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Biodiversity Development Assessment Report



MLA564, Girilambone NSW

Prepared for: AARC Environmental Solutions Pty Ltd

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Glossary and abbreviations

Acronym	Description
*	Denotes exotic species
†	Denotes both native and introduced species
BAM	Biodiversity Assessment Method (DPIE 2020a)
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
BC Reg	NSW <i>Biodiversity Conservation Regulation 2017</i>
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
BVM	Biodiversity Values Map
CEMP	Construction Environmental Management Plan
DA	Development Application
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DotE	Commonwealth Department of the Environment (now DAWE)
DoEE	Commonwealth Department of the Environment and Energy (now DAWE)
DPIE	NSW Department of Planning, Industry and Environment
EES	NSW DPIE Environment, Energy and Science Group (formerly OEH)
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
HBT	Hollow bearing tree
IBRA	Interim Biogeographic Regionalisation of Australia
LEP	Local Environment Plan
LGA	Local Government Area
OEH	NSW Office of Environment and Heritage (now EES)
PCT	Plant Community Type
SAIL	Serious and Irreversible Impacts
SEARs	Secretary's Environmental Assessment Requirements
TEC	Threatened Ecological Community
VI Score	Vegetation Integrity Score
VIS	Vegetation Information System



1 Introduction

1.1 Background

This Biodiversity Development Assessment Report (BDAR) has been prepared to accompany modification to a Development Application (DA) relating to proposed infrastructure at MLA564 (Lot 10, 138, and 144 // DP 751315 and Lot 147 // DP 824129), Girilambone NSW (**Figure 1.1**).

The proposed development will establish infrastructure required for underground mining works at two locations to the north of an existing open cut mine, including establishment of a track linking the new infrastructure to the existing mine. This BDAR has been prepared by Bruce Mullins, an Accredited Assessor (BAAS17024) in accordance with the NSW *Biodiversity Conservation Act 2016* (BC Act) and NSW *Biodiversity Conservation Regulation 2017* (BC Reg), and is consistent with the Biodiversity Assessment Method (BAM; DPIE [2020a]).

The BC Act establishes the biodiversity assessment requirements for proposed developments and land use. The BC Act establishes an offsets scheme which aims to ensure there is no net loss of biodiversity values. Entry into the BC Reg can come about through any combination of four triggers:

- **State significant development** – if a future development was determined to be SSD Secretary's Environmental Assessment Requirements ('SEARs') would be issued for the project, requiring that biodiversity impacts related to the proposed development be assessed using the BAM (DPIE 2020a) and documented in a BDAR.
- **Clearing thresholds** – the amount of vegetation clearance in relation to the minimum lot size is used to determine whether entry into the BAM is triggered (**Table 1.1**).
- **Biodiversity Values Map** - Proposed development is said to exceed the biodiversity threshold where it involves the clearing of native vegetation on land included in the Biodiversity Values Map (BVM; DPIE (2021a)).
- **Significant impact** – A Test of Significance (in accordance with Part 7.3 of the BC Act) is required for development proposals that are not situated on the BVM and that do not exceed the BOS clearing thresholds. If the Test of Significance indicates that there is likely to be a significant impact, the proponent must carry out an assessment in accordance with the BAM.

Table 1.1: Clearing threshold for each minimum lot size which would require entry into the BAM and the Biodiversity Offset Scheme.

Minimum lot size associated with the property	Threshold for clearing, above which the BAM and offsets scheme apply
Less than 1 ha	0.25 ha or more
1 ha to less than 40 ha	0.5 ha or more
40 ha to less than 1 000 ha	1 ha or more
1 000 ha or more	2 ha or more

Review of the subject land finds that clearing associated with the current proposal triggers the BOS, as the proposed development exceeds the area clearing threshold of 1 ha for the minimum lot size of the subject land, which is 600 ha.

This BDAR describes the outcome of the development assessment case (00026114/BAAS17024/21/00026115) conducted consistent with the BAM.

1.2 Location and site identification

The BAM defines the land to which the BDAR applies as the subject land, which includes areas that are proposed to be directly and indirectly impacted. For the purposes of this BDAR, the subject land includes approximately 5.57 ha of land within Lot 10, 138 and 144 // DP 751315 and Lot 147 // DP 824129 (**Figure 1.1** and **Figure 1.2**). No direct or indirect impacts are proposed to areas outside the subject land as shown in **Figure 1.2**. The subject land is part of a Development Application (DA) to establish infrastructure at two locations, within Lot 10 and 144, and an access road traversing the remainder of the area.

The subject land is situated in the Bogan Shire Local Government Area (LGA) and is zoned RU1 – Primary Production under the Bogan Local Environment Plan (Bogan LEP 2011). The subject land is located approximately 50 kilometres (km) north west of Nyngan, NSW. The site is located within a large expanse of rural lands stretching between Nyngan and Bourke, which is to the north west of the subject land.

The subject land is linear in shape with an 8 m wide road corridor extending north west from an existing open cut mine connecting with two larger blocks of approximately 100 m x 170 m which are the proposed infrastructure locations.

A large expanse of woodland surrounds the subject land and is contiguous with native vegetation extending to the north west into large intact vegetated areas of the Cobar Peneplain. To the east and south, cleared agricultural areas are found within about 3 km of the subject land and continue over a vast area extending east toward Dubbo and south toward Condobolin. Several bush tracks cross the subject land and the existing open cut mine surrounds the southern end of the subject land.

1.3 Proposed development

The proposed modification is for infrastructure needed to support underground mining operations. The infrastructure and associated vehicle track are the subject of a modification to an existing development application (DA No. 10/2015/004/001) previously approved by Bogan Shire Council. The proposal will include construction of the mine infrastructure and access tracks as well as ongoing usage of the access track by vehicles in support of mine maintenance and operations.

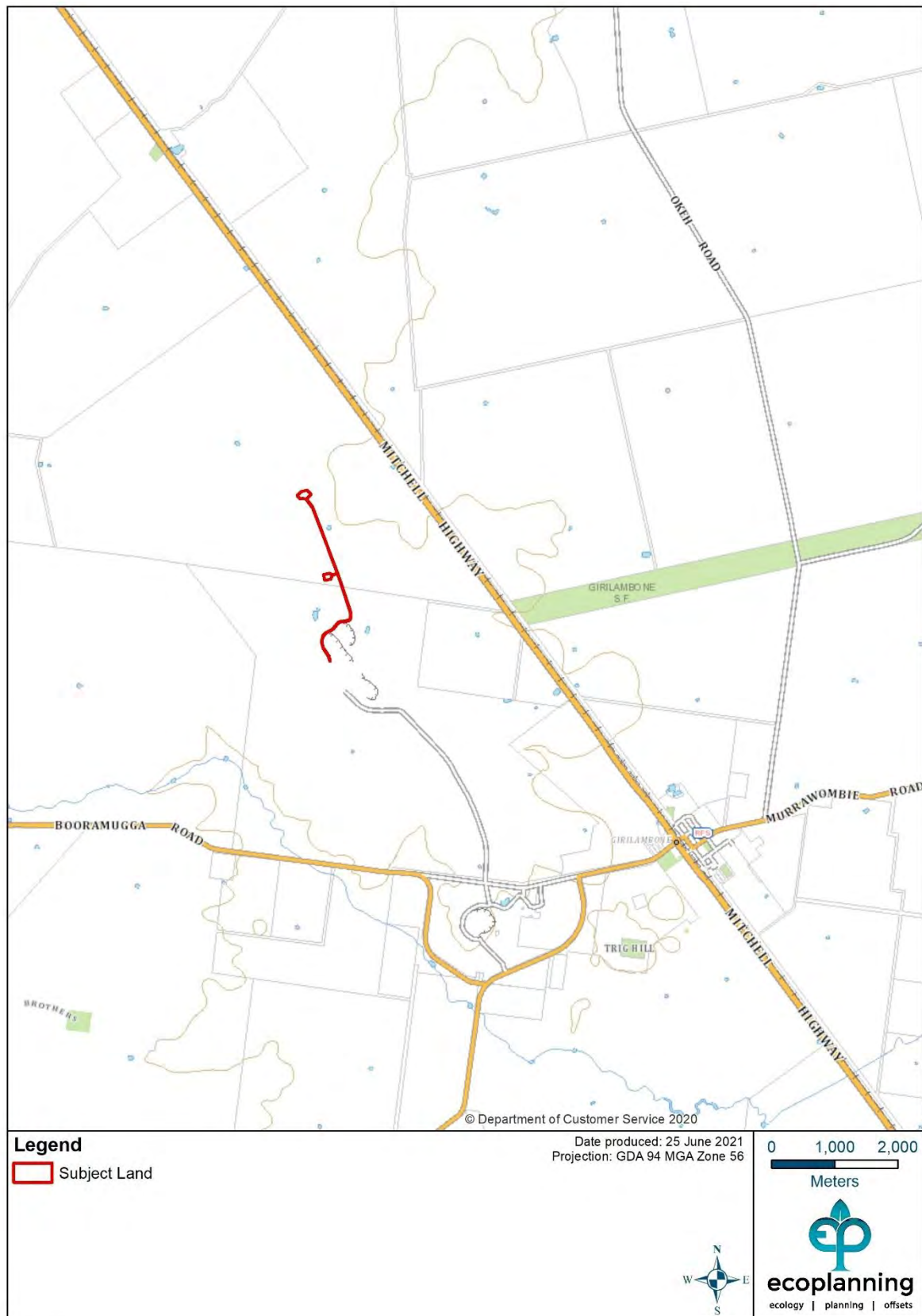


Figure 1.1: Location of the subject land.



Figure 1.2: Site map, including land mapped on the Biodiversity Values Map (DPIE 2021a) and mapped watercourses (LPI 2021).

2 Landscape context

2.1 Identifying landscape features

In accordance with Section 3.1 of the BAM, several features are assessed within the subject land and a 1,500 m assessment circle surrounding the subject land. Provided below are details related to the Interim Biogeographic Regionalisation of Australia (IBRA) (DoEE 2012) regions, its associated subregions and NSW landscapes regions (Mitchell Landscapes; DECC 2016). Other features, such as rivers, streams, estuaries, and wetlands, habitat connectivity, karst areas or areas of outstanding biodiversity value are considered, where appropriate. In accordance with Section 3.1.2 of the BAM, all relevant features are shown in **Figure 2.1** unless otherwise stated.

2.1.1 IBRA regions and subregions

IBRA regions represent a landscape-based approach to classifying the land surface, including attributes of climate, geomorphology, landform, lithology, and characteristic flora and fauna species present. The subject land is located entirely within the Conbelego Downs IBRA subregion (version 7.0) which is part of the Cobar Peneplain IBRA region (version 7.0; DoEE 2012). These attributes were entered into the BAM calculator.

2.1.2 NSW landscape regions (Mitchell Landscapes)

The subject land is located entirely within the 'Cobar Downs' landscape (Mitchell Landscapes v3.1; DECC 2016) and this was entered into the BAM calculator.

This Mitchell Landscape is located in slightly undulating plains in the Cobar Peneplain, with rounded ridges, occasional overlying sand dunes or rock outcrops, and well defined drainage lines of varying relief up to about 10 m. Shallow gravelly loamy soils, or ferruginous clay loam is found on ridges, grading into deeper acid and neutral red earths with hardpan down slope and calcareous red earths with areas of gilgai on drainage lines. Overlying sand dunes may contain deep sands, sandy earths, and red earth soils (DECC 2002).

The subject land is mapped in the Cobar (Cz) land system (Walker 1991). The Cobar land system is an undulating peneplain with low ridges, drainage lines, and residual higher peaks. The soils in this area are mapped as Rudosols and Tenosols, which are highly permeable and low fertility Lithosols (meaning derived from weathered rock) with low water holding capacity (DPIE 2020b).

2.1.3 Other features

Rivers, streams, and estuaries

The subject land crosses one mapped first order watercourse which is mapped as traversing the area directly north and east of the existing open cut mine. However, site surveys did not detect a defined bed and bank or any other features indicating the presence of a watercourse at this location. There is no watercourse present at the mapped location or anywhere else within the subject land. A small, shallow dam is found approximately 100 m to the east of the subject land. Various constructed impoundments and water holding structures including the existing open cut mine are found either side of the subject land's southern extent.

All watercourses found within the 1,500 m assessment buffer form part of the larger catchment of the Bogan River which is approximately 25 km to the east of the subject land.

Local and important wetlands

Under the BAM, a **Local Wetland** is identified as an area of land that is wet by surface water or ground water, or both, for long enough periods that the plants and animals in it are adapted to, and dependant on, moist conditions for at least part of their life cycle (DPIE 2020a)

An **Important Wetland** is a wetland listed under the Directory of Important Wetlands of Australia (DIWA; Environment Australia 2001) or an area included under the *State Environment Planning Policy (Coastal Management 2018)*.

There are no local or important wetlands on the site.

Habitat connectivity

The subject land forms part of a large expanse of woodland that, although fragmented by bush tracks, broadly forms a contiguous area of vegetation extending from the vicinity of Girilambone to the north and west for hundreds of kilometres, with only occasional patches cleared for agriculture within this expanse. To the south and east, cleared agricultural lands are found within about 3 km of the subject land and have generally very poor connectivity with the exception of riparian corridors and occasional patches of remnant woodland.

Areas of geological significance and soil hazard features

No other landscape features, including areas of geological significance (karst, caves, crevices, cliffs, etc.) or soil hazard features have been identified within the subject land and 1,500 m assessment buffer.

Areas of outstanding biodiversity values

No areas of outstanding biodiversity value have been identified within the subject land (**Figure 1.2**).

2.2 Determining site context

2.2.1 Assessing native vegetation cover

In accordance with Section 3.2 and Section 4.3.2 of the BAM, native vegetation cover must be assessed for a 1,500 m assessment buffer around the subject land to assess the habitat suitability for threatened species. The extent of native vegetation on the subject land and immediate surround was mapped using vegetation mapping compiled by Office of Environment and Heritage (OEH 2015), with edits made to improve linework where obvious changes to vegetation extent had occurred using SIX Maps NSW Imagery (LPI 2021) (**Figure 2.1**).

The total area of the 1,500 m assessment circle around the subject land is 1,637 ha, with the area of native vegetation mapped within the assessment circle being 1,444 ha. This is a native vegetation cover of 88% (>70% class as defined by Section 3.2 of the BAM) and this value was entered into the BAM calculator.

2.2.2 Assessing patch size

Patch size is defined by the BAM as *'an area of native vegetation that:*

- *occurs on the development site or biodiversity stewardship, and*
- *includes native vegetation that has a gap of <100 m from the next area of native vegetation (or ≤ 30 m for non-woody ecosystems).*

Patch size may extend onto adjoining land that is not part of the development site or biodiversity stewardship site.'

In assessing patch size, stands of native vegetation within 100 m of other areas of native vegetation, but which are separated by hard barriers (permanent artificial structures, wide roads, etc.) have been treated as separate patches. These highly modified breaks in vegetation connectivity would significantly alter ecological function of these areas of native vegetation such that these areas warrant recognition as separate patches.

Patch size is required to be assessed as one of four classes per vegetation zone mapped, being <5 ha, 5-<25 ha, 25-100 ha, or ≥ 100 ha. The vegetation of the subject land is contiguous with areas of vegetation surrounding the subject land to the north, east. This contiguous land adjoins remnant vegetation within the assessment circle. As such the vegetation patch associated with the subject land has been measured as within the ≥ 100 patch size, and a value of 101 ha has been entered into the BAM calculator for all vegetation zones.



