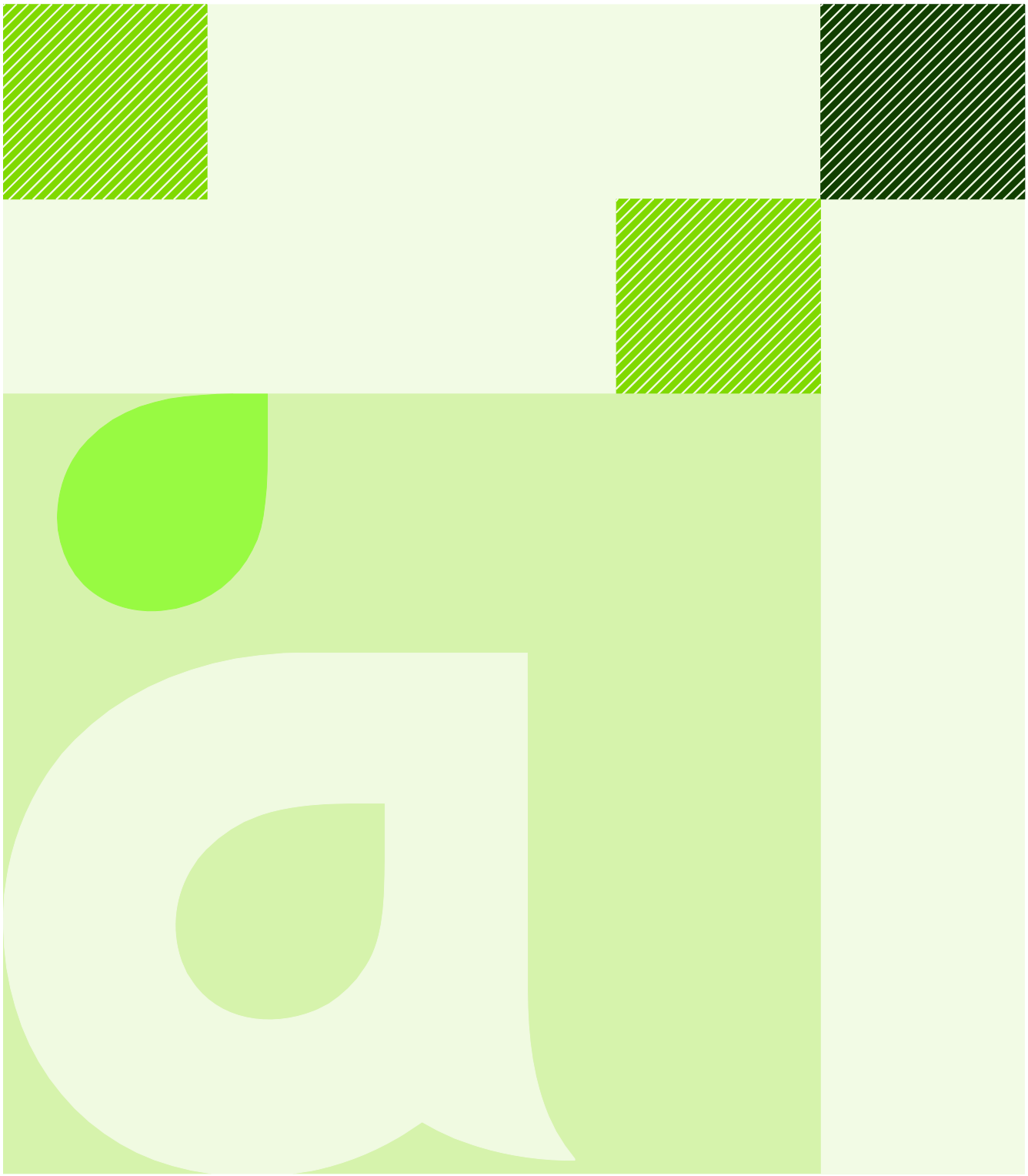

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Project: Roma Ecological Assessment Report

Lot 95 on WV456

Reference: 225678-001

Prepared for: Santos Ltd

Revision: 1

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1 Background

1.1 Project description

Santos Ltd (Santos) have commissioned Aurecon Australia Pty Ltd (Aurecon) to undertake ecological investigations of proposed areas of development for the Roma gas fields.

