped within the study area:

- River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion); and
- Cultivated land.

Neither vegetation type forms part of any threatened ecological communities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* or the NSW *Threatened Species Conservation Act, 1995*. No native plants listed as threatened or potential habitat for threatened plants, were located in the study area.

Three exotic species listed as noxious in the Lachlan Local Government Area were recorded:

- *Lycium ferocissimum*;
- *Phyla canescens*; and
- *Xanthium spinosum*.

Potential habitat exists for a variety of threatened fauna, including threatened birds, arboreal mammals and microbats. The most notable habitat features for threatened fauna occur in *Eucalyptus camaldulensis* (River Red Gum) trees, which contain a source of nectar, foraging substrates, and tree cavities. Similar habitat occurs more widely along the Lachlan River.

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1 Introduction

1.1 Background

Scandium 21 Pty Ltd owns the rights to develop the approved "Syerston Project". The Syerston Project is situated approximately 350 kilometres (km) west-northwest of Sydney, near the village of Fifield, New South Wales (NSW), and includes the establishment and operation of a nickel, cobalt, scandium mine and the development of associated infrastructure (quarry, rail facilities, natural gas and water pipelines). Scandium 21 Pty Ltd is a wholly owned subsidiary of Clean TeQ Holdings Limited (CTQ). In the year 2000, a flora assessment was undertaken as part of the *Syerston Nickel Cobalt Project – Environmental Impact Statement* (Bower & Kenna 2000). Development Consent DA 374-11-00 for the Syerston Project was subsequently issued under Part 4 of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act) in 2001 and has been modified on three occasions since consent was issued.

CTQ have identified potential opportunities to optimise the Syerston Project, and are proposing to incorporate these opportunities through Modification of DA 374-11-00 under section 75W of the EP&A Act. Components of the Syerston Project Modification relevant to this report includes the addition of surface water extraction from the Lachlan River, and associated infrastructure (e.g. pipeline, pump station, transfer station and access road).

AMBS Ecology & Heritage Pty Ltd (AMBS) was commissioned to prepare a baseline flora and fauna habitat report for the proposed surface water extraction site (the study area) located 40 km east of Condobolin on the Lachlan River and approximately 50 km south of the Syerston Mine site.

1.2 Study area

The location of the study area is shown on Figure 1.1 and in detail on Figure 1.2. Major towns in the region include Condobolin to the west, Parkes to the north-east, and Forbes to the south-east. The study area is 6.2 hectares (ha) in size, accessed via North Condobolin Road, and located on the northern side of the Lachlan River 4.5 km north-west of the town of Warroo.

The study area is in the Local Land Service (LLS) area of Lachlan and the Local Government Area (LGA) of Lachlan. It falls within the Interim Biogeographic Regionalisation for Australia Version 7 (IBRA7) bioregion of NSW South Western Slopes.