Figure 2.1: Location map.

3 Native vegetation

3.1 Plant community types (PCTs) and threatened ecological communities

3.1.1 Regional vegetation mapping

In accordance with Section 4.1 of the BAM, existing information relevant to the native vegetation of the subject land and the 1,500 m assessment circle has been reviewed.

Desktop assessment of vegetation mapped by OEH (2015) identified the following vegetation types within the subject land (**Figure 3.1**):

- PCT 103 Poplar Box - Gum Coolabah - White Cypress Pine shrubby woodland mainly in the Cobar Penepine Bioregion
- PCT 176 Green Mallee - White Cypress Pine very tall mallee woodland on gravel rises mainly in the Cobar Penepine Bioregion
- Cleared land, no vegetation or identifiable Plant Community Type (PCT).

This community and the equivalent PCTs and TECs are listed in **Table 3.1**.

Table 3.1: Relationship between vegetation communities, PCTs and TECs.

PCT (OEH 2015)	PCT (DPIE 2021b)	BC Act	EPBC Act
PCT 103	PCT 103	No	No
PCT 176	PCT 176	No	No

3.2 Vegetation extent

In accordance with Section 4.1 of the BAM, the extent of native vegetation was identified and mapped across the subject land (**Figure 3.2 to Figure 3.4**). Within the subject land, 4.87 ha out of the total 5.57 ha was identified as supporting native vegetation.

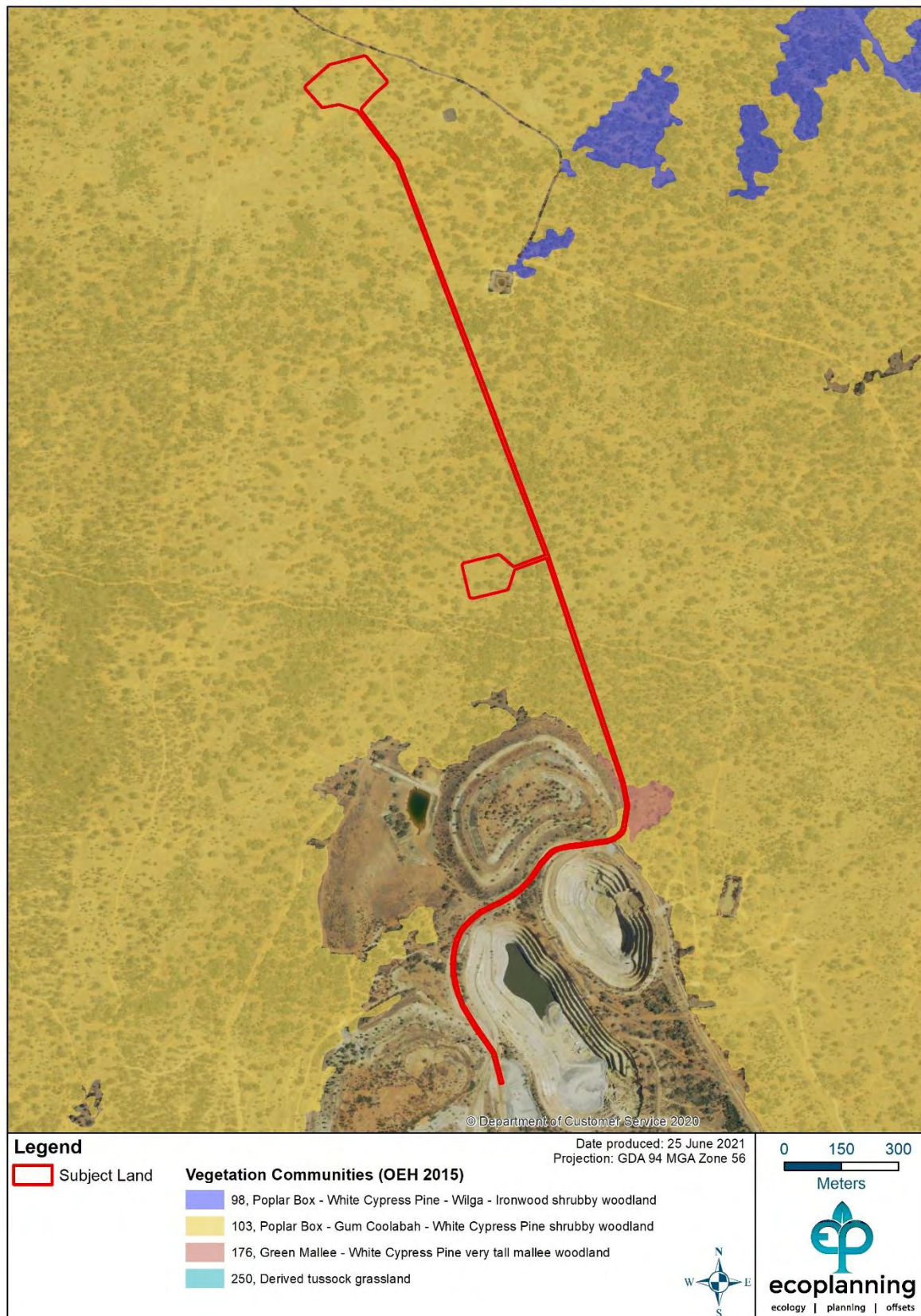


Figure 3.1: Regional vegetation community mapping (OEH 2015).

3.2.1 Field assessment of vegetation communities

Assessment and validation of PCTs by Ecoplaning within the subject land was undertaken on 3 – 5 May 2021 by Elizabeth Norris (Senior Botanist/Ecologist) and Bret Stewart (Senior Ecologist). The subject land was traversed whilst recording the vegetation structure and dominant species within each structural layer and to identify and map vegetation zones (variation in the broad condition state of vegetation polygons) in accordance with the BAM.

Based upon traverses of the subject land, the PCTs present were identified and the PCT and vegetation zone boundaries were mapped. Based on this map, areas of native vegetation on the subject land was sampled with five plot-based floristic vegetation surveys (Vegetation Integrity [VI] plots), consistent with Section 4.2.1 of the BAM. The plots also represented the location of Vegetation Integrity (VI) plots. The location of the floristic vegetation plots was based upon sampling a representative area within the community and avoided, where possible, edge effects (i.e. located close to edges of vegetation extent) or ecotones with adjacent vegetation zones. However, given the small size and linear orientation of the site, capturing some edges of disturbed areas, such as bush tracks, was unavoidable.

The identification of PCTs was in accordance with the NSW PCT classification as described in the BioNet Vegetation Classification (DPIE 2021b). Determination of the most appropriate PCT for the vegetation community within the subject land used the BioNet Vegetation Classification database to identify/confirm PCT types which matched the geographic distribution (based on IBRA subregions), vegetation formation and floristics of vegetation within the subject land. The data for the potential PCT including vegetation formation, descriptive attributes and distribution information were then reviewed to determine the most appropriate PCT for each of the vegetation communities sampled within the subject land. Observations of vegetation structure and composition made during traverse of the subject land as well as adjacent areas also informed the determination of the most appropriate PCT for the vegetation community within the subject land.

Vegetation within the subject land was also assessed against the final determinations for TECs listed under the BC Act to determine whether the vegetation within the subject land formed part of and TEC.

Species composition should be considered in combination with other important vegetation community features, such as landscape position and soils. Some of the characteristic species listed for a PCT can be common to a number of PCTs and, therefore, species composition should not be used in isolation to determine a PCT.

Based on the following characteristics, the site was considered to represent PCT 103:

- **Landscape position** – this community is known to occur on alluvial flats, footslopes, and broad ridges of undulating plains (DPIE 2021b). The subject land is located in an area of flats and gently undulating plains on red-brown loam soils.
- **Location** – Known to occur over a large section of north-central NSW, mainly in the Cobar Peneplain (DPIE 2021b). The subject land is located in the east parts of the Cobar Peneplain.
- **Dominant canopy species and species composition:**
 - o **PCT 103** supports open woodlands dominated in the canopy by *Eucalyptus populnea* subsp. *bimbil* (Poplar Box) together with *Eucalyptus intertexta* (Gum Coolabah) and *Callitris glaucophylla* (White Cypress Pine).



Shrub cover is variable, from dense to sparse, and includes *Geijera parviflora* (Wilga) and a number of *Acacia*, *Eremophila*, and *Dodonaea* spp. Ground cover is dominated by perennial grasses such as *Austrostipa scabra*, *Enteropogon acicularis* and *Chloris truncata* together with herbs such as *Calotis lappulacea*, *Vittadinia cervicalis* and *Einadia nutans*, with *Maireana microphylla* and *Sclerolaena* spp. often colonising disturbed areas.

Within the subject land, *Eucalyptus populnea* subsp. *bimbil* forms the dominant canopy throughout, with *Callitris glaucophylla* present in dense stands in some places, which notably contained a large proportion of dead trees due to recent drought. *Eucalyptus intertexta* is found much less frequently within the subject land. The mid-stratum is dominated by open to sparse *Geijera parviflora*, with *Eremophila mitchellii* and *Abutilon otocarpum*. Patches of *Sclerolaena* spp., *Atriplex stipitata*, and *Salsola australis* occupy disturbed areas. The diagnostic flora species recorded, in particular the dominant *Eucalyptus populnea* subsp. *bimbil* occurring in an open shrubby woodland structure, occurring on a flat to slightly undulating landscape on red-brown loam soils was determined to be characteristic of PCT 103.

- o **PCT 176** is characterised as a very tall mallee woodland dominated by *Eucalyptus viridis* (Green Mallee) which is restricted to gravel, upper slopes, and rises in the eastern Cobar Penepplain.

The area mapped by OEH (2015) as PCT 176 within the subject land possibly relates to aerial photo interpretation (API) rendering the highly modified, rocky landscape surrounding the existing open cut mine, which includes spoil heaps and rehabilitated rocky mounds which have been planted with *Acacia* species, as an area of naturally occurring rocky ridges, which is a landform that typically supports this community in the area. Site assessments confirmed that this area is not commensurate with PCT 176 floristically and that the rocky landform is man-made. The vegetation within the area mapped as PCT 176 has been identified as PCT 103 in 'modified' condition class. Site assessments found a mix of hardier flora representative of this community, such as *Sclerolaena* spp. and *Calotis* spp., together with planted *Acacia* spp. which formed part of the rehabilitation works undertaken at the mine.

In accordance with Section 4.1 of the BAM, the extent of native vegetation was identified and mapped across the subject land (**Figure 3.2**, **Figure 3.3**, and **Figure 3.4**). A total of 4.87 ha of the 5.57 ha of the subject land was identified as supporting native vegetation.

3.2.2 Plant Community Types (PCTs)

Based on the floristic composition of the vegetation in the subject land, one native vegetation community was identified within the subject land (**Table 3.2**):

- Poplar Box - Gum Coolabah - White Cypress Pine shrubby woodland mainly in the Cobar Penepplain Bioregion (PCT 103).

Condition classes of 'intact,' 'disturbed' and 'modified' were applied to this community.

Table 3.2: Details of PCTs within the subject land.

Plant Community Type (PCT)	Vegetation Formation & Class	Vegetation zone	Area (ha)*
Poplar Box - Gum Coolabah - White Cypress Pine shrubby woodland mainly in the Cobar Peneplain Bioregion (PCT 103)	Semi-arid Woodlands (Shrubby sub-formation) Western Peneplain Woodlands	Intact	1.23
		Disturbed	3.48
		Modified	0.16
Total native vegetation			4.87
Cleared land (no PCT)	N/A	-	0.70
Total area of the subject land			5.57

* subject to rounding errors.

Poplar Box – Gum Coolabah – White Cypress Pine shrubby woodland mainly in the Cobar Penepplain bioregion

Vegetation Zone 1 – Intact

This PCT 103 was present on the subject land in three conditions; ‘intact,’ ‘disturbed’ and ‘modified’ (**Figure 3.2**, **Figure 3.3**, and **Figure 3.4**) and is not characteristic of a Threatened Ecological Community listed under the BC Act or EPBC Act

PCT 103 in ‘intact’ condition is present over the majority of the proposed vehicle track, with ‘disturbed’ and ‘modified’ condition (described below) also present in parts of the north and south of the vehicle track respectively. The intact condition is characterised as mature shrubby woodland with a dominant canopy of *Eucalyptus populnea* subsp. *bimbil* (Bimble Box). *Eucalyptus intertexta* (Gum Coolabah) occurs much less frequently in the subject land, most being found in the south. *Callitris glaucophylla* (White Cypress Pine) forms dense variably aged stands of mostly young trees, notably a large proportion of these were dead due to recent drought conditions. The shrub layer is dominated by open to sparse *Geijera parviflora* (Wilga) mostly occurring in patches under canopy trees, with *Eremophila mitchellii* (Budda) also frequently occurring.

Due to good rains occurring in the year prior to survey, the ground layer was green and dense in much of this vegetation zone at the time of survey. Native grasses are dominant within this vegetation zone, including *Austrostipa scabra* subsp. *scabra*, *Paspalidium constrictum*, *Eragrostis parviflora*, and *Eragrostis lacunaria*, with more disturbed areas containing smaller patches of dominated by *Sclerolaena convexula* and *Sclerolaena birchii*. Very few exotic species were recorded, and no high threat exotic species.

Vegetation Zone 2 – Disturbed

The ‘disturbed’ areas of this vegetation community are found within the proposed infrastructure areas and at other locations where patches of disturbance, mostly bush tracks, cross the

proposed vehicle track. The canopy is similar to the intact areas, but with trees more widely scattered, less evidence of regrowth, and obvious historic clearing having occurred. *Eucalyptus populnea* subsp. *bimbil* and *Callitris glaucophylla* were recorded widely scattered in this vegetation zone. Shrub cover likewise is similar to the intact areas in composition but far more sparsely distributed.

The understorey is patchier in the disturbed vegetation zone, with large patches of bare earth present in many places. Species more able to colonise after disturbance such as *Calotis lappulacea*, *Sclerolaena diacantha*, *Sclerolaena birchii*, *Sida cunninghamii* and *Sida corrugata* are far more prevalent. Despite disturbance and lack of ground cover in many places, very few weeds have colonised the area, and no high threat exotic species were found in this vegetation zone.

Vegetation Zone 3 – Modified

The ‘modified’ condition class of this community was present in the southern part of the subject land where the proposed vehicle track enters the vicinity of the existing open cut mine. The vegetation in this area has been previously cleared, much of the landform has been heavily modified including embankments, large man-made rocky hills, and impoundments. The vegetation that has recolonised this area includes a mix of hardier shrubs and groundcover species characteristic of PCT 103, such as *Calotis cuneifolia*, *Sclerolaena convexula*, *Sclerolaena birchii*, *Sida cunninghamii* and *Sida corrugata*, as well as some planted *Acacia* spp. mostly on the rehabilitated hillsides. Notably *Eucalyptus viridis* (Green Mallee) was recorded on rehabilitated hillsides but this was confirmed to be part of rehabilitation plantings. There is no canopy stratum in this vegetation zone.

A summary of the PCT 103 profile from the Vegetation Information System (VIS) (DPIE 2021b) is provided in **Table 3.3**. Species recorded within the subject land are highlighted in bold text.