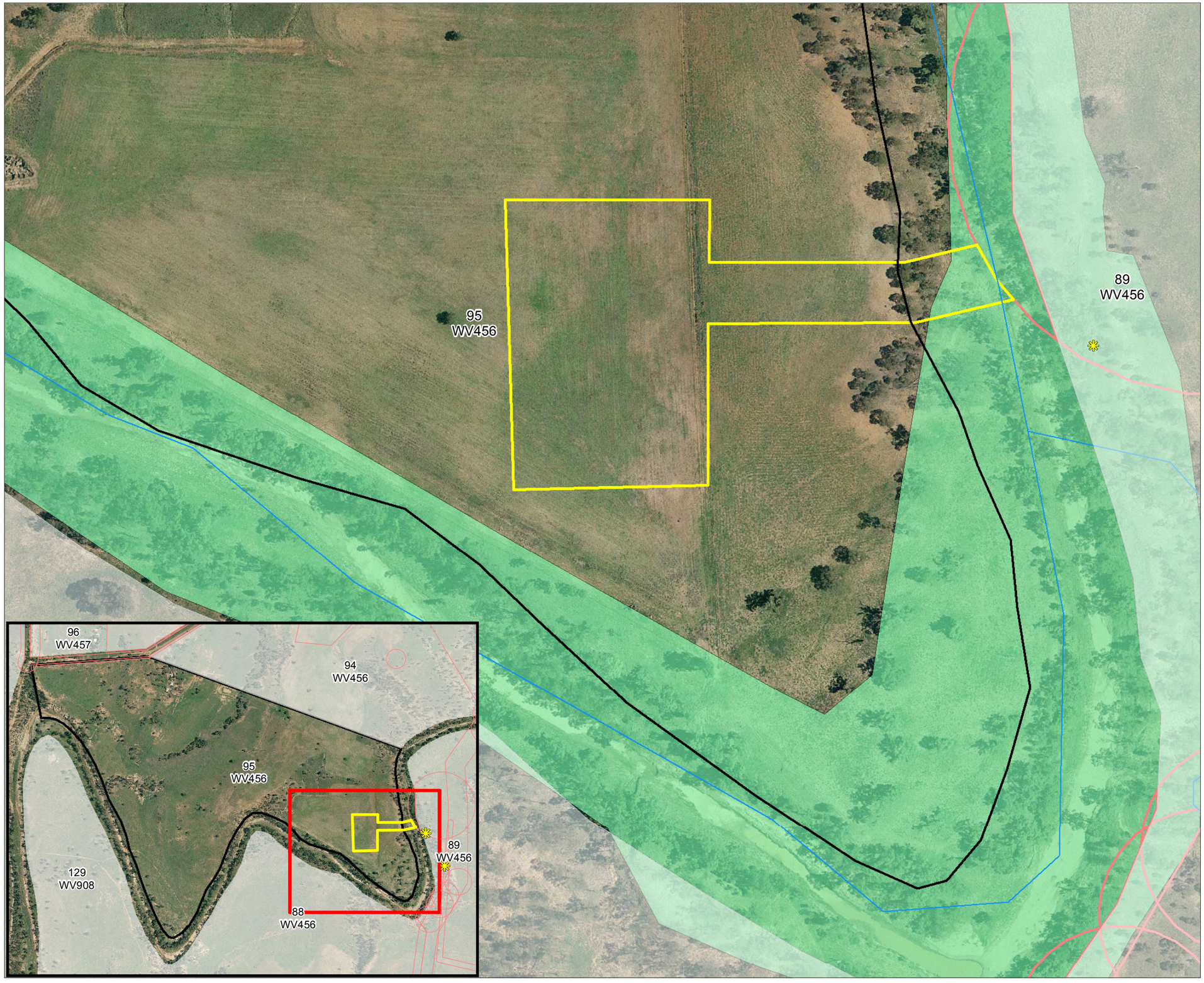
The Roma gas fields are located near the township of Roma and are characterised by undulating terrain with small elevated areas including the Thomby and Grafton Range. The dominant vegetation types within the Roma gas fields include Eucalypt and/or Brigalow woodlands, Blue grass or Mitchell grass downs, and smaller areas of White Cypress Pine and Mulga (Eddie 2007). The Roma gas fields are located within the Balonne River catchment.

Much of this area has been subject to cattle grazing and other agricultural practices, as well as previous development associated with the gas fields.

This report is specific to the proposed development areas shown in Figure 1.1. The proposed development area is located on Lot 95 on WV456, and this report is solely related to this particular area.

1.2 Purpose of report

The purpose of this report is to document the results of an ecological assessment of the proposed development area (Figure 1.1), highlighting areas and species of notable ecological or conservation value. This report does not make any recommendations regarding the development in relation to any Santos environmental authorities or other approvals.