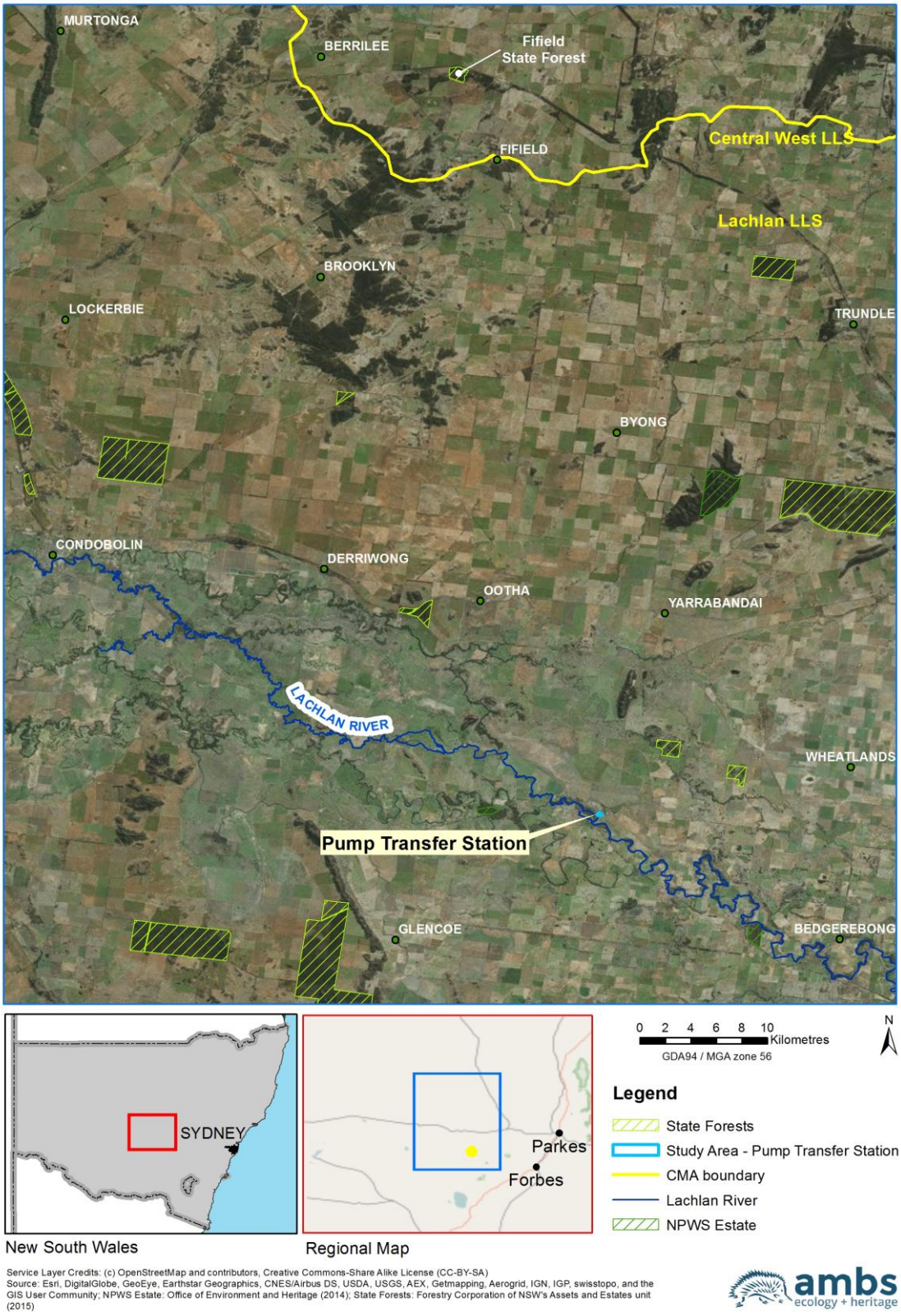

Figure 1.1 Location of the study area in the region

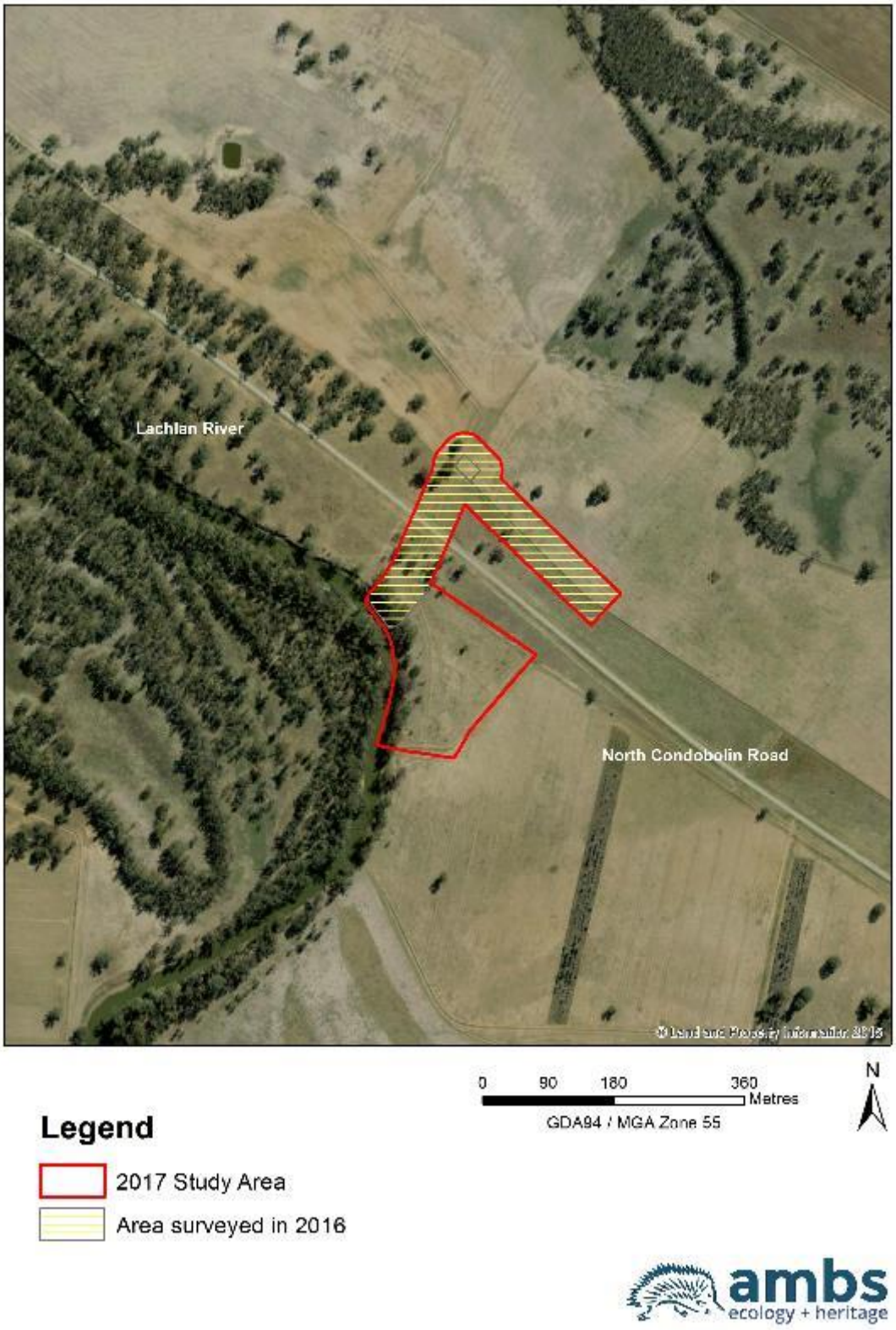

Figure 1.2 Study area - proposed pump transfer station site

1.3 Scope and objectives

The study area was partly surveyed in 2016 by AMBS (flora) and by Future Ecology (fauna). Since that time an additional area has been added for assessment (Figure 1.2). AMBS surveyed the additional area and incorporated results from 2016 and 2017 to prepare this report documenting the flora and fauna habitat of the study area.

The scope and objectives of this assessment were to undertake:

- flora surveys in the study area;
- fauna habitat assessment in the study area;
- map and describe plant communities and their condition (with a reconciliation against Biometric Vegetation Types [BVTs) and Plant Community Types [PCTs]);
- map and describe threatened ecological communities (TECs) (if present) according to the relevant State and Commonwealth listings;
- describe how targeted surveys were undertaken for threatened flora species in consideration of the relevant State and Commonwealth guidelines;
- review the vegetation against relevant tree species listed in the *State Environment Planning Policy (SEPP) 44 - Koala Habitat Protection* (SEPP 44) and *Recovery Plan for the Koala (Phascolarctos cinereus)* (NSW Department of Environment and Climate Change [DECC] 2008); and
- prepare a survey report documenting the survey methods and findings and how surveys were adequate in consideration of the relevant State and Commonwealth guidelines.

2 Methods

2.1 Literature and database review

A 'desktop' study of threatened species information and local reports was conducted prior to undertaking field surveys. This included:

- database searches for threatened plant records in the region using the Australian Virtual Herbarium (AVH) (AVH 2017), Atlas of Living Australia (ALA) (ALA 2017), the Department of the Environment and Energy (DEE) Protected Matters Search Tool (DEE 2017) and BioNet (NSW Office of Environment and Heritage [OEH] 2017a);
- review of data from flora surveys undertaken in 2016 (AMBS 2016);
- familiarisation with fauna data supplied by Future Ecology;
- interpretation of Map 8431 - Bogan Gate, Boona Mount, Condobolin, Dandaloo, Tottenham and Tullamore 1: 100 000 Map Sheets (NSW Department of Water and Land Conservation [DLWC] 2002); and
- review of tree species listed in SEPP 44 and the *Recovery Plan for the Koala (Phascolarctos cinereus)* (DECC 2008).

Prior to the field surveys, potential habitat for threatened flora was reviewed using aerial imagery (NSW Department of Finance, Services and Innovation [DFSI] 2017) and topographic features.

2.2 Flora surveys

2.2.1 Overview

Flora surveys were undertaken on 30 August 2016 by botanist Belinda Pellow and 4 November 2016 and 6 June 2017 by ecologist James Schlunke. Fauna surveys were undertaken by Future Ecology between 24 – 31 October 2016 and fauna habitat surveys by ecologist James Schlunke on 6 June 2017.

Surveys undertaken were designed to detect threatened species that could occur in the study area. They were developed, as required, in accordance with the following guidelines:

- the *Draft Survey Guidelines for Australia's Threatened Orchids* (Department of the Environment [DotE] 2013);
- *Threatened Biodiversity Survey and Assessment Guidelines for Developments and Activities Working Draft* (NSW Department of Environment and Conservation [DEC] 2004);
- *NSW Guide to Surveying Threatened Plants* (OEH 2016);
- *Field Survey Methods* (OEH 2017d); and
- *Native Vegetation Interim Type Standard* (Sivertsen 2009).