Cleared land

Vegetation Zone 4 – cleared land

The southernmost extent of the subject land, where it enters the area of the existing open cut mine, will follow an established vehicle track which is part of the previously constructed mine infrastructure. The existing vehicle track will be upgraded and maintained as part of the current proposal, however, this will not result in any further direct impact to native vegetation. No vegetation is found within the existing vehicle track, which is composed of gravel over compacted earth.

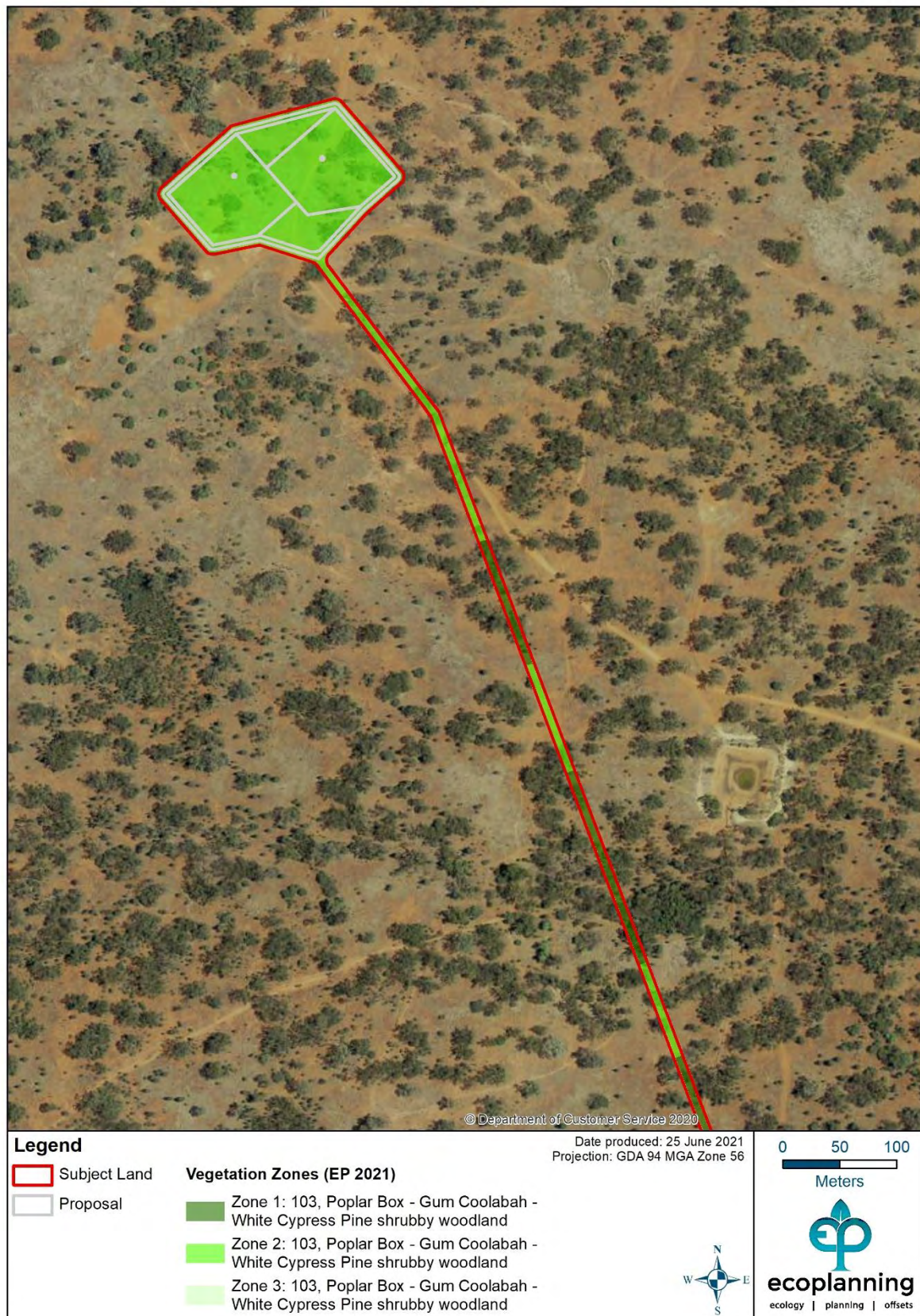


Figure 3.2: Field validated Plant community types within the subject land (northern subject land).



Figure 3.3: Field validated Plant community types within the subject land (middle section of subject land)



Figure 3.4: Field validated Plant community types within the subject land (southern subject land)



Figure 3.5: PCT 103 Vegetation Zone 1 'Intact' in the proposed access track.



Figure 3.6: PCT 103 Vegetation Zone 2 'Disturbed' in the proposed infrastructure area.

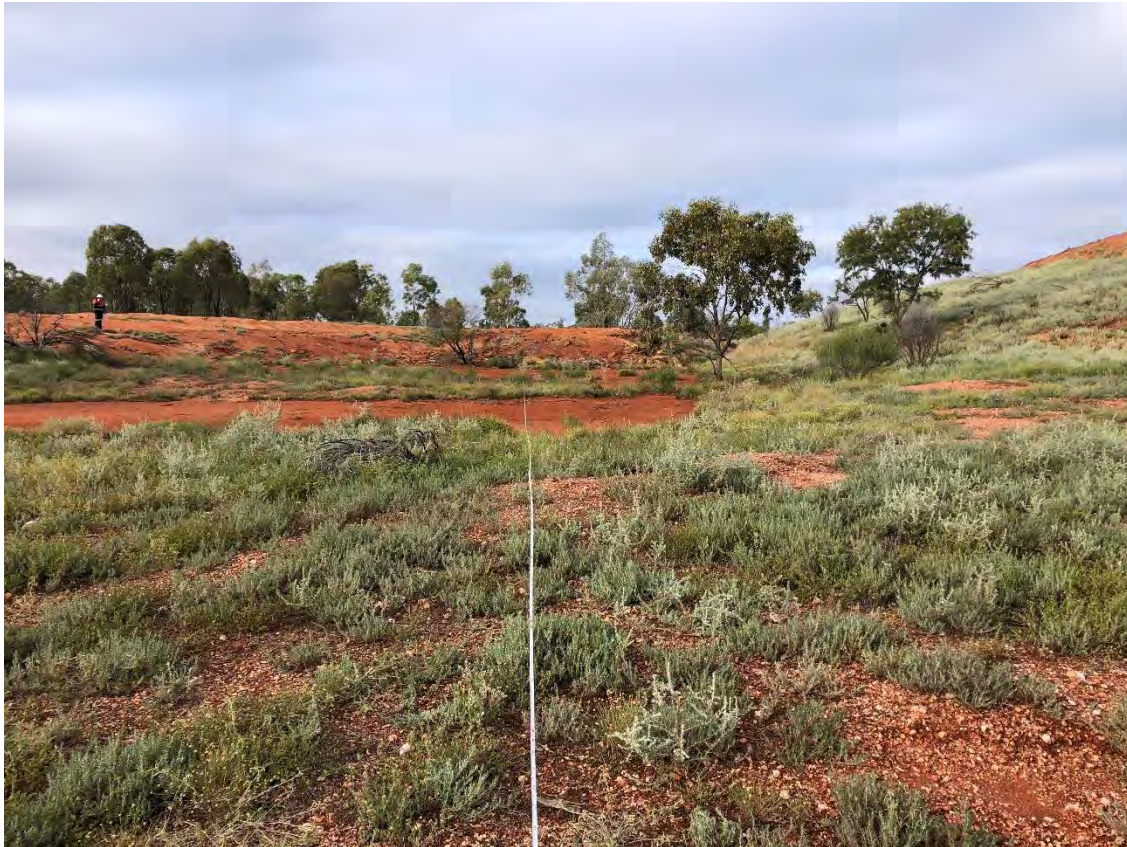


Figure 3.7: PCT 103 Vegetation Zone 3 'Modified' in the proposed access track at the southern end of the impact area.

Table 3.3: VIS PCT profile (DPIE 2021b) - Poplar Box – Gum Coolabah – White Cypress Pine shrubby woodland mainly in the Cobar Peneplain bioregion (PCT 103). Species found within the subject land are in bold.

Plant community type (PCT)	Poplar Box – Gum Coolabah – White Cypress Pine shrubby woodland mainly in the Cobar Peneplain bioregion
PCT ID	PCT 103
Vegetation formation	Semi-arid Woodlands (Shrubby sub-formation)
Vegetation class	Western Peneplain Woodlands
Upper stratum	<i>Eucalyptus populnea</i> subsp. <i>bimbil</i> ; <i>Callitris glaucophylla</i> ; <i>Eucalyptus intertexta</i> ; <i>Casuarina cristata</i> ; <i>Acacia excelsa</i> subsp. <i>angusta</i> ; <i>Atalaya hemiglauc</i> ; <i>Grevillea striata</i> ; <i>Brachychiton populneus</i> subsp. <i>populneus</i> ; <i>Alectryon oleifolius</i> subsp. <i>canescens</i>
Middle stratum	<i>Geijera parviflora</i> ; <i>Eremophila mitchellii</i> ; <i>Eremophila glabra</i> ; <i>Acacia deanei</i> subsp. <i>paucijuga</i> ; <i>Dodonaea viscosa</i> subsp. <i>angustissima</i> ; <i>Dodonaea viscosa</i> subsp. <i>spatulata</i> ; <i>Bertya cunninghamii</i> ; <i>Dodonaea viscosa</i> subsp. <i>cuneata</i> ; <i>Apophyllum anomalum</i> ; <i>Rhagodia spinescens</i> ; <i>Acacia aneura</i> ; <i>Eremophila sturtii</i> ; <i>Senna form taxon 'artemisioides'</i> ; <i>Eremophila longifolia</i> ; <i>Hakea tephrosperma</i> ; <i>Pimelea microcephala</i> subsp. <i>microcephala</i> ; <i>Beyeria viscosa</i> ; <i>Acacia tetragonophylla</i> ; <i>Acacia homalophylla</i> ; <i>Amyema quandang</i> var. <i>quandang</i>
Ground stratum	<i>Maireana microphylla</i> ; <i>Enteropogon acicularis</i> ; <i>Sclerolaena birchii</i> ; <i>Austrostipa scabra</i> subsp. <i>scabra</i> ; <i>Sclerolaena diacantha</i> ; <i>Einadia nutans</i>

	<i>subsp. nutans</i> ; <i>Einadia nutans</i> subsp. <i>linifolia</i> ; <i>Aristida jerichoensis</i> var. <i>subspinulifera</i> ; <i>Thyridolepis mitchelliana</i> ; <i>Monachather paradoxus</i> ; <i>Chloris truncata</i> ; <i>Eragrostis lacunaria</i> ; <i>Vittadinia cervicalis</i> var. <i>cervicalis</i> ; <i>Calotis lappulacea</i> ; <i>Vittadinia cuneata</i> var. <i>hirsuta</i> ; <i>Sida corrugata</i> ; <i>Ptilotus atriplicifolius</i> var. <i>atriplicifolius</i> ¹ ; <i>Cheilanthes austrotenuifolia</i> ; <i>Oxalis chnoodes</i> ; <i>Boerhavia dominii</i> ; <i>Solanum ferocissimum</i> ; <i>Ptilotus obovatus</i> var. <i>obovatus</i> ; <i>Chrysocephalum semipapposum</i> ; <i>Xerochrysum bracteatum</i> ; <i>Chenopodium desertorum</i> subsp. <i>desertorum</i> ; <i>Solanum coactiliferum</i>
Landscape position	Alluvial flats, footslopes and broad ridges of undulating plains. Occurs on clay loam, sandy loam or lateritic soils. Occurs mainly in the Cobar Peneplain Bioregion of central-western NSW with annual rainfall 350 - 450 mm.
Profile source	Benson 103 (Benson et al. 2006)
Full reference details	Westbrooke, M. et al. (2004); Thompson, D.F. (1982); Porteners, M.F. (1993); Ritman, K. (1995); Pickard, J. & Norris, E.H. (1994); Dick, R. (1999); Sivertsen, D. & Metcalfe, L. (2001); Porteners, M.F. (2001a); Porteners, M.F. (2003b); Metcalfe, L., Sivertsen, D.P., Tindall, D.R. & Ryan, K.M. (2003); Brickhill, J. (1978b); Beeston, G.R., Walker, P.J., Purdie, R. & Pickard, J. (1980); DEC (2006); DEC (2006a); Lewer, S., Ismay, K., Grounds, S., Gibson, R., Harris, M., Armstrong, R., Deluca, S. & Ryan, C. (2003); Masters, P. & Foster, E. (2000)
Estimate remaining pre-European extent rounded to nearest 5%	50%
TEC Name (Listing status)	NA

¹ *Ptilotus atriplicifolius* var. *atriplicifolius* is now known as *Ptilotus sessilifolius*.

3.2.3 Threatened Ecological Communities

PCT 103 – Poplar Box – Gum Coolabah – White Cypress Pine shrubby woodland mainly in the Cobar Peneplain bioregion

Within the subject land, PCT 103 identified in the condition classes 'intact,' 'disturbed' and 'modified' is not characteristic any Threatened Ecological Communities (TEC) listed under the BC Act or the EPBC Act.

3.3 Vegetation zones

3.3.1 Vegetation integrity (VI) survey plots

Five (5) VI plots were completed in PCT 103 to meet the requirements of the BAM (**Appendix A**).

The number of VI plots surveyed was consistent with the requirements as outlined within Table 3 of the BAM and for the subject land was one to two plots per vegetation zone (**Figure 3.8 to Figure 3.10**). Given the small size of each vegetation zone and linear orientation of much of the subject land, plots were orientated as best as possible to capture the most representative parts of each zone and to avoid ecotones, zone boundaries and disturbances such as tracks. However, this was not always possible.

The linear orientation of the 'intact' and 'modified' vegetation zones meant that establishing a standard BAM plot of 20 m x 20 m nested within 20 m x 50 m was not possible. Instead, equivalent linear 10 m x 40 m nested within 10 m x 100 m plots were used to cover a proportionate area. Also, the bearing of the plot established within the 'modified' condition class was adjusted from 170 degrees to 205 degrees at 50 m from the start of the plot (halfway) to maximise the proportion of the impact area captured within the plot, as shown in **Figure 3.10**.

Table 3.4: Number of VI plots required for each vegetation zone base on their respective sizes.

PCT Name	Vegetation Zone	Area	Number of plots required (completed)*
Poplar Box – Gum Coolabah – White Cypress Pine shrubby woodland mainly in the Cobar Penneplain bioregion (PCT 103).	Intact	1.23 ha	1 (2) (plots G-01, G-03)
	Disturbed	3.48 ha	2 (2) (plots G-02, G-05)
	Modified	0.16 ha	1 (1) (plot G-04)

3.3.2 Current and future vegetation integrity scores

VI scores were calculated based on the VI survey plot data collected within the subject land. Data collected for the VI plot is included in **Appendix A**. The VI score for the vegetation zones is provided in **Table 3.5**.

All vegetation within the subject land will be considered to be completely cleared. As such, the future VI scores were given a value of 0 / 100 for vegetation zones of PCT 103 (**Table 3.5**).

Table 3.5: Vegetation Integrity scores.