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Legend

- Notable Species
- Drainage (100K)
- DCDB Parcels
- Proposed development area
- Upstream ground truth areas

Regional Ecosystem (Biodiversity Status)

- Endangered - Dominant
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- No Concern at Present

Notes:

Date: 23/07/2012 Version: 1

Map by: Moore NK P:\Aurecon\215648 Santos\Mapping\24WV432_Overview.mxd 23/07/2012 15:56

A3 scale: 1:2,500

0 50 m

Job No: 225678

Coordinate system: GDA 1994 MGA Zone 55

Santos Ecological Assessment Report 95WV456

Figure 1.1: Proposed development area - Lot 95 on WV456

2 Methodology

2.1 Desktop methodology

Proposed development areas have been projected on a range of maps provided by Santos. These maps include Regional Ecosystem (RE) Mapping (version 6.1; Department of Environment and Heritage Protection [DEHP]), Environmentally Sensitive Areas (ESA) mapping, drainage mapping and aerial photography. Where available ahead of time, these resources were reviewed to determine target areas for the field inspection. It is important to note that the RE classifications used in this report are based on the 'biodiversity status' of the vegetation and not the '*Vegetation Management Act 1999* (VM Act) status' of the vegetation.

2.2 Field methodology

The proposed development area was assessed by two (2) Aurecon ecologists (Hayley Poole and Joseph Callaghan) on the 17 July 2012. The assessment was undertaken to determine the existing vegetation communities and habitat value of the proposed development area as well as to verify the RE mapping as produced by DEHP.

GIS environmental constraints layers (eg RE Mapping, ESA mapping etc) and high resolution aerial photography were uploaded onto a toughbook (C5 mobile clinical assistant CFT-001 – Motion computing), with an integrated GPS used to locate surveys areas. Handheld Garmin GPS units (GPS map 78s) were also used during the field investigations. It should be noted that while efforts were made to ensure the GPS co-ordinates provided in this report are accurate, a margin of error approximately +/- 15 m is expected due to the limitations of the devices used and the recording environment.

The ground-truthing of the proposed development area included undertaking detailed flora species surveys including sampling of unknown flora, and recording all incidental fauna observations. All species known to be of conservation significance (such as 'endangered', 'vulnerable', 'near threatened' or 'Type A restricted' species under the provisions of the *Nature Conservation Act 1992* [NC Act] or 'critically endangered', 'endangered' or 'vulnerable' species under the *Environment Protection and Biodiversity Conservation Act 1999* [EPBC Act]) were recorded using the toughbook.

A list of flora species observed within the proposed development area has been included in Appendix A. Incidental fauna observations are provided in Section 3.1 of this report.

3 Ecological assessment

3.1 Ecological Assessment

3.1.1 General

The proposed development area is located in the south-west corner of Lot 95 on WV456, which is a part of the privately owned property “The Bend”. The proposed development area involves a rectangular pad (approximately 125 x 185 m) with a corridor (approximately 40 m wide) extending east towards the river.

Most of the proposed development area is currently mapped as ‘non-remnant’ vegetation on the Regional Ecosystem (RE) mapping, which is certified by Department of Environment and Heritage Protection (DEHP) (formally DERM). There are no Environmentally Sensitive Areas (ESA) mapped within the proposed development area.

There is one mapped ‘watercourse’ located at the eastern edge of the proposed development area, which correlates to the edge of a river bank. This ‘watercourse’ is mapped as a ‘stream order 5’.

The proposed development area has been extensively cleared and is dominated by exotic grasses. A square area (approximately 60 m by 60 m) within the rectangular pad has been sectioned off with electric fencing. The ground layer appeared to be slashed, and soil disturbance and gas well infrastructure was evident within the area that had been sectioned off by the electric fence. Cattle were observed grazing outside of this fenced area.

3.1.2 Floristics

The vegetation within the proposed development area has been extensively cleared and as a result, most of the area is mapped as ‘non-remnant’ vegetation on the DEHP certified RE map. The rectangular pad (outside of the electric fenced area) was actively grazed and was dominated by *Urochloa mosambicensis* (Sabi Grass) and *Pennisetum ciliare* (Buffel Grass), with associated species including *Chloris* sp (Windmill grasses), *Dichanthium sericeum* (Queensland Blue Grass), *Sclerolaena birchii* (Galvanised Burr) and *Verbena tenuisecta* (Mayne’s Curse). The ground layer had a height range of 0.1 m to 0.7 m, with a cover of approximately 90%. Several juvenile *Eucalyptus* species in the shrub layer were observed at the southern edge of the proposed development area. The area was positioned in a low-lying area adjacent to a watercourse and was actively grazed by cattle. A photograph of the vegetation typically observed within the area is shown in Photo 3.1.

