



Perilya Broken Hill Limited

ABN: 46 099 761 289

Broken Hill North Mine

Ecological Assessment

Prepared by

**OzArk Environmental & Heritage Management
Pty Ltd**

January 2017

**Specialist Consultant Studies Compendium
Part 6**

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ABN: 46 099 761 289

Broken Hill North Mine

Ecological Assessment

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January 2017



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Perilya Broken Hill Limited
BROKEN HILL NORTH MINE
Ecological Assessment
Broken Hill LGA, NSW

January 2017

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EXECUTIVE SUMMARY

Perilya Broken Hill Limited (the proponent) propose to undertake exploration activities at the Broken Hill North Mine. The proposal is located on the eastern outskirts of Broken Hill within the Broken Hill Local Government Area. OzArk Environmental & Heritage Management Pty Ltd (OzArk) was commissioned by RW Corkery & Co Pty Ltd (the client) on behalf of the proponent to complete an ecological assessment under Part 4.1 (State Significant Development) of the NSW *Environmental Planning and Assessment Act 1979* for the proposal.

This assessment has been carried out to inform the Environmental Impact Statement which is required to address the Secretary's Environmental Assessment Requirements issued for this proposal. This assessment addresses considers the requirements of the following legislation:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- NSW *Threatened Species Conservation Act 1995* (TSC Act).
- NSW *Fisheries Management Act 1994* (FM Act).

The proposal will reinstate drilling operations within the Cosmopolitan Open Cut and construct a new access road to and from the Cosmopolitan Open Cut and Run-of-Mine pad. Operational lifetime of the proposal is expected to last 20 years. Construction is expected to take six to 12 months.

Field survey consisted of a bat survey and photo recording of flora species only. Field survey results recorded 15 flora species in the subject site. Of the 15, there were:

- No threatened flora.
- Twelve native flora species.
- Three exotic flora species:
 - One of which was the noxious weed Green Cestrum (*Cestrum parqui*).

Bat survey was conducted over five consecutive nights using the Songmeter SM3 echolocation detector, which was placed at the entrance of the Cosmopolitan Portal mine shaft. Analysis of the bat recordings positively identified three bat species:

- Gould's Wattled Bat (*Chalinolobus gouldi*) (no TSC or EPBC Act listing).
- Inland Freetail Bat (*Mormopterus (Ozimops) planiceps*) (no TSC or EPBC Act listing).
- Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*) (vulnerable TSC Act only).

Number of bat calls was low, which indicates a low number of bats are roosting in the mine shaft and by extension a local viable population of bats does not rely on the mine shaft for breeding purposes. A seven-part test was completed for TSC Act listed Yellow-bellied Sheath-tail-bat. It was determined that the proposal will not place this bat at risk of extinction, therefore, a Species Impact Statement is not required.

Safeguards and mitigation measures have been provided to minimise harm to the environment. If these are implemented then the proposal is unlikely to have a significant impact to species, populations and communities listed under the EPBC, TSC or FM Acts. No further ecological assessment is required.

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1 Introduction

Perilya Broken Hill Limited (the proponent) propose to undertake exploration activities at the Broken Hill North Mine. The proposal is located on the eastern outskirts of Broken Hill within the Broken Hill Local Government Area (**Figure 1-1**). OzArk Environmental & Heritage Management Pty Ltd (OzArk) was commissioned by RW Corkery & Co Pty Ltd (the client) on behalf of the proponent to complete an ecological assessment under Part 4.1 (State Significant Development) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) for the proposal.

1.1 Objectives

OzArk was commissioned by the client on behalf of the proponent to complete an ecological assessment under Part 4.1 (State Significant Development) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) for the proposal. This assessment has been carried out to inform the Environmental Impact Statement which is required to address the Secretary's Environmental Assessment Requirements issued for this proposal.

This assessment addresses considers the requirements of the following legislation:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- NSW *Threatened Species Conservation Act 1995* (TSC Act).
- NSW *Fisheries Management Act 1994* (FM Act).