Veg Zone	Plant Community Types	Condition Class	Area Impacted (ha)	Vegetation Integrity Score	
				Before Development	After Development
1	PCT 103	Intact	1.23	87.0	0
2	Poplar Box – Gum Coolabah – White	Disturbed	3.48	29.0	0
3	Cypress Pine shrubby woodland	Modified	0.16	39.8	0

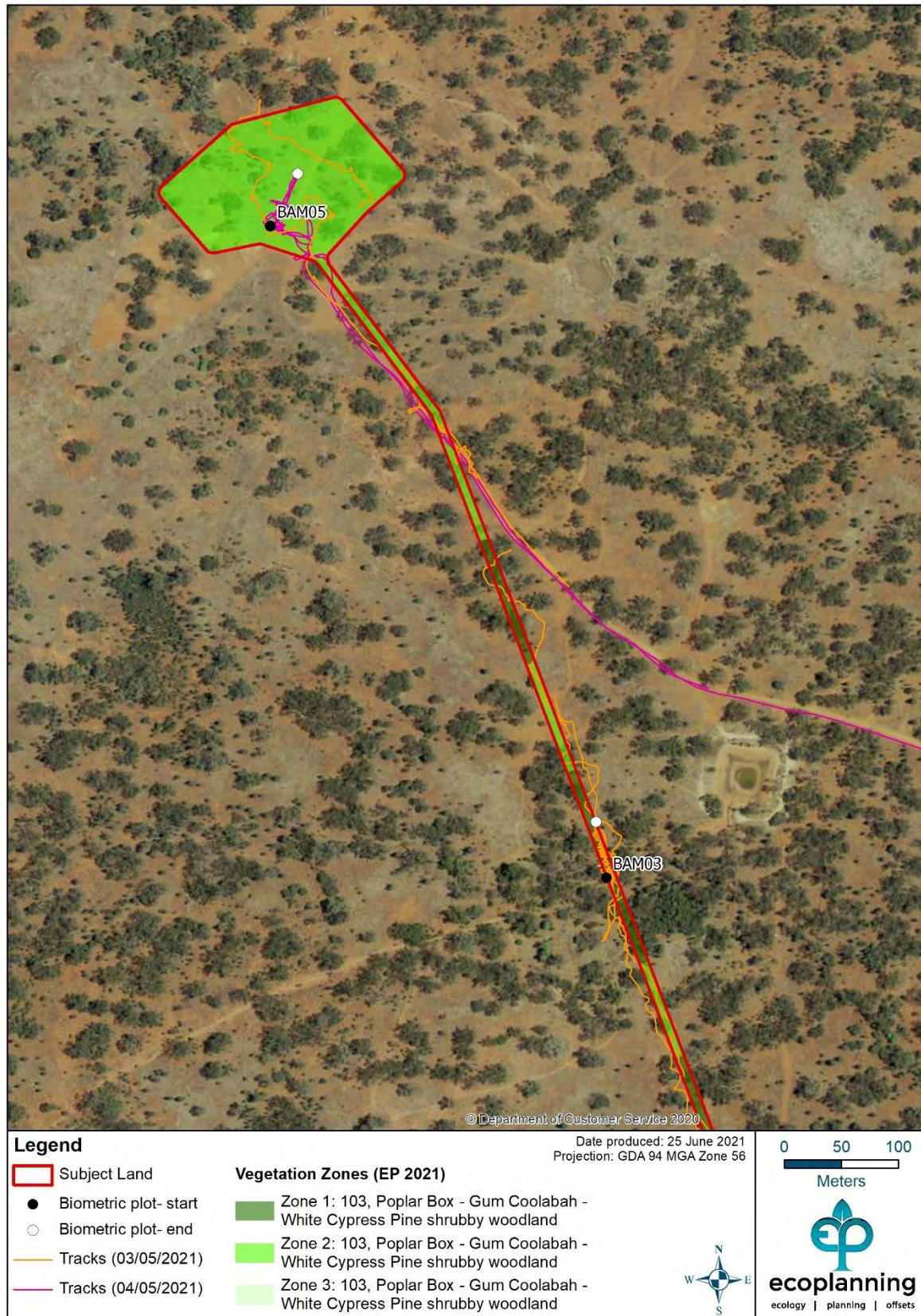


Figure 3.8: Vegetation zones and VI plot locations (northern).

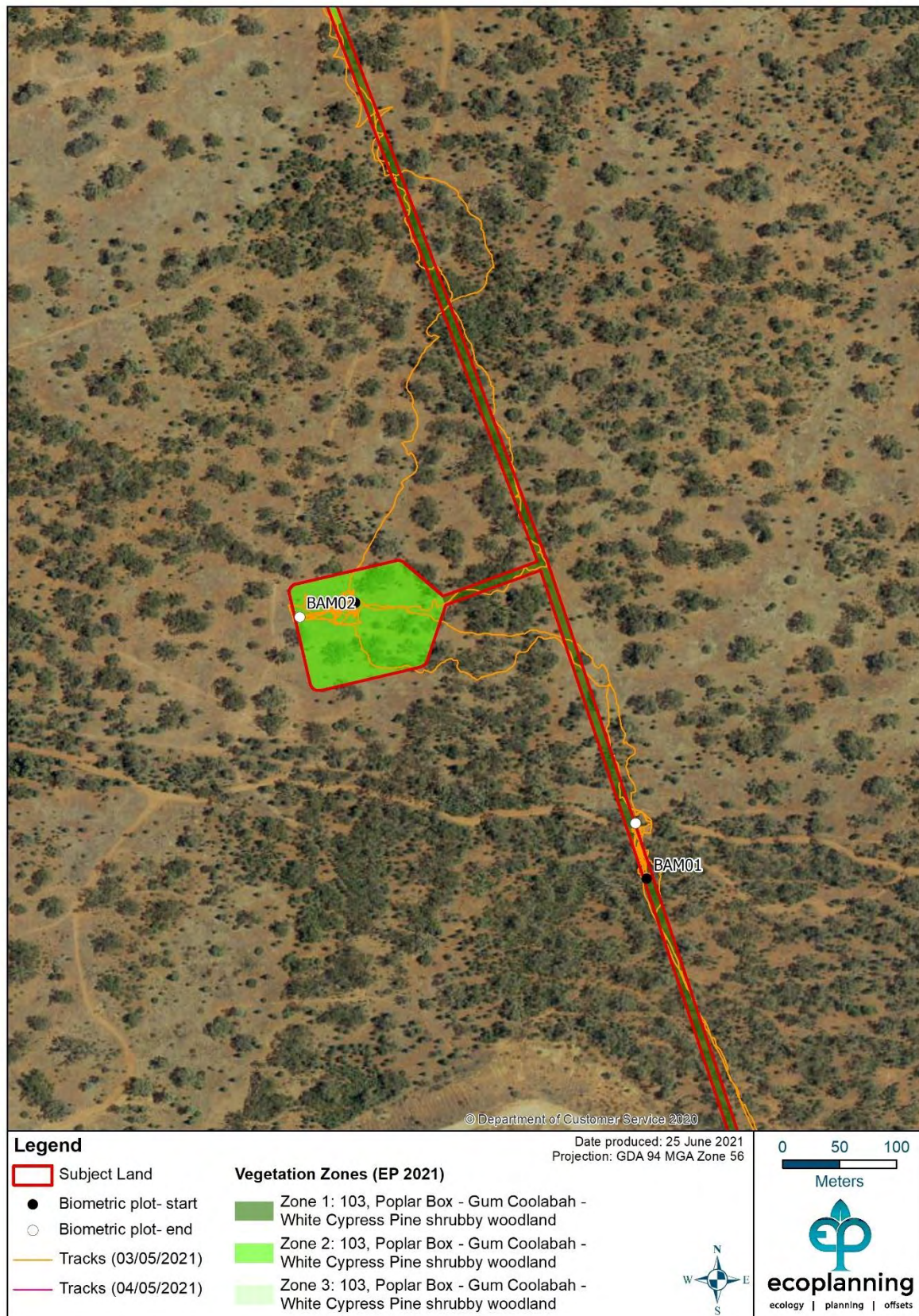


Figure 3.9: Vegetation zones and VI plots (middle).



Figure 3.10: Vegetation zones and VI plots (southern).

3.4 Hollow bearing trees

Section 4.3.4 of the BAM ‘*assess the presence of hollow bearing trees*’ 8 – 12 requires that the assessor identify all hollow bearing trees within the subject land and identify them on a map. The locations of hollow bearing trees is shown in **Figure 3.11**, some of which were within VI plots (see **Appendix A**). The number of HBTs within size ranges per vegetation zone is presented in **Table 3.6**.

Section 4.3.4 (11) of the BAM states that ‘*where hollow bearing trees are present within a vegetation zone, the assessor must include a hollow bearing tree in at least one plot for that zone*’. Two VI plots within vegetation zone 1 were each allocated one HBT (G-01 and G-03).

Table 3.6: Number of hollow bearing trees identified within the subject land organised by size and vegetation zone.

Vegetation Zone	Number of HBTs according to entrance diameter				Total HBTs
	<5 cm	5-15 cm	>15-25 cm	>25 cm	
1	0	8	2	0	10
2	0	0	0	0	0
3	0	0	0	0	0
Total	0	8	2	0	10

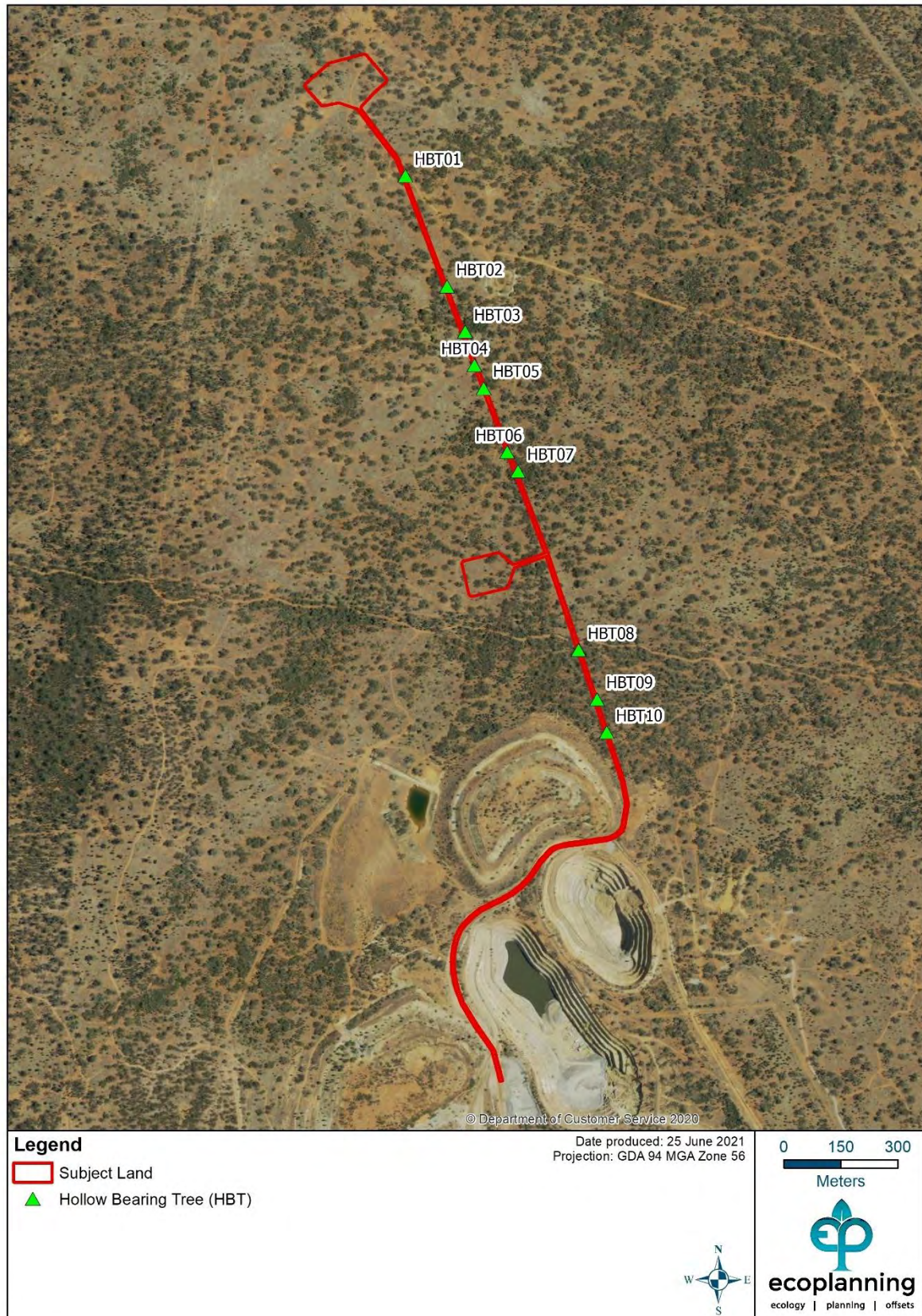


Figure 3.11: Hollow bearing trees within the subject land.

4 Threatened species

Section 5 of the BAM details the process for determining the habitat suitability for threatened species.

Under the BAM, threatened species are separated into two classes, 'ecosystem' and 'species' credit species. Those threatened species where the likelihood of occurrence of a species or elements of the species' habitat can be predicted by vegetation surrogates and landscape features, or which a targeted survey has a low probability of detection, are identified as 'ecosystem' credit species. Targeted surveys are not required for ecosystem species and potential impacts to these species are assessed in conjunction with impacts to PCTs.

Threatened species where the likelihood of occurrence of a species or elements of suitable habitat for the species cannot be confidently predicted by vegetation surrogates and landscape features and can be reliably detected by survey are identifiable as species credit species. A targeted survey or an expert report is required to confirm the presence or absence of these species on the subject land.

For some threatened species, they are identifiable as both ecosystem and species credit species, with different aspects of the habitat and life cycle representing different credit types. Commonly, threatened fauna species foraging habitat as an ecosystem credit, while their breeding habitat represents a species credit.

The following sections outline the process for determining the habitat suitability for threatened species within the subject land, and the results of the targeted surveys for candidate threatened species.

4.1.1 Threatened species for assessment

Threatened species that require assessment are initially identified based upon the following criteria:

- the distribution of the species including the IBRA subregion in which the subject land occurs (Conbelego Downs IBRA subregion),
- the species is associated with any of the PCTs identified within the subject land,
- the native vegetation cover within the assessment area including the 1,500 m assessment circle around the subject and is equal to or greater than the minimum required for the species,
- the patch size that each vegetation zone is part of is equal to or greater than the minimum required for that species,
- the species is identified as an ecosystem or species credit species in the Threatened Biodiversity Data Collection.

The process for identifying threatened species that meet the above criteria is completed through the BAM calculator. The PCT identified within the subject land, patch size, and native vegetation cover, as outlined in Section 3 of BAM, were entered into the BAM calculator and a preliminary list of ecosystem and species credit species was tabulated.

4.1.2 Geographic and habitat features

Selected ecosystem credit species and species credit species are predicted following assessment of geographic and habitat features in the credit calculator, such as site location (IBRA subregion), PCTs and their condition, patch size, and area of vegetation within the assessment circle. Some species require further assessment of habitat constraints and/or geographic limitations before being confirmed as an ecosystem credit species or candidate species for assessment.