The photograph in Photo 3.2 shows the area of disturbance (60 x 60 m) which had been cordoned off with electric fencing. This area had a ground cover of approximately 40% overall.

Photo 3.1 Photo taken looking across the rectangular pad of the proposed development area

Photo 3.2 The area of disturbance located within the proposed development area

The vegetation located in the eastern corridor of the proposed development area differed from that contained within the rectangular footprint to the west. A noticeable difference was observed in regard to grazing pressure, as the corridor was separated by a fence line and appeared ungrazed by cattle with an increased stratum height and change in vegetation composition. The ground cover had a height range of 0.4 m to 1.2 m, with an approximate cover of 95%. There was a higher proportion of surface rock in the brown clay loam soils, and *Melinis repens* (Red Natal) dominated in these areas. Closer to the river bank, *Heteropogon contortus* (Black Spear Grass) dominated the ground layer. Other ground layer species included *Maireana microphylla* (Small-leaf Bluebush), *Eragrostis* sp. (Lovegrasses) and *Sporobolus caroli* (Western Rats Tail Grass). Canopy and shrub layers were absent in this area.

At the eastern edge of the proposed development area, there was a change in vegetation composition due to the close proximity to a major river. Along the river's edge, *Eucalyptus tereticornis* (Queensland Blue Gum) was evident in the canopy layer, however no mature individuals were observed. While this area had a similar vegetation composition to that of 'of concern' RE 11.3.25, the area was restricted to the very edge of the 'watercourse' and was too narrow (less than 75 metres) to be mapped. The canopy vegetation all appeared to be of similar age and quite open in areas (approximately 5% cover), which indicated that the area may have been subjected to historical disturbance.

A sub-canopy layer (8 to 10 m high) of *Eucalyptus chloroclada* (Dirty Gum), *Acacia excelsa* (Ironwood) and Eucalyptus populnea (Poplar Box) was present on the upper slopes of the riparian area. This stratum had approximately 35% cover. The shrub layer consisted of *Acacia macradenia* (Zigzag wattle), *Eremophila mitchellii* (False Sandalwood), *Eremophila deserti* (Ellangowan Poison Bush) and *Allocasuarina luehmannii* (Bull Oak). The shrub layer had a height range of 0.5 m to 2 m, with a cover of 10%. The ground layer contained species typical of a riparian area including *Themeda triandra* (Kangaroo Grass), *Juncus usitatus* (Juncus), *Lomandra* sp. (Matrush) and *Cheilanthes sieberi* (Mulga Fern). *Heteropogon contortus* (Black Spear Grass) dominated the upper banks.

Opuntia tomentosa (Velvety Tree Pear) and *Opuntia stricta* (Prickly Pear) were observed within the proposed development area. These species are listed as 'Class 2 pests' declared under the provisions of the *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act).

No flora species of conservation significance under the provisions of the *Nature Conservation Act 1992* (NC Act) and/or the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) were recorded within the proposed development area. No 'Type A restricted plants' protected under the provisions of the NC Act were observed within the proposed development area.

3.2 Habitat Value

The habitat value of the proposed development area is considered to be low overall. Most of the area has been historically cleared, and only a small vegetated area was evident near the riparian corridor in the eastern portion of the proposed development area. Most of the proposed development area was devoid of canopy and sub-canopy layers, and the shrub layer only contained isolated individuals. There was very little opportunity for shelter, perching or foraging for birds, and only the eastern corridor contained dense grassy tussocks suitable for shelter by reptiles and small common mammals (ie mice).

Incidental fauna observed within the proposed development area were recorded and are outlined in Table 3.1.

Table 3.1 Incidental fauna recorded in the proposed development area

Common name	Scientific name
Birds	
Wedge-tailed Eagle	*Aquila audax*
Torresian Crow	*Corvus orru*
Grey Butcherbird	*Cracticus torquatus*
Sulphur-crested Cockatoo	*Cacatua galerita*
Galah	*Eolophus roseicapilla*
Little Corella	*Cacatua sanguinea*
Magpie-lark	*Grallina cyanoleuca*
Pale-headed Rosella	*Platycercus adscitus*

Macropod scats were also noted near the riparian area, indicating the presence of kangaroos and wallabies in the area.

No fauna species of conservation significance as listed under the provisions of the NC Act and/or EPBC Act were observed within the proposed development area.

4 Conclusion

The proposed development area has been extensively cleared in the past and as a result of this, is relatively devoid of any canopy vegetation. There is a small area of mature vegetation located along the banks of a river, located at the eastern edge of the proposed development area. This river is mapped as a ‘stream order 5’ ‘watercourse’.

No ESA’s are mapped within the proposed development area.