2.2.2 Plant communities

The field survey for plant community definition and mapping used rapid data points (RDPs) and opportunistic observations. Photographs were taken at each point and the location of the point was recorded using a Global Positioning System (GPS).

RDPs were used to collect data for the purpose of refining the vegetation mapping. At each RDP site, the dominant species in the canopy layer, the shrub layer and ground layer were recorded. Notes were made on the percentage cover of each structural layer and the general condition/disturbance issues of the vegetation at each site. Utilising the information collected and photographic images, each RDP was used to assist in interpreting aerial imagery and assigning boundaries for vegetation map units.

Plant species were identified in the field or collected and identified in the laboratory. If specimens required further identification or confirmation they were sent to the National Herbarium of NSW.

The NSW Vegetation Information System (VIS) Classification 2.1 (OEH 2017c) was used to test the similarity of vegetation descriptions to PCTs so that each vegetation type could be assigned a BVT and PCT number. Where an exact match was not possible the best fit was determined.

2.2.3 Threatened flora surveys

The NSW BioNet (OEH 2017a) was used to determine threatened plant species known or predicted for the Lachlan LLS Lower slopes subregion (Table 2.1). One species *Austrostipa wakoolica* has been recorded within a 10 km radius of the study area (OEH 2017a). Candidate species were further assessed by referring to the *Threatened Species Profile Database* (OEH 2017d) to determine if they were likely to occur in the study area (Table 2.1).

Searches for threatened plant species were undertaken using techniques outlined in the *NSW Guide to Surveying Threatened Plants* (OEH 2016) and Cropper (1993). In this small and degraded study area, one parallel field traverse was used in a linear patch of woodland vegetation that covered 1.8 ha of the study area. The aim of this technique is to maximise the likelihood of detecting the target species. If a threatened plant species is found the following information is recorded:

- location coordinates (using a hand-held GPS);
- extent of each occurrence;
- population counts or population estimates; and
- detailed habitat and condition description including native species lists and weed occurrences.

Table 2.1 Threatened plant species known or predicted to occur in the Lachlan LLS, Lower Slopes Subregion (OEH 2017a)

Scientific name	Common name	NSW status	Commonwealth status	Occurrence	Vegetation class	Survey time	Likely to occur
Austrostipa metatoris	A spear-grass	Vulnerable	Vulnerable	Known	Floodplain Transition Woodlands	All year	No, study area degraded
Austrostipa wakoolica	A spear-grass	Endangered	Endangered	Known	Floodplain Transition Woodlands	Sept-Dec	Unlikely, study area degraded
Acacia ausfeldii	Ausfeld's Wattle	Vulnerable	n/a	Known	Western Slopes Grassy Woodlands	Sept-Oct	No, study area degraded
Eleocharis obicis	Spike-Rush	Vulnerable	Vulnerable	Known	Forested Wetland and Freshwater Wetlands	All year	No, Habitat not present
Diuris tricolor	Pine Donkey Orchid	Vulnerable	n/a	Known	Floodplain Transition Woodlands and Western Slopes Grassy Woodlands	Aug-Sept	No, Habitat not present

Scientific name	Common name	NSW status	Commonwealth status	Occurrence	Vegetation class	Survey time	Likely to occur
Kippistia suaedifolia	Fleshy Minuria	Endangered	n/a	Known	Arid shrublands and Saline wetlands	Sept-Nov	No, Habitat not present
Lepidium aschersonii	Spiny Peppercress	Vulnerable	Vulnerable	Known	Floodplain Transition Woodlands	Aug-May	No, Habitat not present
Lepidium monoplocoides	Winged Peppercress	Endangered	Endangered	Known	Floodplain Transition Woodlands	Nov-Feb	No, Habitat not present
Pilularia novae-hollandiae	Austral Pillwort	Endangered	n/a	Known	Floodplain Transition Woodlands	All year	No, Habitat not present
Senecio garlandii	Woolly Ragwort	Vulnerable	n/a	Predicted	Western Slopes Dry Sclerophyll Forests and Western Slopes Grassy Woodlands	All year	No, Habitat not present
Swainsona murrayana	Slender Darling Pea	Vulnerable	Vulnerable	Known	Floodplain Transition Woodlands	Sept-Feb	No, study area degraded
Swainsona sericea	Silky Swainson-pea	Vulnerable	n/a	Known	Floodplain Transition Woodlands and Western Slopes Grassy Woodlands	Sept-Dec	No, study area degraded
Tylophora linearis		Vulnerable	Endangered	Known	Floodplain Transition Woodlands	Sept-May	No, Habitat not present

2.3 Fauna surveys

2.3.1 Previous fauna surveys

Results from the previous fauna surveys undertaken by Future Ecology in the study area were reviewed for relevant data and results used to inform surveys undertaken in 2017.