4.1.3 Ecosystem credit species

Twenty-five (25) ecosystem credit species were predicted to occur within the subject land. Twenty-two have been retained based on habitat constraints. The ecosystem species retained for the subject land are listed in **Table 4.1**.

Table 4.1: Assessment of habitat constraints and geographic limitations of ecosystem credits species.

Scientific name / Common name	Habitat constraints	Geographic limitations	Maintained as an Ecosystem Credit Species	Status	
				BC Act	EPBC Act
<i>Antechinomys laniger</i> Kultarr	-	-	Yes	E	-
<i>Artamus cyanopterus</i> Dusky Woodswallow	-	-	Yes	V	-
<i>Calyptorhynchus lathami</i> Glossy Black- Cockatoo (foraging)	Presence of <i>Allocasuarina</i> and <i>Casuarina</i> species	-	No	V	-
<i>Certhionyx variegatus</i> Pied Honeyeater	-	-	Yes	V	-
<i>Chalinolobus picatus</i> Little Pied Bat	-	-	Yes	V	-
<i>Chthonicola sagittata</i> Speckled Warbler	-	East and south of Cobar	Yes	V	-
<i>Circus assimilis</i> Spotted Harrier	-	-	Yes	V	-
<i>Daphoenositta chrysoptera</i> Varied Sittella	-	-	Yes	V	-
<i>Falco hypoleucos</i> Grey Falcon	-	-	Yes	E	-
<i>Falco subniger</i>	-	-	Yes	V	-

Scientific name / Common name	Habitat constraints	Geographic limitations	Maintained as an Ecosystem Credit Species	Status	
				BC Act	EPBC Act
Black Falcon					
<i>Grantiella picta</i> Painted Honeyeater	Mistletoes present at a density of greater than five mistletoes per hectare	-	No	V	V
<i>Haliaeetus leucogaster</i> White-bellied Sea- Eagle (foraging)	Within 1 km of a river, lake, large dam or creek, wetlands and coastlines	-	No	V	-
<i>Hamirostra melanosternon</i> Black-breasted Buzzard (foraging)	-	-	Yes	V	E
<i>Hieraaetus morphnoides</i> Little Eagle (foraging)	-	-	Yes	V	-
<i>Lophochroa leadbeateri</i> Major Mitchell's Cockatoo (foraging)	-	-	Yes	V	-
<i>Melanodryas cucullata cucullata</i> Hooded Robin (south- eastern form)	-	-	Yes	V	-
<i>Melithreptus gularis gularis</i> Black-chinned Honeyeater (eastern subspecies)	-	-	Yes	V	-
<i>Ninox connivens</i> Barking Owl (foraging)	-	-	Yes	V	-
<i>Nyctophilus corbeni</i> Corben's Long-eared Bat	-	-	Yes	V	V
<i>Pachycephalainornate</i> Gilbert's Whistler	-	-	Yes	V	-



Scientific name / Common name	Habitat constraints	Geographic limitations	Maintained as an Ecosystem Credit Species	Status	
				BC Act	EPBC Act
<i>Phascolarctos cinereus</i> Koala	-	-	Yes	V	V
<i>Polytelis swainsonii</i> Superb Parrot	-	-	Yes	V	V
<i>Pomatostomus temporalis temporalis</i> Grey-crowned Babbler (eastern subspecies)	-	-	Yes	V	-
<i>Saccolaimus flaviventris</i> Yellow-bellied Sheath-tail-bat	-	-	Yes	V	-
<i>Stagonopleuraguttata</i> Diamond Firetail	-	-	Yes	V	-

4.1.4 Identify candidate species

In accordance with Section 5.2.2 and 5.2.3 of the BAM, a predicted candidate species can be considered unlikely to occur with the subject land (or specific vegetation zones) where habitat is substantially degraded such that the species is unlikely to use the area, or where an expert report identifies that the species is unlikely to be present within the subject land (or a vegetation zone within the subject land). A predicted candidate species credit species that is not considered to have suitable habitat on the subject land (or specific vegetation zones) in accordance with Section 5.2.2 of the BAM does not require further assessment on the subject land (or specific vegetation zones). The reasons for determining that a predicted species credit species is unlikely to have suitable habitat on the subject land (or specific vegetation zones) is provided in

Table 4.2.

Fifteen species credit species were predicted to occur on the subject land. Of the 15 species credit species predicted to occur, five have been retained (

Table 4.2).



Table 4.2: Assessment of habitat constraints and geographic limitations of candidate species credit species.

Scientific name / Common name	Habitat constraints	Geographic limitations	Maintained as a Candidate Species Credit
<i>Acacia curranii</i> Curly-bark Wattle	Rocky slopes and ridges, or within 100 m of break of slope	-	No – suitable habitat is not present on the subject land (Section 5.2.2. (2b) of the BAM). No rocky habitats were found within the subject land or within 100 m of the subject land (DPIE 2021c).
<i>Antaresia stimsoni</i> Stimson's Python	Areas within 500 m of rocks or gibber	-	No – suitable habitat is not present on the subject land (Section 5.2.2. (2b) of the BAM). No rocky habitat areas are found within the subject land or within 500 m of the subject land.
<i>Calyptorhynchus lathami</i> Glossy Black-Cockatoo (Breeding)	Living or dead tree with hollows greater than 15cm diameter and greater than 8m above ground	-	No – suitable breeding habitat is not present on the subject land (Section 5.2.2. (2b) of the BAM). Habitat surveys recorded all hollow bearing trees within the subject land. Hollows were recorded but none of a height >8m above the ground.
<i>Diuris tricolor</i> Pine Donkey Orchid		-	Yes
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle (Breeding)	Living or dead mature trees within suitable vegetation within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastline	-	No – The subject land is not within 1 km of any rivers, lakes, large dams or creeks, wetlands or coastlines (Section 5.2.2. (2b) of the BAM).
<i>Hamirostra melanosternon</i> Black-breasted Buzzard (Breeding)	Land within 40 m of riparian woodland on inland watercourses/ waterholes containing dead or dying eucalypts	-	No - The subject land is not within 40 m of any riparian woodland habitats (Section 5.2.2. (2b) of the BAM). Further, no stick nests were recorded on the subject land during habitat surveys.

Scientific name / Common name	Habitat constraints	Geographic limitations	Maintained as a Candidate Species Credit
<i>Hieraaetus morphnoides</i> Little Eagle (Breeding)	Nest trees – live (occasionally dead) large old trees within vegetation	-	No – The subject land does not contain any large old trees (Section 5.2.2. (2b) of the BAM). Further, no stick nests were recorded on the subject land during surveys
<i>Lophochroa leadbeateri</i> Major Mitchell's Cockatoo (Breeding)	Living or dead tree with hollows greater than 10 cm diameter	-	Yes
<i>Ninox connivens</i> Barking Owl (Breeding)	Living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground	-	No – suitable breeding habitat is not present on the subject land (Section 5.2.2. (2b) of the BAM). Habitat surveys recorded all hollow bearing trees within the subject land. Hollows were recorded but none of a height >4 m above the ground and entrance diameter >20 cm.
<i>Phascolarctos cinereus</i> Koala (Breeding)	Areas identified via survey as important habitat (see comments)	-	No – this species has not been recorded from the Cobar Peneplain, the nearest records to the site being along the Bogan River over 80 km north east of the subject land. While food trees including <i>Eucalyptus populnea</i> are the dominant canopy on the site, Koalas have not been recorded in the drier plains and flats of the Cobar Peneplain which are distant from and substantially different to the riparian areas where koalas are found further east (Section 5.2.3. (2a(i)) of the BAM).
<i>Polytelis swainsonii</i> Superb Parrot (Breeding)	Living or dead <i>E. blakelyi</i>, <i>E. melliodora</i>, <i>E. albens</i>, <i>E. camaldulensis</i>, <i>E. microcarpa</i>, <i>E.</i>	-	No – the subject land is outside the known breeding range of this species, as described in the Conservation Advice (TSSC 2016). The species has been

Scientific name / Common name	Habitat constraints	Geographic limitations	Maintained as a Candidate Species Credit
	<i>polyanthemos</i>, <i>E. mannifera</i>, <i>E. intertexta</i> with hollows greater than 5 cm diameter greater than 4 m above ground or trees with a DBH of greater than 30 cm		recorded within about 3 km and suitable hollow bearing trees are found within the subject land, but the records of Superb Parrot in the region relate to non-breeding dispersal of the species (Section 5.2.2. (2b) of the BAM).
<i>Pterostylis cobarensis</i> Greenhood Orchid		-	Yes
<i>Setirostris eleryi</i> Bristle-faced Free-tailed Bat	Land within 500 m of watercourses or dams surrounded by eucalypts containing hollows	-	No – suitable habitat is not present on subject land. While one small, shallow dam is found within 500 m of the subject land, this is not considered to represent suitable habitat. (Section 5.2.2. (2a(i)) of the BAM).
<i>Sida rohlenae</i> Shrub Sida		-	Yes

4.2 Determine presence or absence of candidate species credit species

Confirmed candidate species were assessed consistent with Section 5.2.3 of the BAM. Targeted surveys for species credit species detectable at the time of survey were undertaken in accordance with Section 5.3 of the BAM.

Species not identified as candidate species for further assessment do not require formal site survey, however, informal survey was opportunistically conducted whilst surveying for other threatened species.

4.2.1 Targeted field surveys - flora

Targeted surveys for candidate threatened flora species were not conducted within the subject land. Of the candidate species, only *Acacia curranii* (Curly-bark Wattle) was detectable at the time of survey. No suitable rocky habitats for this species are found within the subject land for this species. For all candidate threatened flora species for which suitable habitat was found within the subject land, these species have been 'assumed present' in accordance with Section 5.2.4 (2a) of the BAM. These species are *Diuris tricolor* (Pine Donkey Orchid),

Pterostylis cobarensis (Greenhood Orchid), and *Sida rohlenae* (Shrub Sida). The field survey did not occur during the survey period for these species (**Table 4.3**).

A species polygon has been prepared in accordance with section 5.2.5 of the BAM for *Diuris tricolor* (Pine Donkey Orchid), *Pterostylis cobarensis* (Greenhood Orchid), and *Sida rohlenae* (Shrub Sida) (**Figure 4.2**).

Table 4.3: Survey periods for confirmed candidate threatened flora species.

	Survey period (BAM Calculator)											
	Jan	Feb	Mar	Apr	May*	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Diuris tricolor</i> Pine Donkey Orchid									Y	Y		
<i>Pterostylis cobarensis</i> Greenhood Orchid										Y		
<i>Sida rohlenae</i> Shrub Sida	Y	Y							Y	Y	Y	Y

*month of survey

4.2.2 Targeted field surveys - fauna

Targeted surveys for candidate threatened fauna species were not conducted within the subject land. For all candidate threatened fauna species for which suitable habitat was found within the subject land, these species have been 'assumed present' in accordance with Section 5.2.4 (2a) of the BAM. Major Mitchell's Cockatoo was retained as a candidate threatened fauna species with suitable habitat. This species is a species credit species for breeding habitat only. Therefore, only impacts to breeding habitat represent a species credit. A total of 1.23 ha of habitat for the Major Mitchell's Cockatoo was identified within the subject land, as only the 'intact' vegetation zone of PCT 103 contained suitable habitat required for breeding (hollow bearing trees). The survey period for Major Mitchell's Cockatoo is provided in **Table 4.4**.

Considerable thought was given to the likely occurrence of Bush Stone-curlew on the subject land. The Bush Stone-curlew Recovery Plan (DEC 2006) notes the distribution of the species west of the Great Dividing Range to be:

- River Red and Black Box Gum Woodlands, and adjoining Bore country
- Conargo – Deniliquin – Barham – Wakool – Oaklands
- The RRG and Boree country along the Murrumbidgee River near Darlington Point
- TSRs and grass woodlands of the Warren – Gilgandra – Coonamble and Gulargambone – Baradine area
- Grassy woodlands of Moree, Mungindi and Cubberoo
- Bimble Box woodland and very open Coolibah woodland near Walgett and Collarenebri
- **Poplar Box-Wilga woodland and Baradine Gum - White Cypress woodland in the central west of NSW**
- Along the Bogan River and Narran River

- River flat area, Belah woodland and Belah-Rosewood-mallee vegetation around Buronga and Mildura
- Mixed Coolabah – Poplar Box – cypress vegetation (Lightning Ridge).

The two potential areas that may match the subject land are highlighted above. Both regions were derived from Shelly (2001). Shelly's (2001) study centred on the Coonamble-Walgett district, which does not overlap the subject land and is well to the east, therefore, reference to the "central west of NSW" does not apply to the subject land. However, within Shelly's report he notes the distribution of the species to include an area east of Coolabah (the region immediately adjacent to Girilambone to the NW towards Bourke) on the Bogan River in Black Box woodland, and that it favours riverine woodlands in inland Australia. The record on the Bogan River included "repeated sightings" in Black Box woodland, and the habitat was noted to be "grassy" following above average rainfall. Above average rainfall fell in the region from Dec 2020 to March 2021, inclusive.

Older records in the broader region include the Atlas of Living Australia and BioNet. A record of the species more than 50 km to the northwest of the subject land towards Bourke, was recorded near Byrock (the Byrock Aboriginal Site) in 2010 (Atlas of Living Australia [ALA]). No habitat information has been noted. Other records in the ALA much closer to the subject land include undated records from the South Australian Museum, an undated historical bird atlas record, and a record from 1976. While the accuracy of these records would be somewhat questionable, and none are recent, the records indicate a potential occurrence in low numbers. It is acknowledged that a low number of records could be an artefact of few surveys in the area that may detect the species.

The species occurs in Poplar Box – Cypress woodlands within NSW, which is a widespread, broad vegetation type. As it is possible that PCT 103 overlaps part of the species normal distribution, there is potential for the species normal distribution to overlap the subject land. Therefore the species has been retained as a candidate species.

Superb Parrot has been recorded from within approximately 3 km of the subject land, however, this species is a species credit species for breeding habitat only, and the subject land is outside the known breeding range of the species per the Conservation Advice (TSSC 2016). These records likely relate to non-breeding dispersal of Superb Parrots. As such, the Superb Parrot was assessed as 'vagrant' with respect to species credits in accordance with Section 5.2.2 (2c) of the BAM.

A species polygon has been prepared in accordance with section 5.2.5 of the BAM for Major Mitchell's Cockatoo (*Lophochroa leadbeateri*) (**Figure 4.3**) and Bush Stone-curlew (*Burhinus grallarius*). It is noted that the species polygon for Major Mitchell's Cockatoo likely exceeds the actual area of impact to Major Mitchell's Cockatoo breeding habitat, as the species polygon does not use buffers (e.g. 100 m, 50 m, etc.) from the hollow bearing trees which were recorded during targeted candidate species credit species surveys conducted outside the survey period for the Major Mitchell's Cockatoo (breeding). Rather, the entire area of the vegetation zone within which tree hollows were found was used to create the species polygon for Major Mitchell's Cockatoo. No advice is given within the Threatened Biodiversity Data Collection (TBDC) (DPIE 2021c) regarding species polygons for this species. Similarly, the species polygon for Bush Stone-curlew includes all potential habitat within the zone. Advice from experts in the species confirmed that the species polygon should include PCT 103 in "intact" and "disturbed" condition.

Habitat for the remainder of the candidate species credit threatened fauna species was not present within the subject land.