The objectives of the ecological assessment are to provide:

- Accurate predictions and mapping of any vegetation clearing on site.
- Detailed assessment of the potential impact to any threatened species, populations, endangered ecological communities or their habitats; groundwater dependent ecosystems predicted to occur; and any potential for offset requirements in accordance with the relevant Office of Environment and Heritage (OEH) Guidelines.
- Detailed description of the measures to avoid, minimise, mitigate and offset biodiversity impacts.

1.2 Location

Three terms are used in this report to contextualise the proposal:

- Subject site.
- Study area.
- 10km buffer.

Boundaries of the subject site and study area are shown in **Figures 1-2** and **1-3**. Additional terms and abbreviations used are provided in **Appendix E**.

1.2.1 Subject site

The 'subject site' is the area directly affected by the proposal (DEC, 2004). The boundary of the Cosmopolitan Open Cut, access road and associated buildings to the north-east should be considered the subject site (**Figure 1-3**).

1.2.2 Study area

The 'study area' includes the 'subject site' and any additional areas likely to be affected by the proposal, either directly or indirectly (DEC, 2004). The study area is the mine site boundary, which covers 386ha and is shown on **Figure 1-2**.

Regional context of the study area is provided in **Table 1-1** and proximity to environmentally sensitive areas is shown in **Table 1-2**. **Table 1-2** shows that the study area is not within any environmentally sensitive land, however, Strahler first and second order waterways do traverse the study area.

Table 1-1: Regional context of the study area

Criteria	Value
Interim Biogeographic Regionalisation for Australia (IBRA Region)	Broken Hill Complex
State	NSW
Catchment Management Authority (CMA)	Western and Lower Murray Darling
CMA subregion	Barrier Range
Topographical map sheet	Broken Hill 7134
Local Government Area	Broken Hill
Nearest town	Broken Hill
Accessed from nearest town by	Barrier Highway
Nearest locality	Broken Hill
Mitchell Landform	Barrier Ranges
Land use / disturbance	Mining and Quarrying
Nearest waterway (Name, Strahler Order)	Unnamed first order tributary of Willa Willyong Creek
Spot point Australian Height Datum (AHD)	280m
Surrounding land use	Conservation Area – Willyama Common

Table 1-2: Proximity of environmentally sensitive areas to the study area

Environmental Considerations	In the study area?
An area reserved or dedicated under the <i>National Parks and Wildlife Act 1974</i> ?	No
Is the proposal located within land reserved or dedicated within the meaning of the <i>Crown Lands Act 1989</i> for preservation of other environmental protection purposes?	No
A World Heritage Area?	No
Environmental Protection Zones in environmental planning instruments?	No
Lands protected under SEPP 14 – Coastal Wetlands?	No
Lands protected under SEPP 26 – Littoral Rainforests?	No
Lands protected under SEPP 71 – Coastal Protection?	No
Lands protected under SEPP 44 – Koala Protection?	No
Lands protected under SEPP Sydney Drinking Water Catchment?	No
Land identified as wilderness under the <i>Wilderness Act 1987</i> or declared as wilderness under the <i>National Parks and Wildlife Act 1974</i> ?	No
Aquatic reserves dedicated under the <i>Fisheries Management Act 1994</i> ?	No
Wetland areas dedicated under the Ramsar Wetlands Convention?	No

Environmental Considerations	In the study area?
Land subject to a conservation agreement under the <i>National Parks and Wildlife Act 1974</i> ?	No
Land identified as State Forest under the <i>Forestry Act 1916</i> ?	No
Western Lands Lease	No
Freehold or Crown Land. If Crown Land, what type?	No
Land within a mining subsidence district?	No
Acid sulphate area?	No
Protected riparian habitat?	Yes
Mapped as Key Fish Habitat?	No
Critical habitat NSW?	No
Critical habitat nationally?	No

1.2.3 10km buffer

The 10km buffer means all land within a 10km radius of the study area. The 10km buffer is used to review database records of listed plants and animals to predict what may occur in the study area.