2.3.2 Fauna habitat survey

Fauna habitat features were recorded to provide observations of habitat features for threatened fauna. A proforma developed using OEH *Field Survey Methods* (OEH 2017b) was used to record habitat features across the area. Features assessed are listed in Table 2.2.

Table 2.2 Fauna habitat features assessed

Feature
BVTs
Other vegetation native and introduced
Hollow-bearing trees, including dead stags
Bush rock and rocky outcrops
Natural burrows
Large trees with basal cavities
Logs
Wetlands, streams, rivers, dams and other water bodies
Nests and roosts
Wombat burrows
Dens used by Yellow-bellied Gliders (*Petaurus australis*), Squirrel Gliders (*Petaurus norfolcensis*) and Brush-tailed Phascogales (*Phascogale tapoatafa*)
Sap feed trees for the Yellow-bellied Glider and Squirrel Glider
Distinctive scats (e.g. those of the Spotted-tailed Quoll [*Dasyurus maculatus*] or Koala)
Latrine and den sites of the Spotted-tailed Quoll
Allocasuarina spp.
Flying-fox camps
Microchiropteran bat tree roosts
Microchiropteran bat subterranean roosts (caves, culverts, tunnels and disused mine shafts)
Swift Parrot (*Lathamus discolor*) and Regent Honeyeater (*Anthochaera phrygia*) feed or nest trees
Winter-flowering eucalypts
Permanent soaks and seepages in potential habitat for *Philoria* spp.
Areas that can act as corridors for plant or animal species
Connectivity value of the site

2.3.3 Koala habitat tree assessment

A list of potential food trees is provided in SEPP 44 and the *Recovery Plan for the Koala (Phascolarctos cinereus)* (DECC 2008). During field surveys the presence of tree species known to provide food for the Koala in the central west region was recorded.

2.4 Data interpretation and mapping

Plant species identifications were checked against descriptions and distribution information provided by PlantNet (PlantNet 2012) to confirm that the species identified were known for the region and the habitat they were located in. If a species was considered unusual for the location its identification was confirmed at the National Herbarium of NSW.

RDP information was used to establish the vegetation type present. The OEH vegetation map 8431 (DLWC 2002), which provides broad scale vegetation covering the study area, was reviewed. As well, the NSW VIS Classification 2.1 (OEH 2017c) was accessed for descriptions of relevant PCTs. To determine if communities conformed to a relevant TEC under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) and/or the NSW *Threatened Species Conservation Act, 1995* (TSC Act) relevant listing advice/final determinations were reviewed.

3 Results

3.1 Flora

3.1.1 Plant communities

The determination of plant communities and their boundaries was based on rapid assessment site data, interpretation of PCT descriptions (OEH 2017c) and previous mapping (DLWC 2002). A full list of species recorded across the study areas can be found in Appendix A. A total of 44 species were recorded, of which 17 were natives.

The native vegetation in the study area consisted of River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion). Other portions of the study area were land that has been cultivated and North Condobolin Road (Figure 3.1 and Table 3.1).

Table 3.1 Plant Community Types in the study area

BVT	BVT Number	PCT Number	Keith Formation	Total Area Mapped (ha)
River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion	LA190	11	Forested Wetland	1.8
Cultivated	n/a	n/a	n/a	4.4

The location of the plant communities is shown in Figure 3.1 and descriptions of each are provided below.

River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion).

Plate 1 River Red Gum vegetation adjecent to the Lachlan River

The River Red Gum community adjacent to the Lachlan River had recently been flooded (Plate 1). The canopy was dominated by *Eucalyptus camaldulensis* (River Red Gum) with *Eucalyptus populnea* (Poplar Box) occurring on the outer edge of the wooded area. A smaller tree layer of *Eucalyptus camaldulensis* also occurred. Shrubs were sparse and were primarily *Duma florulenta* and *Maireana microphylla.* The ground layer was also sparse, primarily due to the recent flooding. Native ground layer species recorded included *Marsilea drummondii, Lythrum hyssopifolia, Rumex brownii, Eleocharis pallens, Paspalidium jubiflorum* and *Austrostipa verticillata.*