A list of all fauna species seen or heard during field survey was recorded and is provided in **Appendix B**.

Table 4.4: Survey periods for confirmed candidate threatened flora species.

Candidate species	Survey period (BAM Calculator)											
	Jan	Feb	Mar	Apr	May*	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Burhinus grallarius</i> Bush Stone-curlew												
<i>Lophochroa leadbeateri</i> Major Mitchell's Cockatoo									Y	Y	Y	Y

*month of survey



Figure 4.1: Survey effort including hollow bearing tree survey

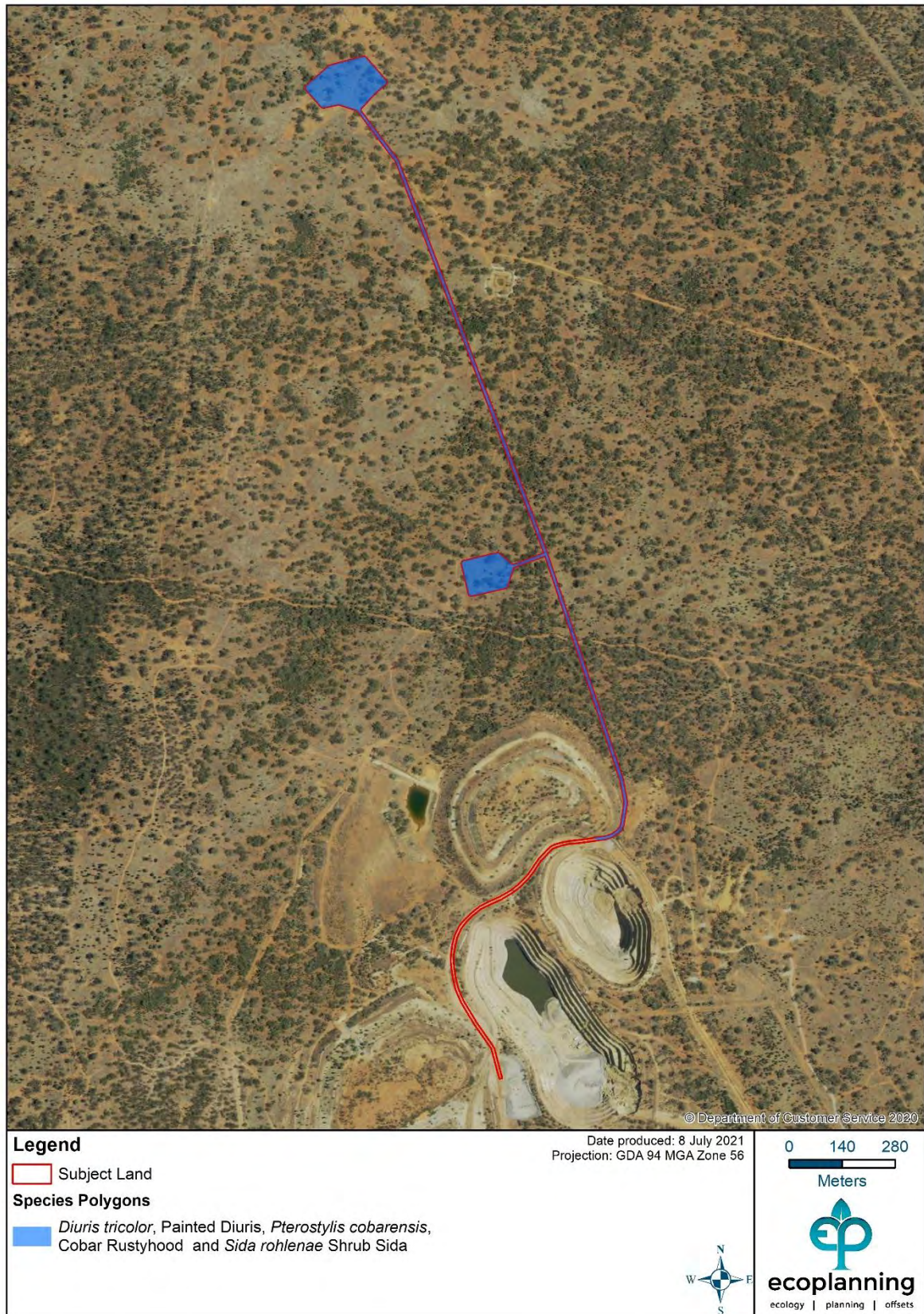


Figure 4.2: *Diuris tricolor*, *Pterostylis cobarensis*, and *Sida rohlenae* species polygons



Figure 4.3: Major Mitchell's Cockatoo species polygon

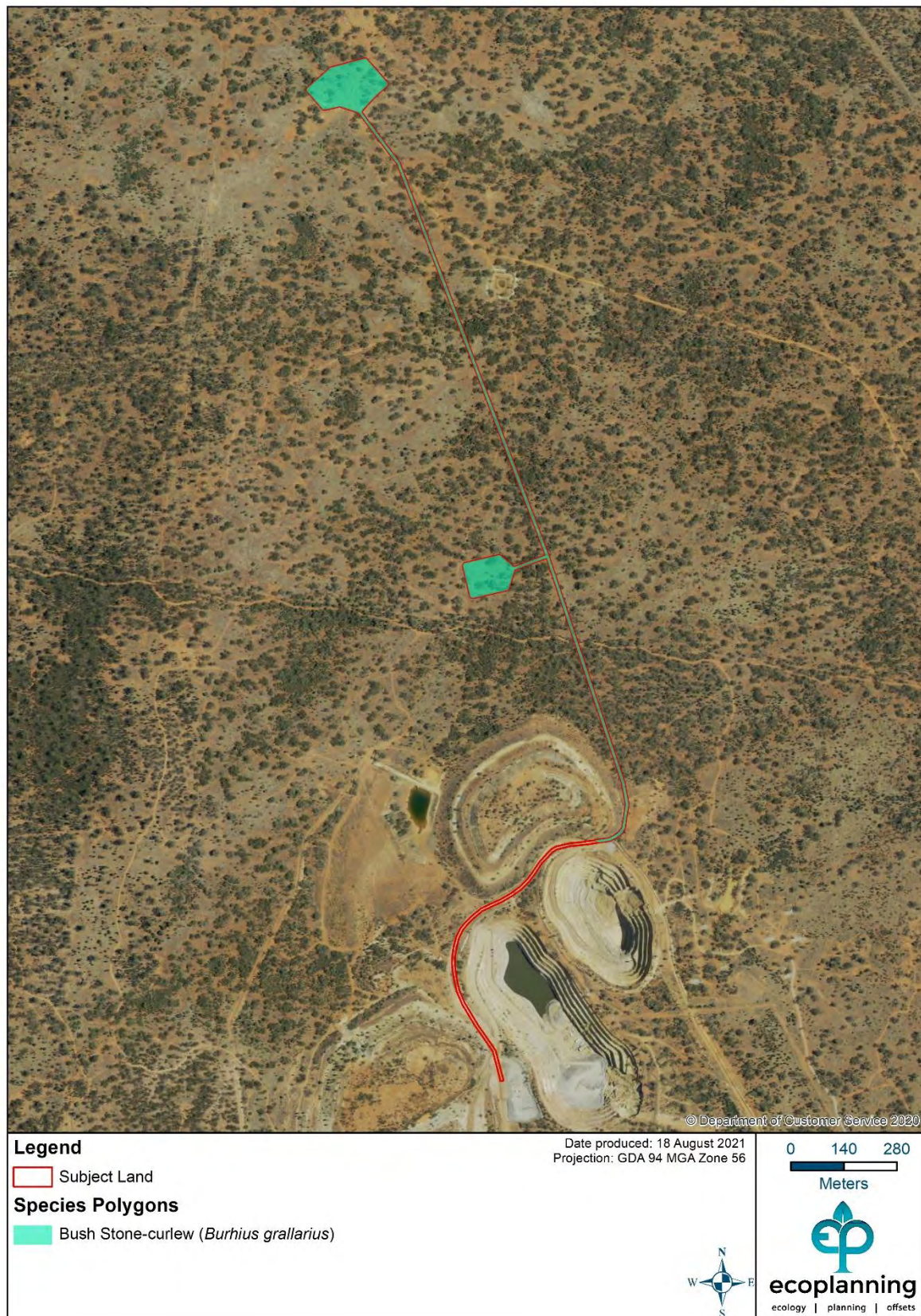


Figure 4.4: Bush Stone-curlew species polygon.

5 Identifying potential prescribed biodiversity impacts on threatened species

Prescribed biodiversity impacts are defined under Clause 6.1 of the BC Reg and Section 6 of the BAM 2020 and include impacts on biodiversity values in addition to, or instead of, impacts from clearing vegetation and/or loss of habitat. The presence of biodiversity values prescribed by the BC Reg 2017 and BAM 2020 have been considered in context of the subject land below (**Table 5.1**).

Table 5.1: Prescribed Biodiversity Impacts

Prescribed Biodiversity Impacts	Presence within the Subject Land
(a) the impacts of development on the following habitat of threatened species or ecological communities: (i) karst, caves, crevices, cliffs, rocks and other geological features of significance,	The subject land does not contain areas of cliffs, crevices, rocks and other geological areas of significance.
(ii) human-made structures,	The subject land does not contain human made structures and, therefore, does not have the potential to host threatened fauna species which use human made structures.
(iii) non-native vegetation,	The subject land does not contain significant areas of non-native vegetation and, therefore, does not have the potential to host threatened fauna species which may use non-native vegetation.
(b) the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range (impacts of development on movement of threatened species that maintains their lifecycle – BC reg),	The subject land is linear in shape and extends northward from an existing open cut mine into a large contiguous tract of woodland (see Figure 2.1). The development therefore has some potential to impact connectivity on a local scale. The primary barrier to connectivity introduced into the landscape will be the vehicle track extending from the existing mine to the two infrastructure areas. This vehicle track is approximately 8 m wide and, outside of the construction phase, vehicle movements per day or per week along this track are anticipated to be very few. As such, the potential that the development may result in a significant impact on the movement of threatened species, such as through the potential for vehicle strike on the newly created track, is negligible. The development is unlikely to restrict the movement of threatened species such that it impacts their lifecycle.

Prescribed Biodiversity Impacts	Presence within the Subject Land
(c) the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development),	One mapped first-order ephemeral drainage channel is present crossing the subject land. This drainage channel lacks a discernible bed and bank and, therefore, does not meet the definition of a watercourse under the WM Act. This watercourse, as mapped, already in a modified state due to alterations to its course and impoundment further downstream. Generally, the area traversed by the subject land has low variation in relief, and sheetwash from areas of higher elevation to lower elevation areas, including flooding of small depressions in the landscape, may occur during heavy rainfall events. The development may alter the water flows on a minor, localised scale as it is anticipated that the vehicle track could result in minor alterations in the localised reliever, however, in the absence of any major drainage channels or watercourses, this is not anticipated to significantly impact hydrological processes such that surrounding vegetation communities and/ or threatened species may be affected. The development has potential to impact water quality on a local scale during the construction phase through disturbance of soils. It is recommended that Construction Management Plans or similar management documents are prepared and implemented during the construction phase of the development to mitigate these impacts. No impacts on water quality are anticipated during the operational phase of the infrastructure and vehicle track.
(d) the impacts of wind turbine strike on threatened and protected animals,	Not applicable.
(e) the impacts of vehicle strike on threatened species or fauna that are part of a threatened ecological community.	The development will include construction of a vehicle track which is approximately 8 m wide. Outside of the construction phase, vehicle movements per day or per week along this track are anticipated to be very few and associated with occasional maintenance activities or carrying out periodic mine operations activities. As such, the potential that the development may result in a significant impact on the movement of threatened species, such as through the potential for vehicle strike on the newly created track, is negligible.

Prescribed Biodiversity Impacts	Presence within the Subject Land
	The development is unlikely to increase the risk of vehicle strike on threatened species such that it impacts the local population.

6 Avoiding and minimising impacts on biodiversity

6.1 Avoiding and minimising impacts on native vegetation and habitat during project planning

In accordance with Section 7 of the BAM, actions taken to avoid and minimise impacts through locating the project must be documented and justified in the BDAR. As outlined in Section 7.1.1 (3) of the BAM, impacts from clearing native vegetation and threatened species habitat can be avoided or minimised by locating the proposal in areas:

- lacking biodiversity values
- where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas that have a low VI score)
- that avoid habitat for species with a high biodiversity risk weighting or land mapped on the important habitat map, or native vegetation that is a TEC or highly cleared PCT
- outside of the buffer area around breeding habitat features such as nest trees or caves

Additionally, Section 7.1.1 (4) of the BAM states that in selecting a project location, the following should be addressed, as they apply to the project:

- alternative modes or technologies that would avoid or minimise prescribed impacts
- alternative routes that would avoid or minimise prescribed impacts,
- alternative locations that would avoid or minimise prescribed impacts,
- alternative sites within a property on which the proposal is located that would avoid or minimise prescribed impacts.

The proposal has been situated to avoid the most intact stands of vegetation on the site and threatened species, wherever possible. The following avoidance measures have been implemented.

Avoid

The proposal is for small areas of above ground infrastructure necessary to support underground mining operations, which requires far less vegetation clearing than would be needed for an open cut mine.

The proposed infrastructure areas, which are 1.11 ha and 1.97 ha (3.08 ha total), were positioned in areas of existing disturbance to minimise impacts to higher quality intact vegetation. All of the intact vegetation (1.23 ha) impacted by the development is within the 8 m wide vehicle track that links the existing open cut mine to the infrastructure locations and thus cannot be relocated in such a way that intact vegetation is avoided. No existing vehicle tracks which could be used as an alternative to the proposed vehicle tracks are found in the area surrounding the subject land.

The southern most extent of the vehicle track is located within areas of previous modification and disturbance related to operation of the open cut mine. Northward from the existing mine, the track follows an existing fence line which has previously been cleared either side and is more disturbed than the surrounding landscape.

Minimise

The proposed vehicle track is 8 m wide which is the minimum width possible while still remaining fit for purpose. The mine operates under environmental management plans which include rehabilitation after construction and minimising ongoing impacts of mine operation. Vehicle movements along the proposed access track are expected to be minimal and only as needed to support the ongoing operations of the mine, likely to be periodic maintenance of infrastructure and monitoring.

The location of the access track should be micro-sited, wherever possible, to minimise the removal of hollow bearing trees.

6.2 Avoiding and minimising prescribed biodiversity impacts during project planning

Section 7.2 of the BAM outlines avoidance and mitigation with respect to prescribed impacts. The nature of prescribed impacts mean they can be difficult to offset through the provision of biodiversity credits (e.g. impacts to caves, rocky outcrops and flyways) and cannot be readily replaced. Therefore, it is important that measures to avoid or minimise impacts to these features are prioritised.

Prescribed biodiversity impacts are defined under Clause 6.1 of the BC Reg and include impacts on biodiversity values in addition to, or instead of, impacts from clearing vegetation and/or loss of habitat. Prescribed biodiversity impacts are outlined within **Section 5** including their relevance to the proposal.

As outlined in **Section 5**, prescribed biodiversity impacts associated with the development are expected to be minimal. Potential impacts in relation to hydrology and water quality during the construction phase are to be managed as per the recommendations outlined in **Section 7.3**.