Figure 1-1: Regional setting

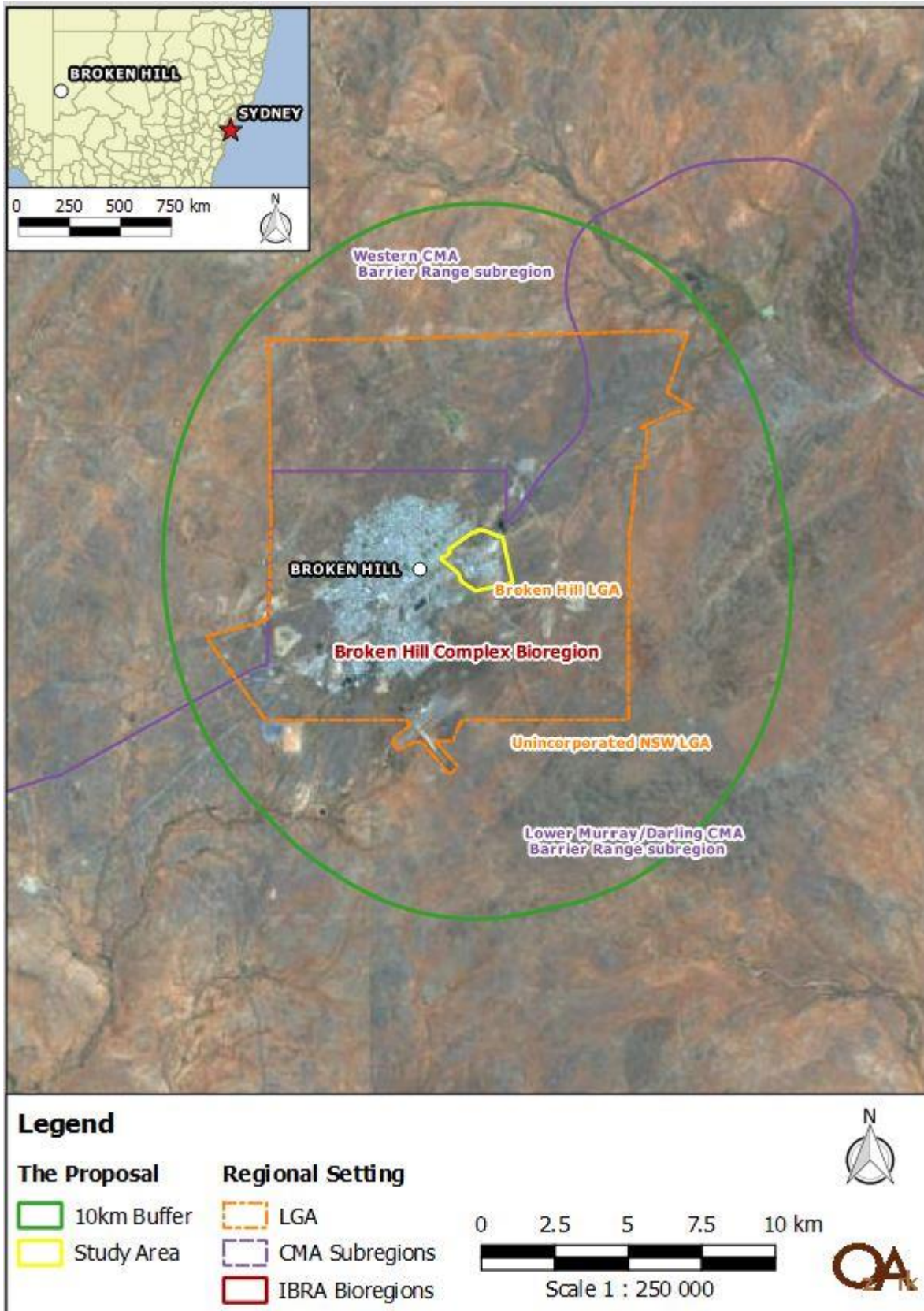