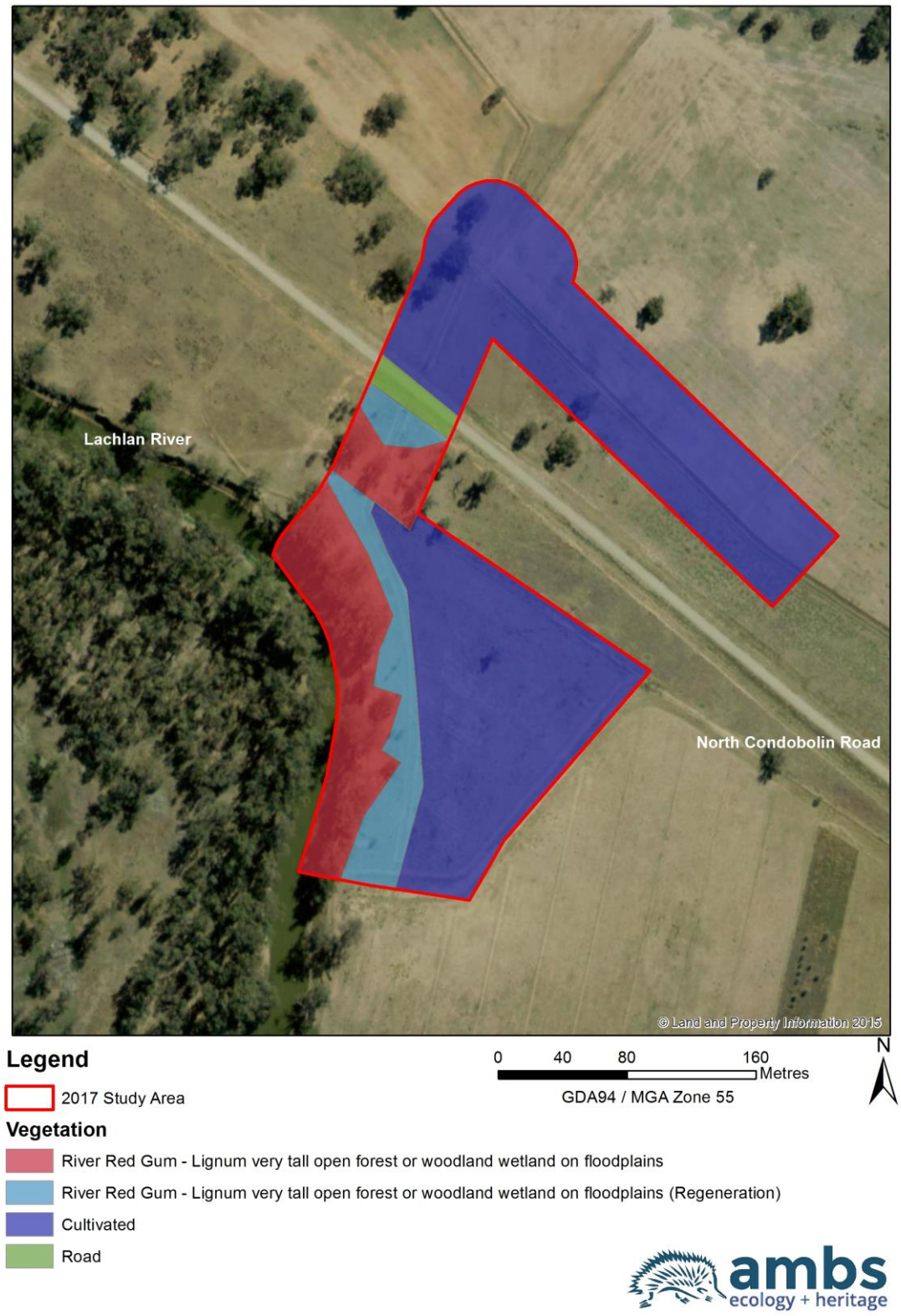

Figure 3.1 Plant communities within the study area

The vegetation in this plant community was in poor condition, being disturbed by grazing and recreational activities such as camping. The ground cover was dominated by exotic species including *Phyla canescens, Lolium perenne, Hordeum marinum, Echium plantagineum, Sonchus oleraceus, Xanthium spinosum, Malva parviflora, Polygonum aviculare* and *Lycium ferocissimum.*

Soils were deep, dark brown alluvial silts and the ground surface was relatively flat, with little or no slope.

This plant community is not listed as a TEC.

Full floristic survey sites: Rapid assessment sites only.

Cultivated

Plate 2 Typical cultivated area

A large portion of the study area was cleared and cultivated agricultural land (Plate 2) with a few remnant shrubs and trees including *Eucalyptus microcarpa* (Grey Box), *Eucalyptus populnea* (Poplar Box), *Eucalyptus camaldulensis* (River Red Gum) and *Geijera parviflora* are sparsely dotted across the landscape. The ground layer had few native species and was dominated by exotic species.