6.3 EPBC Act Assessment of Significance

A EPBC Act Protected Matters Report for the site and a 10 km buffer was generated on 22 June 2021 using the Protected Matters Search Tool (PMST). The PMST identified nine threatened ecological communities, twelve threatened species, and seven migratory species with potential to occur in the subject land or 10 km buffer. Vegetation assessments and habitat surveys of the site are sufficient to rule out the presence of the protected entities identified by the PMST search.

EPBC Act Significant Impact Guidelines (DotE 2013)

A referral is not recommended for matters of national environmental significance protected under the EPBC Act. No EPBC Act listed threatened ecological communities or threatened species are likely to be significantly impacted by the proposed action.

7 Assessing and offsetting impacts

7.1 Assessment of impacts

7.1.1 Assessing impacts to native vegetation and habitat

The proposed development will include direct impacts to 4.87 ha of PCT 103 - Poplar Box - Gum Coolabah - White Cypress Pine shrubby woodland mainly in the Cobar Penneplain Bioregion. The direct clearing and subsequent development of the subject land would represent a permanent impact, and in accordance with Section 8.1.1 of the BAM, the future VI score for all vegetation within the subject land has been assigned a VI score of zero (0).

7.1.2 Assessing indirect impacts on native vegetation

It is difficult to quantify the indirect impacts associated with the project. Indirect impacts may include, but are not limited to, noise pollution, dust, erosion and run-off associated with the construction phase of the proposed development. Further, within adjacent areas of habitat, the project is considered unlikely to cause any increase in trampling of flora, rubbish dumping, or other anthropogenic disturbance as the proposed development will lead to a minimal increase in human activity in the area of the vehicle track and proposed infrastructure. The introduction of pests, weeds, or pathogens above levels currently found in the locality is limited. Field assessments of vegetation found very low incidence of exotic flora species and the surrounding native vegetation is considered to have high resilience.

Indirect impacts will be managed through the development of appropriate environmental management plans, whereby sediment and erosion controls will be put in place according to best practices (Landcom 2004).

Further information regarding mitigation measures which would aim to avoid any indirect impacts are included in **Section 7.3**.

7.2 Assessing prescribed biodiversity impacts

As described in **Table 5.1**, and in accordance with Section 8.3 of the BAM, no prescribed biodiversity impacts are anticipated from the proposed development. Impacts to habitat associated with native vegetation are calculated and included in **Section 8**.

7.3 Mitigating and managing impacts on biodiversity values

The complete avoidance of impacts is unlikely, however, the location of the proposed development has sought to minimise impacts to native vegetation through minimising encroachment of the development into higher quality 'intact' areas where most of the significant habitat features (e.g. hollow bearing trees) are found. Other measures will be implemented to mitigate and manage direct and indirect impacts where possible, including the preparation of a Construction Environmental Management Plan (CEMP), and appropriate preclearance protocols. Details are provided in the following sections.

7.3.1 Pre-clearance protocols

Several non-threatened fauna species were recorded within the subject land (**Appendix B**). Appropriate pre-clearance protocols are to be put in place at the time of vegetation clearing to

mitigate and avoid potential harm or injury to these individuals. These protocols should include, as a minimum, soft-felling techniques and clearing supervision where habitat trees (where nests or other habitat features are identified) are to be removed.

Soft-felling techniques as part of vegetation clearing encourages fauna to relocate outside of the disturbance footprint prior to habitat clearing or alternatively provide an opportunity to move fauna during vegetation clearing works. Soft felling techniques should be adaptive depending on site species conditions but typically includes:

- marking of all habitat trees to be cleared,
- removal of ground-layer and mid-storey vegetation (under-scrubbing) around habitat trees,
- tapping/nudging of habitat trees by heavy machinery prior to the removal of habitat trees,
- 'slow drop' of habitat trees, involving the gentle lowering of habitat trees with hollow intact,
- inspection of lowered habitat trees and capture and release of any fauna species present. Injured wildlife are to be taken to an appropriately qualified wildlife carer or the nearest veterinary clinic.

7.3.2 Management plans

To avoid potential indirect offsite impacts during construction, an appropriate erosion and sedimentation control plan should be in place following best proactive protocols such as Landcom (2004). It is recommended that this is included in appropriate site-specific environmental management plans prior to any construction works commencing.

Appropriate management plans will be required to span the prior, during, and post construction periods, and will include the above pre-clearance and fauna management protocols.

7.4 Thresholds for the assessment and offsetting of impacts of development

7.4.1 Serious and Irreversible Impacts (SAIL)

Section 6.7 of the BC Reg defines Serious and Irreversible Impacts (SAIL) as impacts likely to contribute significantly to the risk of threatened species or ecological communities becoming extinct due to the following:

- it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to be in a rapid rate of decline, or*
- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred, or reasonable suspected to have a very small population size, or*
- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very small population size, or*
- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are replaceable.*



The guidance to assist a decision maker to determine a SAI (DPIE 2019a) was used to determine whether or not an impact on biodiversity values is likely to be a SAI. The guide lists in Appendix A criteria for identifying potential species and ecological communities that meet the SAI principles, listed above.

No threatened species or ecological communities defined as potential SAI entities have been identified within the subject land and none are predicted to occur within the subject land.

7.4.2 Impacts which require an offset

Section 9.2.1 of the BAM indicates that the following vegetation zones will require offsets:

- a) a vegetation zone with a VI score ≥ 15 *and* the PCT is representative of an EEC or CEEC,
- b) a vegetation zone with a VI score ≥ 17 *and* the PCT is associated with threatened species habitat (as represented by ecosystem credits) *or* represents a vulnerable ecological community,
- c) a vegetation zone with a VI score ≥ 20 *and* the PCT does not represent a TEC *and* is not associated with a threatened species habitat.

Vegetation zones Poplar Box - Gum Coolabah - White Cypress Pine shrubby woodland in the 'intact', 'disturbed', and 'modified' condition states require offsetting as these vegetation zones meet criteria b) above, namely:

- a vegetation zone with a VI score ≥ 17 and the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community.

The vegetation zones on the subject land have VI scores of 87.0/100 'intact' condition class, 29.0/100 'disturbed' condition class, 39.8/100 'modified' condition class and are not associated with a TEC.

7.4.3 Impacts that do not require further assessment

There are no other impacts that require offsetting.

8 Final credit calculations

A biodiversity offset requirement for residual impacts of a proposed development must be calculated in accordance with Section 10.1 and Section 10.2 of the BAM. The following section outlines the credit requirements for the development to achieve the 'no net loss standard' as established by the BAM.

8.1 Credit calculations and classes

8.1.1 Ecosystem credits

The ecosystem credits required to offset the proposal are provided in **Table 8.1** and **Appendix C**. A total of 94 ecosystem credits is required to offset the proposed development.

Table 8.1: Ecosystem credits summary and credit profiles.

Veg zone	Plant community type	Condition class	Credits required
1	PCT 103 Poplar Box - Gum Coolabah - White Cypress Pine shrubby woodland mainly in the Cobar Peneplain Bioregion	Intact	47
2		Disturbed	44
3		Modified	3
Total ecosystem credits required			94

8.1.2 Species credits

The species credits required to offset the proposal are provided in **Table 8.2** and **Appendix C**.

Table 8.2: Species credits summary

Species	Condition class	Credits required
<i>Diuris tricolor</i> Pine Donkey Orchid	Intact	40
	Disturbed	38
	Modified	2
Subtotal species credits required		80
<i>Pterostylis cobarensis</i> Greenhood Orchid	Intact	54
	Disturbed	50
	Modified	3
Subtotal species credits required		107
<i>Sida rohlenae</i> Shrub Sida	Intact	54
	Disturbed	50
	Modified	3
Subtotal species credits required		107

Species	Condition class	Credits required
<i>Lophochroa leadbeateri</i> Major Mitchell's Cockatoo (Breeding)	Intact	54
Subtotal species credits required		54
<i>Burhinus grallarius</i> Bush Stone-curlew	Intact	54
	Disturbed	50
Subtotal species credits required		104

8.2 Securing biodiversity credits

The measures proposed to address the offset obligation outlined above will be determined as the project approval progresses, noting that the credit requirements will need to be met prior to commencement of the project. All credit requirements are to be met using like-for-like biodiversity credits under Section 6.3 of the BC Reg. or payment of an amount into the Biodiversity Conservation Fund to satisfy the requirement to retire biodiversity credits as defined under Section 6.6 of the BC Reg.

8.2.1 Credit costs

The total cost of credits, should the Biodiversity Conservation Trust (BCT) be used to offset the impacts, are calculated (as at 24 August 2021) to be \$423,528.47 (ex. GST). Details are provided in **Table 8.3**. Note that this includes a management fee that the BCT include in the final credit price.

Credit costs calculated are subject to change with the BOPC updated every 3 months.

Table 8.3: Credit requirements and estimated costs

Plant Community Type	Price per credit	No. of credits	Final credit price (ex GST)#
Ecosystem credits			
PCT 103 Poplar Box - Gum Coolabah - White Cypress Pine shrubby woodland mainly in the Cobar Penepplain Bioregion	\$2,782.19	94	\$261,526.02
Species credits			
<i>Diuris tricolor</i> Pine Donkey Orchid	\$158.64	80	\$21,717.01
<i>Pterostylis cobarensis</i> Greenhood Orchid	\$173.02	107	\$30,903.51
<i>Sida rohlenae</i> Shrub Sida	\$147.57	107	\$27,616.94
<i>Lophochroa leadbeateri</i> Major Mitchell's Cockatoo (Breeding)	\$463.67	54	\$34,538.58
<i>Burhinus grallarius</i> Bush Stone-curlew	\$309.97	104	\$47,226.69
Total (ex GST)			\$423,528.47

calculated 24 August 2021.

9 Conclusions and summary of the BDAR

This BDAR has been prepared in accordance with the BAM to assess the impacts to biodiversity values, including threatened species communities and their habitats, associated with the proposed modification to a development application for construction of mine infrastructure and access tracks at MLA564 (Lot 10, 138, and 144 // DP 751315 and Lot 147 // DP 824129), Girilambone, NSW.

This BDAR has identified the landscape context of the subject land and a 1,500 m buffer around the subject land, in accordance with the BAM. The native vegetation within the subject land has been assessed including identification of the PCTs present across the subject land. Further, the vegetation condition has been mapped (vegetation zones) and vegetation integrity scores have been assigned for each of the vegetation zones. No TECs have been identified on the subject land. The calculated vegetation integrity scores are above the threshold for a vegetation community associated with threatened species habitat (i.e. >17/100) and thus the offset rules apply.

In accordance with the BAM, impacts to threatened flora and fauna species, including their habitats, have been considered and assessed. Candidate species predicted to occur were assessed in accordance with the BAM.

The proposal will completely remove 4.87 ha of native vegetation from the subject land. Measures to avoid and minimise impacts to biodiversity have been outlined in consideration of habitat features on the subject land. Additional measures to minimise impacts to biodiversity which are to be incorporated into the project have been provided. A CEMP should be prepared to manage any direct and indirect impacts during the vegetation clearing and subsequent development works.

The biodiversity offset requirement for residual impacts of the proposed development have been calculated and presented in accordance with Section 10 of the BAM. The Credit Payment Report generated from the BAM Calculator is included in this report. A total of 94 ecosystem credits and 452 species credits are required at a total estimated cost of **\$423,528.47** (ex GST).

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Appendix A Plot data

Plot No.	PCT	Area (ha)	Condition class	Zone	Easting	Northing	Bearing
BAM-G-01	103	1.23	Intact	55	485395	6546958	190°
BAM-G-02	103	3.48	Disturbed	55	485141	6547183	242°
BAM-G-03	103	1.23	Intact	55	485060	6547865	340°
BAM-G-04	103	0.16	Modified	55	485513	6546615	170°
BAM-G-05	103	3.48	Disturbed	55	484765	6548437	10°

Plot No.	Composition					
	Tree	Shrub	Grass	Forb	Fern	Other
BAM-G-01	2	13	15	16	1	3
BAM-G-02	2	7	14	10	1	1
BAM-G-03	2	12	15	18	1	2
BAM-G-04	1	11	8	9	0	1
BAM-G-05	0	7	12	9	1	0

Plot No.	Structure					
	Tree	Shrub	Grass	Forb	Fern	Other
BAM-G-01	10.5	4.1	32.1	12.4	0.1	0.4
BAM-G-02	2.1	2.0	3.7	21.0	0.2	0.1
BAM-G-03	12.0	13.0	38.3	10.8	0.1	0.7
BAM-G-04	1.0	14.3	6.0	15.7	0.0	0.1
BAM-G-05	0.0	4.7	6.7	25.8	0.1	0.0

Plot No.	Function				
	Large trees (>30cm DBH)	Hollow trees	Litter cover (%)	Fallen logs (m)	Tree stem 5-10 cm
BAM-G-01	4	1	29.4	15	1
BAM-G-02	0	0	2.4	4	0
BAM-G-03	2	1	17.2	4	0
BAM-G-04	0	0	1.8	2	1
BAM-G-05	0	0	10.0	2	0

Plot No.	Function			
	Tree stem 10-20 cm	Tree stem 20-30 cm	Tree regen	High threat exotic
BAM-G-01	1	0	Present	0
BAM-G-02	0	0	Present	0
BAM-G-03	1	0	Present	0
BAM-G-04	1	0	Absent	0
BAM-G-05	1	0	Absent	0

Plot Data – Flora and opportunistic records

Family	Species	Common Name	Plots					Opportunistic	Native/ Exotic/HTE
			G-01	G-02	G-03	G-04	G-05		
Acanthaceae	<i>Brunoniella australis</i>	Blue Trumpet	x		x				Native
	<i>Rostellularia adscendens</i> var. <i>pogonantha</i>				x				Native
Amaranthaceae	<i>Alternanthera denticulata</i>				x			x	Native
	<i>Ptilotus polystachyus</i>	Long Tails	x					x	Native
	<i>Ptilotus modestus</i>			x				x	Native
	<i>Ptilotus sessilifolius</i>	Silver-tails	x	x	x	x		x	Native
Anthericaceae	<i>Arthropodium</i> spp.				x				Native
Apocynaceae	<i>Marsdenia australis</i>	Doubah						x	Native
	<i>Parsonsia eucalyptophylla</i>	Gargaloo						x	Native
Asphodelaceae	<i>Tricoryne elatior</i>	Yellow Autumn-lily	x						Native
Asteraceae	<i>Calotis cuneifolia</i>	Purple Burr-daisy	x		x	x	x	x	Native
	<i>Calotis lappulacea</i>	Yellow Burr-daisy	x	x	x	x		x	Native
	<i>Carthamus lanatus</i>	Saffron Thistle				x		x	Exotic
	<i>Centaurea melitensis</i>	Maltese Cockspur				x			Exotic
	<i>Centipeda minima</i>	Spreading Sneezeweed						x	Native
	<i>Chrysocephalum apiculatum</i>	Common Everlasting		x				x	Native
	<i>Conyza</i> sp.	Fleabane						x	Exotic
	<i>Coronidium scorpioides</i>							x	Native
	<i>Sigesbeckia orientalis</i>	Indian Weed						x	Native
	<i>Tagetes minuta</i>	Stinking Roger						x	Exotic