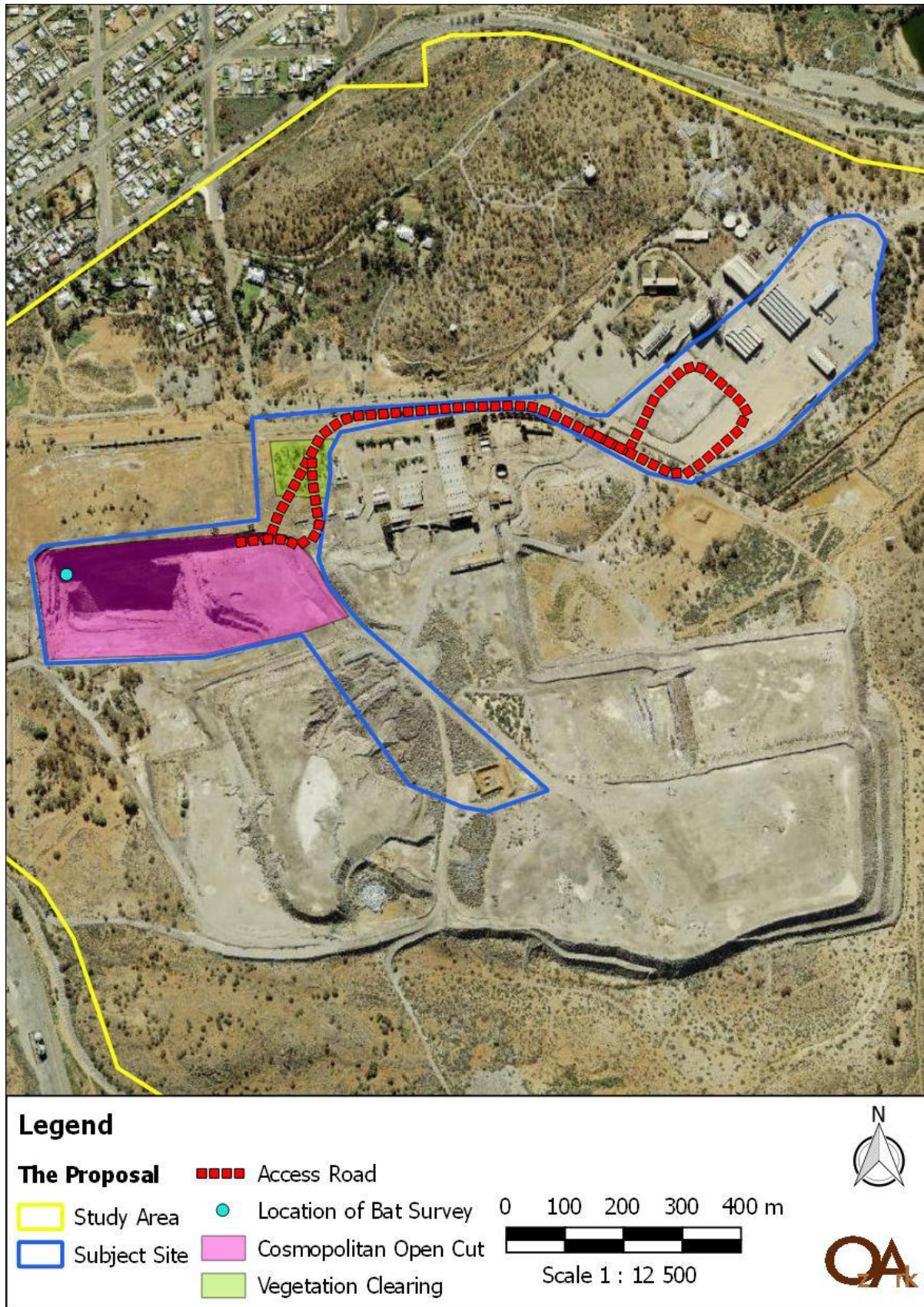