This plant community is not listed as a TEC.

3.1.2 Threatened Ecological Communities

River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion does not represent a threatened ecological community relevant to State or Commonwealth listings.

3.1.3 Threatened plant species

No threatened plant species were likely to occur within this disturbed study area. Searches in the linear woodland vegetation adjacent to the Lachlan River and the cultivated land did not locate any threatened flora species. Potential habitat for threatened flora was not located in the study area.

3.1.4 Weed species

Field surveys recorded 27 exotic species across the study areas (Appendix A). Of these, three are recorded as noxious weeds in the Lachlan LGA (DPI 2017) (Table 3.2).

Table 3.2 Noxious weeds recorded within the study areas

Scientific Name	Common Name	Noxious Class
Lycium ferocissimum	African Boxthorn	4
Phyla canescens	Lippia	4
Xanthium spinosum	Bathurst Burr	4

3.2 Fauna

3.2.1 Previous fauna surveys

Surveys of a portion of the study area were undertaken by Future Ecology in 2016. During those surveys one Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*) was recorded (Future Ecology 2016). This species is listed as Vulnerable under the TSC Act.

3.2.2 Fauna habitat description

Woodland on Alluvial Plain / Riparian Woodland

This habitat occurred adjacent to the Lachlan River. It was a mixed aged stand including mature and medium-aged trees, as well as young regenerating eucalypts. The woodland has been subject to various disturbances, including historical clearing and recent grazing, which has impacted mid-storey development and encouraged exotic plant cover in ground layers. The woodland is continuous along both sides of the Lachlan River within the study area and beyond, however is sparsely wooded in some adjacent areas.

The canopy was moderately dense and composed entirely of *Eucalyptus camaldulensis* (River Red Gum). The shrub layer was almost absent, with the exception of a few areas with *Lycium ferocissimum* (African Boxthorn). Groundcover was in moderate density composed of mostly exotic species, including *Phyla canescens* and *Xanthium spinosum* (Bathurst burr).

Small and large tree hollows were common in mature *Eucalyptus camaldulensis* (River Red Gums) within the study area and are likely to be widespread along the Lachlan River. Standing dead timber and large trees with basal cavities were also observed in smaller numbers. Logs were relatively common, consisting mostly of fallen hollow branches from *Eucalyptus camaldulensis* (River Red Gum). Other habitat resources such as decorticating bark and mistletoe were considered sparse. Leaf litter was sparse, although likely dependent on time since flooding. No bush rock was observed. Signs of feral species included sheep and rabbits.

Open Grassland / Pasture

This habitat occurred adjacent to the Riparian Woodland. It consisted of an open grassland that has been previously cultivated, and is currently dominated by exotic species. A few remnant shrubs and trees are sparsely dotted across the area, including *Eucalyptus microcarpa* (Grey Box), *Eucalyptus populnea* (Poplar Box) and *Geijera parviflora* (Wilga). One *Eucalyptus camaldulensis* (River Red Gum) occurred as a paddock tree and contained small tree hollows. Evidence of previous disturbance (e.g. clearing, grazing) was obvious due to the lack of any structural vegetation layers. Connectivity with other areas of habitat, apart from the adjacent Riparian Woodland, was non-existent. Habitat resources such as decorticating bark, mistletoe, logs and bush rock were not observed. Leaf litter was sparse. Signs of feral species included sheep and rabbits were observed.

3.2.3 Threatened fauna habitat

The *Eucalyptus camaldulensis* (River Red Gum) woodland in the study area occurs more extensively along the Lachlan River. A variety of threatened fauna species have potential to use the woodland habitat within the study area. Mature trees with cavities provide potential roosting locations for threatened microbats such Southern Myotis (*Myotis macropus*) (Vulnerable TSC Act), as well as the Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*) (Vulnerable TSC Act). Other threatened species such as the Grey-crowned Babbler (*Pomatostomus temporalis temporalis*) (Vulnerable TSC Act), Diamond Firetail (*Stagonopleura guttata*) (Vulnerable TSC Act) and Spotted Harrier (*Circus assimilis*) (Vulnerable TSC Act), have potential to also utilise the Red Gum woodland, as well as the lightly treed and grassland areas. No threatened species under the EPBC Act have been recorded within 15 km of the study area (OEH, 2017a).

3.2.4 Koala food trees

Trees listed as food trees for the Koala in the central west region (DECC 2008) were located across the study area. No Koalas have been recorded within 15 km of the study area (OEH, 2017a).