No fauna or flora species of conservation significance under the NC Act and/or the EPBC Act were observed within the proposed development area. The overall habitat value is considered to be low.

Appendices

Appendix A
Botanical species list

Botanical Species recorded within the proposed development area

Family Name	Scientific Name	Common Name	Notes
Adiantaceae	*Cheilanthes sieberi*	Mulga Fern	
Asteraceae	*Brachycome dentata*	Lobe-seed Daisy	
Asteraceae	*Cirsium vulgare*	Spear Thistle, Black Thistle	Non-native
Asteraceae	*Conyza bonariensis*	Fleabane	Non-native
Asteraceae	*Podolepis jaceoides*	Showy Copper Wire Daisy	
Cactaceae	*Opuntia stricta*	Prickly Pear	Non-native, LP Act Class 2 Weed
Cactaceae	*Opuntia tomentosa*	Velvety Tree Pear	Non-native, LP Act Class 2 Weed
Casuarinaceae	*Allocasuarina luehmannii*	Bull Oak	
Chenopodiaceae	*Maireana microphylla*	Small-leaf Bluebush	
Chenopodiaceae	*Sclerolaena birchii*	Galvanised Burr	
Cyperaceae	*Fimbristylis dichotoma*	Fimbristylis	
Fabaceae - Faboideae	*Indigofera hirsuta*	Hairy indigo	
Fabaceae - Faboideae	*Medicago laciniata*	Cut-leaf Medic	Non-native
Fabaceae - Mimosoideae	*Acacia excelsa*	Iron wood	
Fabaceae - Mimosoideae	*Acacia macradenia*	Zigzag Wattle	
Juncaceae	*Juncus usitatus*	Juncus	
Lomandraceae	*Lomandra longifolia*	Lomandra	
Lomandraceae	*Lomandra multiflora*	Lomandra	
Malvaceae	*Malva parviflora*	Small-flowered Mallow	Non-native
Meliaceae	*Owenia acidula*	Emu Apple	
Myoporaceae	*Eremophila deserti*	Ellangowan Poison Bush	
Myoporaceae	*Eremophila mitchellii*	False Sandalwood	
Myrtaceae	*Eucalyptus chloroclada*	Dirty Gum	
Myrtaceae	*Eucalyptus populnea*	Poplar Box	
Myrtaceae	*Eucalyptus sp. (juvenile)*		
Myrtaceae	*Eucalyptus tereticornis*	Queensland Blue Gum	
Oxalidaceae	*Oxalis corniculata*	Yellow Wood Sorrel	
Phormiaceae	*Dianella longifolia*	Dianella	
Poaceae	*Aristida calycina*	Dark Wiregrass	
Poaceae	*Aristida jerichoensis*	Jericho wire grass	
Poaceae	*Aristida ramosa*	Wire Grass	
Poaceae	*Capillipedium spicigerum*	Scented-top grass	
Poaceae	*Chloris divaricata*	Windmill Chloris, Slender Chloris	
Poaceae	*Chloris pectinata*	Comb chloris	
Poaceae	*Chloris virgata*	Feathertop Rhodes Grass	Non-native
Poaceae	*Cynodon dactylon*	Green Couch	Non-native
Poaceae	*Dichanthium sericeum*	Queensland Blue Grass	

Family Name	Scientific Name	Common Name	Notes
Poaceae	*Eragrostis elongata*	Clustered Lovegrass	
Poaceae	*Eragrostis lacunaria*	Tall Love Grass	
Poaceae	*Eragrostis sororia*	Blue eragrostis	
Poaceae	*Heteropogon contortus*	Black Spear Grass	
Poaceae	*Melinis repens*	Red Natal	Non-native
Poaceae	*Panicum effusum*	Inquisitive Grass	
Poaceae	*Pennisetum ciliare*	Buffel Grass	Non-native
Poaceae	*Sorghum halepense*	Johnson Grass	Non-native
Poaceae	*Sporobolus caroli*	Desert Sporobolus	
Poaceae	*Sporobolus creber*	Western Rats Tail Grass	
Poaceae	*Themeda avenacea*	Wild Oats Grass	
Poaceae	*Themeda triandra*	Kangaroo Grass	
Poaceae	*Urochloa mosambicensis*	Urochloa	Non-native
Solanaceae	*Solanum sp.*	Solanum	
Verbenaceae	*Verbena bonariensis*	Bunchy Verbena, Purpletop Verbena	Non-native
Verbenaceae	*Verbena litoralis*	Tall Verbena	Non-native
Verbenaceae	*Verbena tenuisecta*	Mayne's Curse	Non-native

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