Figure 1-2: The study area



Figure 1-3: The subject site



1.3 The proposal

The proposal will reinstate drilling operations within the Cosmopolitan Open Cut and construct a new access road to and from the Cosmopolitan Open Cut and Run-of-Mine (ROM) pad. Operational lifetime of the proposal is expected to last 20 years. Construction is expected to take six to 12 months and will include:

- Surface and underground drilling.
- Extraction of a bulk sample of up to 20,000 tonnes for testing and trial processing using the South Mine Concentrator.
- Ancillary activities require to support the above, including:
 - Make safe access to the 12 Level.
 - Development of diamond drill platforms and rehabilitation of decline.
 - Establishment and rehabilitation of access roads.
 - Stockpiling of waste rock either underground or within the Cosmopolitan Open Cut.
 - Transporting of ore.

For the purpose of this report, the impact of the proposal is summarised into two sections; the access road and operation of the Cosmopolitan Open Cut.

1.3.1 Cosmopolitan Open Cut

This will involve all of the proposed work listed above except for the establishment and rehabilitation of access roads. Impact at surface level will be restricted to the existing area of occupancy of Cosmopolitan Open Cut as work will be predominately underground (**Figure 1-3**).

1.3.2 Access road

This only applies to the establishment and rehabilitation of access roads. The access road will use some existing infrastructure near the ROM pad and require establishment of a partial new alignment for the access road. The exact alignment of the new access road is currently undecided. For the purpose of this report, it is assumed it will be located anywhere within the green section and impact to biodiversity has been assessed assuming all of the green section (**Figure 1-3**) will be cleared.

1.3.3 Vegetation removal

As outlined in **section 1.3.2**, all vegetation within the one hectare green section will be cleared. No other vegetation clearing is required.

2 Methods

The methodology employed for this report consisted of:

- A desktop and literature review of ecological databases and literature sources as direct references for the field survey
- A field survey of the study area.

The assessment rationale was to evaluate the type and quality of habitat to be affected by the proposal; apply professional judgement, then complete targeted assessment of potential habitat to detect the regions listed species, populations or communities.

2.1 Reporting

Reporting components were completed by:

- Main Author: Nikki Allen.
- Editor: Rowan Murphy.
- Quality Management System Reviewer: Rowan Murphy.

2.1.1 Licensing and qualifications

OzArk operates under NSW Department of Primary Industries (DPI) Ethics Approval No. 11/5475 and NSW Scientific Research License 101087. Key details of scientific personnel from OzArk are provided in **Table 2-1**.

Table 2-1: Summary of OzArk qualifications

Name	Position	CV Details
Phil Cameron	Principal Ecologist Senior Project Manager	• BSc. Major in Biology. Macquarie University • Ass Dip App Sci. University of Queensland • Certified Environmental Practitioner (EIANZ) • Lean Six Sigma Certificate (Sydney Uni) • OEH BioBanking and Bio-certification Assessor: accreditation number 0117 • OEH Scientific License: 101087 • NSW DPI Ethics Approval 11/5475 • Practicing member of the NSW Ecological Consulting Association • Practicing member of the Environment Institute of Australia and New Zealand (EIANZ) • National Railtrack Safety Induction (ARTC and John Holland Inductions) • WHS White Card and Blue Card • Apply First Aid (Parasol) ID: 6007221
Rowan Murphy	Ecologist	• BEnvSc, University of New England • LLB, University of New England • Listed on scientific license and NSW DPI ethics approval • WHS White Card • Induction training for Local Government Operations • National Railtrack Safety Induction (ARTC and John Holland

Name	Position	CV Details
		- Inductions) - Practicing member of the NSW Ecological Consulting Association - Practicing member of the Environment Institute of Australia and New Zealand (EIANZ) - Cert 4 in 4WD training (Nationally recognised training) - Roads and Maritime Worker on Foot training - First Aid certificate.
Nikki Allen	Environmental Scientist	- BSc. Major in Chemistry and Geography. University of New South Wales at the Australian Defence Force Academy - Grad. Dip. In Environmental Health. Queensland University of Technology. - Apply First Aid (ABC First Aid) ID: 34795 - CPCCOHS1001A Work Safely in the Construction Industry (White Card) - Roads and Maritime Worker on Foot Training
Heidi Kolkert	Senior Ecologist	- PhD in progress. University of New England (current). - Bachelor of Science (Hons, Reproduction and Endocrinology). University of Tasmania. - Bachelor of Arts/Bachelor of Science, Major Zoology and Geography. University of Tasmania. - OEH BioBanking accredited assessor number 0127. - Listed on OzArk scientific license and NSW DPI ethics approval. - WHS White Card. - Practicing member of the NSW Ecological Consulting Association, - Practicing member of the Environment Institute of Australia and New Zealand (EIANZ) Member. - Australian Bird and Bat Banding Scheme (C Class banding license) - Member of: Ecological Society of Australia, Australasian Bat Society, Australian Mammal Society, Royal Zoological Society, Birdlife Australia, Bat Conservation International, Citizens for Wildlife Corridors (Armidale) - Senior First Aid (Red Cross) and Remote Area First Aid (St John).