Primary food tree species: *Eucalyptus camaldulensis* (River Red Gum) was adjacent to the Lachlan River in River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion).

Secondary food tree species: *Eucalyptus populnea* (Poplar Box) and *Eucalyptus microcarpa* (Western Grey Box), were recorded as isolated individuals adjacent to the River Red Gum community.

Stringybarks/supplementary species: None were recorded.

Please note that Western Grey box has been incorrectly named in the Recovery Plan for the Koala (*Phascolarctos cinereus*) (DECC 2008). In Appendix 2 Management Area 6: Western Slopes and Plains, it states the species is *Eucalyptus macrocarpa* (it should say *Eucalyptus microcarpa*).

4 Conclusion

Two vegetation types were mapped within the study area:

- River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion); and
- Cultivated land.

Neither vegetation type forms part of any TEC communities listed under the EPBC Act or the TSC Act. No native plants listed as threatened or potential habitat for threatened plants, were located in the study area.

Three exotic species listed as noxious in the Lachlan LGA were recorded:

- *Lycium ferocissimum*;
- *Phyla canescens*; and
- *Xanthium spinosum*.

Potential habitat exists for a variety of threatened fauna, including threatened birds, arboreal mammals and microbats. The most notable habitat features for threatened fauna occur in *Eucalyptus camaldulensis* (River Red Gum) trees, which contain a source of nectar, foraging substrates, and tree cavities. Similar habitat occurs more widely along the Lachlan River.

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Appendix A: List of all species recorded across the study areas

Family	Scientific name	Common name	Exotic
Amaranthaceae	*Alternanthera sp.*		
Asteraceae	*Arctotheca calendula*	Capeweed	X
Poaceae	*Austrostipa aristiglumis*	Plains Grass	
Poaceae	*Austrostipa verticillata*		
Poaceae	*Bromus diandrus*	Great Brome	X
Poaceae	*Bromus sp.*		X
Brassicaceae	*Capsella bursa-pastoris*	Shepherd's Purse	X
Poaceae	*Chloris truncata*	Windmill Grass	
Asteraceae	*Cirsium vulgare*	Spear Thistle	
Polygonaceae	*Duma florulenta*	Lignum	
Boraginaceae	*Echium plantagineum*	Paterson's Curse	X
Cyperaceae	*Eleocharis pallens*		
Poaceae	*Eragrostis cilianensis*	Stinkgrass	X
Myrtaceae	*Eucalyptus camaldulensis*	River red gum	
Myrtaceae	*Eucalyptus microcarpa*	Grey Box	
Myrtaceae	*Eucalyptus populnea*	Bimble Box, Poplar Box	
Rutaceae	*Geijera parviflora*	Wilga	
Amaranthaceae	*Gomphrena celosioides*	Gomphrena weed	X
Poaceae	*Hordeum leporinum*	Barley grass	X
Poaceae	*Hordeum marinum*	Barley grasses	X
Brassicaceae	*Lepidium africanum*		X
Poaceae	*Lolium perenne*	Perennial Ryegrass	X
Poaceae	*Lolium rigidum*	Wimmera ryegrass	X
Onagraceae	*Ludwigia peploides*	Primrose	
Solanaceae	*Lycium ferocissimum*	African Boxthorn	X
Lythraceae	*Lythrum hyssopifolia*	Hyssop Loosestrife	
Chenopodiaceae	*Maireana microphylla*	Small-leaf bluebush	
Malvaceae	*Malva parviflora*	Small-flowered mallow	X
Marsileaceae	*Marsilea drummondii*	Common nardoo	
Fabaceae	*Medicago polymorpha*	Burr Medic	X
Fabaceae	*Medicago sp.*	Medics	X
Poaceae	*Paspalidium jubiflorum*	Warrego Grass	
Poaceae	*Phalaris sp.*	Canary grasses	X
Verbenaceae	*Phyla canescens*		X
Polygonaceae	*Polygonum aviculare*	Wireweed	X
Polygonaceae	*Rumex brownii*	Swamp Dock	
Chenopodiaceae	*Sclerolaena muricata var. semiglabra*	Black rolypoly	
Brassicaceae	*Sisymbrium sp.*	Mustards	X
Asteraceae	*Soliva stolonifera*	Carpet Burweed	X
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	X
Fabaceae	*Trifolium angustifolium*	Narrow-leaved clover	X
Fabaceae	*Trifolium repens*	White clover	X
Fabaceae	*Trifolium sp.*	Clover	X
Poaceae	*Vulpia sp.*	Fescue grasses	X
Asteraceae	*Xanthium spinosum*	Bathurst Burr	X