Family	Species	Common Name	Plots					Opportunistic	Native/ Exotic/HTE
			G-01	G-02	G-03	G-04	G-05		
	<i>Vittadinia cuneata</i> var. <i>cuneata</i>	Fuzzweed	x		x	x		x	Native
	<i>Vittadinia pustulata</i>		x					x	Native
	<i>Xerochrysum viscosum</i>	Sticky Everlasting	x						Native
Brassicaceae	<i>Cuphonotus andraeanus</i>			x					Native
Capparaceae	<i>Apophyllum anomalum</i>	Warrior Bush						x	Native
	<i>Capparis mitchelli</i>	Wild Orange	x					x	Native
Chenopodiaceae	<i>Atriplex stipitata</i>						x	x	Native
	<i>Chenopodium desertorum</i>		x						Native
	<i>Dysphania cristata</i>	Crested Crumbweed					x	x	Native
	<i>Dysphania melanocarpa</i>	Black Crumbweed			x				Native
	<i>Dysphania pumilio</i>	Small Crumbweed			x				Native
	<i>Einadia hastata</i>	Berry Saltbush			x				Native
	<i>Einadia nutans</i>	Climbing Saltbush			x				Native
	<i>Enchylaena tomentosa</i>	Ruby Saltbush	x					x	Native
	<i>Maireana enchylaenoides</i>	Wingless Bluebush	x						Native
	<i>Maireana villosa</i>	Silky Bluebush						x	Native
	<i>Salsola australis</i>				x	x		x	Native
	<i>Sclerolaena birchii</i>	Galvanised Burr	x		x	x	x	x	Native
	<i>Sclerolaena convexula</i>	Tall Cooper Burr	x	x	x	x	x	x	Native
	<i>Sclerolaena diacantha</i>	Gray Copper Burr	x		x	x	x		Native
Convolvulaceae	<i>Convolvulus erubescens</i>	Blushing Bindweed	x	x	x	x		x	Native
	<i>Dichondra repens</i>				x				Native

Family	Species	Common Name	Plots					Opportunistic	Native/ Exotic/HTE
			G-01	G-02	G-03	G-04	G-05		
Cupressaceae	<i>Callitris glaucophylla</i>	White Cypress Pine	x	x	x			x	Native
Cyperaceae	<i>Fimbristylis dichotoma</i>	Common Fringe-sedge		x			x		Native
	<i>Isolepis</i> sp.							x	Native
Euphorbiaceae	<i>Euphorbia drummondii</i>	Caustic Weed	x	x	x	x	x	x	Native
Fabaceae (Caesalpinioideae)	<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>					x		x	Native
Fabaceae (Faboideae)	<i>Glycine canescens</i>	Silky Glycine						x	Native
	<i>Glycine tabacina</i>	Variable Glycine	x						Native
	<i>Grona varians</i>			x				x	Native
	<i>Medicago polymorpha</i>					x	x		Exotic
	<i>Medicago</i> sp.			x					Exotic
Fabaceae (Mimosoideae)	<i>Acacia excelsa</i> subsp. <i>angusta</i>	Ironwood						x	Native
	<i>Acacia deanei</i> subsp. <i>paucijuga</i>	Dean's Wattle						x	Native
Geraniaceae	<i>Erodium crinitum</i>			x		x	x	x	Native
Goodeniaceae	<i>Goodenia cycloptera</i>		x	x	x			x	Native
Juncaceae	<i>Juncus</i> sp.							x	Native
Malvaceae	<i>Abutilon cryptopetalum</i>		x	x				x	Native
	<i>Abutilon otocarpum</i>	Desert Lantern	x	x		x	x	x	Native
	<i>Abutilon oxycarpum</i>	Straggly Lantern-bush	x		x			x	Native
	<i>Abutilon</i> sp.		x			x			Native
	<i>Sida corrugata</i>			x	x	x	x	x	Native
	<i>Sida cunninghamii</i>		x	x	x	x	x	x	Native
	<i>Sida everistiana</i>				x	x			Native

Family	Species	Common Name	Plots					Opportunistic	Native/ Exotic/HTE
			G-01	G-02	G-03	G-04	G-05		
	<i>Sida</i> sp.						x		Native
Marsileaceae	<i>Marsilea costulifera</i>							x	Native
Myrtaceae	<i>Eucalyptus intertexta</i>	Gum Coolabah	x	x				x	Native
	<i>Eucalyptus populnea</i> subsp. <i>bimbil</i>	Poplar Box	x	x	x	x		x	Native
	<i>Eucalyptus viridis</i>	Green Mallee						x	Native (P)
Nyctaginaceae	<i>Boerhavia dominii</i>	Tarvine			x	x	x	x	Native
Oxalidaceae	<i>Oxalis perennans</i>		x	x	x			x	Native
Poaceae	<i>Aristida behriana</i>			x					Native
	<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>			x	x	x	x	x	Native
	<i>Austrostipa nitida</i>			x		x	x		Native
	<i>Austrostipa scabra</i> subsp. <i>scabra</i>		x	x	x			x	Native
	<i>Cenchrus ciliaris</i>	Buffel Grass						x	HTE
	<i>Chloris truncata</i>	Windmill Grass	x			x		x	Native
	<i>Digitaria brownii</i>	Cotton Panic Grass	x	x	x		x	x	Native
	<i>Digitaria coenicola</i>	Finger Panic Grass						x	Native
	<i>Digitaria hubbardii</i>			x	x				Native
	<i>Digitaria</i> sp.	Umbrella Grass	x				x		Native
	<i>Enneapogon nigricans</i>		x		x		x	x	Native
	<i>Enteropogon acicularis</i>		x		x			x	Native
	<i>Eragrostis cilianensis</i>	Stinkgrass						x	Exotic
	<i>Eragrostis lacunaria</i>	Purple Lovegrass	x	x	x	x	x	x	Native
	<i>Eragrostis parviflora</i>		x	x	x		x	x	Native

Family	Species	Common Name	Plots					Opportunistic	Native/ Exotic/HTE
			G-01	G-02	G-03	G-04	G-05		
	<i>Lachnagrostis filiformis</i>							x	Native
	<i>Panicum effusum</i>	Hairy Panic	x	x	x	x	x	x	Native
	<i>Panicum queenslandicum</i>							x	Native
	<i>Paspalidium constrictum</i>		x		x	x		x	Native
	<i>Rytidosperma</i> sp.		x	x	x	x	x	x	Native
	<i>Thyridolepis mitchelliana</i>	Mulga Mitchell Grass	x	x	x	x			Native
	<i>Tragus australianus</i>	Small Burr-grass	x	x	x	x	x	x	Native
	<i>Tripogon loliiformis</i>	Five Minute Grass		x	x		x	x	Native
Polygonaceae	<i>Persicaria</i> sp.	Knotweed						x	Native
	<i>Rumex brownii</i>	Swamp Dock						x	Native
Portulacaceae	<i>Portulaca oleracea</i>	Pigweed	x	x	x	x	x	x	Native
Pteridaceae	<i>Cheilanthes sieberi</i>	Rock Fern	x	x	x		x	x	Native
Rutaceae	<i>Geijera parviflora</i>	Wilga	x	x	x			x	Native
Sapindaceae	<i>Alectryon oleifolius</i> subsp. <i>canescens</i>	Western Rosewood						x	Native
	<i>Dodonaea viscosa</i> subsp. <i>angustissima</i>	Narrow-leaved Hopbush		x					Native
Scrophulariaceae	<i>Eremophila longifolia</i>	Berrigan						x	Native
	<i>Eremophila mitchellii</i>	Budda	x	x	x			x	Native
Solanaceae	<i>Lycium ferocissimum</i>	African Boxthorn						x	HTE
	<i>Solanum ellipticum</i>	Potato Bush	x		x	x			Native
	<i>Solanum esuriale</i>	Quena				x	x	x	Native
	<i>Solanum ferocissimum</i>	Spiny Potato Bush	x					x	Native
	<i>Solanum nigrum</i>	Blackberry Nightshade	x					x	Exotic

Family	Species	Common Name	Plots					Opportunistic	Native/ Exotic/HTE
			G-01	G-02	G-03	G-04	G-05		
Sterculiaceae	<i>Brachychiton populneus</i> subsp. <i>populneus</i>	Kurrajong						x	Native
Thymelaeaceae	<i>Pimelea microcephala</i> subsp. <i>microcephala</i>							x	Native

Key: P – planted – regeneration works; HTE – high threat exotic species

Appendix B Fauna

Class	Family	Scientific name	Common name	Native/Exotic	Observation Type
Aves	Acanthizidae	<i>Acanthiza apicalis</i>	Inland Thornbill	Native	O
	Accipitridae	<i>Aquila audax</i>	Wedgetail Eagle	Native	O
	Artamidae	<i>Cracticus torquatus</i>	Grey Butcher Bird	Native	W
	Campephagidae	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo Shrike	Native	O
	Corvidae	<i>Corvus coronoides</i>	Australian Raven	Native	O
	Hirundinidae	<i>Hirundo neoxena</i>	Welcome Swallow	Native	O
	Meliphagidae	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	Native	O
	Pachycephalidae	<i>Colluricincla harmonica</i>	Grey Shrike Thrush	Native	O
	Pardalotidae	<i>Pardalotus punctatus</i>	Spotted Pardalote	Native	W
	Phasianidae	<i>Coturnix ypsilophora</i>	Brown Quail	Native	O
	Psittaculidae	<i>Psephotus haematonotus</i>	Red-rumped Parrot	Native	O
	Pterocidae	<i>Microeca fascinans</i>	Jacky Winter	Native	O
	Rhipiduridae	<i>Rhipidura albiscapa</i>	Grey Fantail	Native	O
	Rhipiduridae	<i>Rhipidura leucophrys</i>	Willie Wagtail	Native	O
Mammalia	Muridae	<i>Mus musculus</i>	House Mouse	Exotic	O
Reptilia	Gekkonidae	<i>Gehyra variegata</i>	Variegated Dterra	Native	O

Class	Family	Scientific name	Common name	Native/Exotic	Observation Type
	Gekkonidae	<i>Heteronotia binoei</i>	Bynoe's Gecko	Native	O

O = observed, W = heard

Appendix C Biodiversity credit reports



BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00026114/BAAS17024/21/00026115	Girilambone MLA 564	10/06/2021
Assessor Name	Report Created	BAM Data version *
Bruce Mullins	24/08/2021	45
Assessor Number	BAM Case Status	Date Finalised
BAAS17024	Open	To be finalised
Assessment Revision	Assessment Type	BOS entry trigger
0	Part 4 Developments (General)	BOS Threshold: Area clearing threshold

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	BC Act Listing status	EPBC Act listing status	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAIL	Ecosystem credits
Poplar Box - Gum Coolabah - White Cypress Pine shrubby woodland mainly in the Cobar Peneplain Bioregion											
1	103_intact	Not a TEC	87	87.0	1.2			High Sensitivity to Potential Gain	1.75		47
2	103_disturbed	Not a TEC	29	29.0	3.5			High Sensitivity to Potential Gain	1.75		44

Assessment Id
00026114/BAAS17024/21/00026115

Proposal Name
Girilambone MLA 564

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ecoplanning

ecology | planning | offsets



BAM Credit Summary Report

3	103_modified	Not a TEC	39.8	39.8	0.16		High Sensitivity to Potential Gain	1.75	3
								Subtotal	94
								Total	94

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAIL	Species credits
Burhinus grallarius / Bush Stone-curlew (Fauna)								
103_intact	87.0	87.0	1.2	Endangered	Not Listed	2	False	54
103_disturbed	29.0	29.0	3.5	Endangered	Not Listed	2	False	50
							Subtotal	104
Diuris tricolor / Pine Donkey Orchid (Flora)								
103_intact	87.0	87.0	1.2	Vulnerable	Not Listed	1.5	False	40
103_disturbed	29.0	29.0	3.5	Vulnerable	Not Listed	1.5	False	38
103_modified	39.8	39.8	0.16	Vulnerable	Not Listed	1.5	False	2
							Subtotal	80
Lophochroa leadbeateri / Major Mitchell's Cockatoo (Fauna)								
103_intact	87.0	87.0	1.2	Vulnerable	Not Listed	2	False	54
							Subtotal	54
Pterostylis cobarensis / Greenhood Orchid (Flora)								
103_intact	87.0	87.0	1.2	Vulnerable	Not Listed	2	False	54
103_disturbed	29.0	29.0	3.5	Vulnerable	Not Listed	2	False	50
103_modified	39.8	39.8	0.16	Vulnerable	Not Listed	2	False	3



BAM Credit Summary Report

							Subtotal	107
<i>Sida rohlenae / Shrub Sida (Flora)</i>								
103_intact	87.0	87.0	1.2	Endangered	Not Listed	2	False	54
103_disturbed	29.0	29.0	3.5	Endangered	Not Listed	2	False	50
103_modified	39.8	39.8	0.16	Endangered	Not Listed	2	False	3
							Subtotal	107





Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00026114/BAAS17024/21/00026115		0	24/08/2021
Assessor Name	Assessor Number	Proposal Name	BAM Case Status
Bruce Mullins	BAAS17024	Girilambone MLA 564	Open
Assessment Type	Date Finalised	BOS entry trigger	
Part 4 Developments (General)	To be finalised	BOS Threshold: Area clearing threshold	

PCT list

Price calculated	PCT common name	Credits
Yes	103 - Poplar Box - Gum Coolabah - White Cypress Pine shrubby woodland mainly in the Cobar Penneplain Bioregion	94

Species list

Price calculated	Species	Credits
Yes	<i>Burhinus grallarius</i> (Bush Stone-curlew)	104
Yes	<i>Lophochroa leadbeateri</i> (Major Mitchell's Cockatoo)	54
Yes	<i>Diuris tricolor</i> (Pine Donkey Orchid)	80
Yes	<i>Pterostylis cobarensis</i> (Greenhood Orchid)	107
Yes	<i>Sida rohlenae</i> (Shrub Sida)	107

Assessment Id	Proposal Name	Page 1 of 3
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Biodiversity payment summary report

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

IBRA sub region	PCT common name	Threat status	Offset trading group	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Canbelego Downs	103 - Poplar Box - Gum Coolabah - White Cypress Pine shrubby woodland mainly in the Cobar Penneplain Bioregion	No	Western Penneplain Woodlands > =50% and <70%	18.87%	\$90.57	2.1967	\$2,782.19	94	\$261,526.02

Subtotal (excl. GST) **\$261,526.02**

GST **\$26,152.60**

Total ecosystem credits (incl. GST) \$287,678.62

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price
10113	Burhinus grallarius (Bush Stone-curlew)	Endangered	\$309.97	20.6900%	\$80.00	104	\$47,226.69
10116	Lophochroa leadbeateri (Major Mitchell's Cockatoo)	Vulnerable	\$463.67	20.6900%	\$80.00	54	\$34,538.58

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Biodiversity payment summary report

10243	<i>Diuris tricolor</i> (Pine Donkey Orchid)	Vulnerable	\$158.64	20.6900%	\$80.00	80	\$21,717.01
10698	<i>Pterostylis cobarensis</i> (Greenhood Orchid)	Vulnerable	\$173.02	20.6900%	\$80.00	107	\$30,903.51
10756	<i>Sida rohlenae</i> (Shrub Sida)	Endangered	\$147.57	20.6900%	\$80.00	107	\$27,616.94
Subtotal (excl. GST)							\$162,002.73
GST							\$16,200.27
Total species credits (incl. GST)							\$178,203.00
Grand total							\$465,881.62