2.2 Desktop review

2.2.1 Information sources

Preliminary assessments drew on local experience, previous preliminary reporting and information held on government databases and archives (**Appendix D**). Data was used to assist in identifying distributions, suitable habitats and known records of threatened species to increase the effectiveness of field investigations. Database searches were completed on 12 July 2016 and was centred on the study area with a 10 km radius buffer. Information sources included:

- Aerial photograph interpretation of the landscape and previous vegetation maps.

- Literature reviews (OzArk library, OEH Biometric list) to determine vegetation and species habitat(s) within the proposed study area and environs.
- Review of flora and fauna records contained in the NSW Threatened Species Database, EPBC Protected Matters Search Tool and DPI Records Viewer.
- NSW Wildlife Atlas/Bionet GIS data request and website search.
- Royal Botanical Gardens (PlantNET NSW Flora Online).

The background searches enabled the consultant to develop a predictive model for threatened flora and fauna to be recorded in the study area (**Section 4**).

2.3 Field survey

Field survey was carried out by Jodie Benton on 16 to 20 June 2016 (five days). Survey effort consisted of bat call recording and photo recording of flora species in the study area only.

Weather was cool and sunny, ranging from 6.4 to 20.9°C. It rained on the 17 and 18 of June, however, this is not considered a limitation to the field survey.

2.3.1 Microbat survey

Microbat ultrasonic assessment and stag/roost watches were employed. Songmeter SM3 echolocation detector was left at the entrance of the Cosmopolitan Portal mine shaft (see **Figure 1-3** and **Plate 2-1**). The detector was set prior to dusk and left in place for the entire duration of the evening over five nights. Calls were analysed using Anabat 6.3 computer software.

Plate 2-1: Photo of Cosmopolitan Portal mine shaft entrance



2.3.2 Limitations

Not all animals and plants can be fully accounted for within any given study area. The presence of threatened species is not static. It changes over time, often in response to longer term natural forces which can, at any time, be dramatically influenced by man-made disturbance or weather. In order to overcome some of these limitations, database searches were conducted for threatened species, populations and ecological communities known to occur within the region. A 'precautionary approach' for species occurrence has been adopted where required.

This report is based upon data acquired from recent and current surveys, however, it should be recognised that data gathered is indicative of the environmental conditions of the site at the time the report was prepared.

Limitations associated with the survey included:

- Trapping was not a component of the assessment.
- Opportunistic fauna survey was not conducted and no fauna species were observed during the field work.
- Formal flora and vegetation surveys were not conducted during the field work. Instead photographs were taken of the flora present in the study area which were later identified by OzArk ecologist Phil Cameron.

- Microbat ultrasonic call capture was conducted during winter which may not accurately reflect the actual population of microbats in the study area as they may have been in a state of torpor.
- Nocturnal assessments were not a component of the assessment.

The above-mentioned constraints are not considered to compromise the findings or results of the field assessment as the study area is predominantly cleared for daily mine operations and impact to vegetation is restricted to a small patch of planted native trees.

3 Results

3.1 Landscape context

Landscape context of the study area locality is important when predicting the presence and abundance of species. Landscape features such as distance to water and land use can greatly influence the presence of certain species in an area. Of note, the study area is adjacent to the Willyama Common; an approximately 9340ha reserve created in the 1890s to provide grazing land (Broken Hill Operations Pty Ltd, 2010). Vegetation of the Willyama Common has grazing and clearing restrictions and is abundant across the western NSW region. The Willyama Common has higher biodiversity than the study area, however, given the close proximity to Broken Hill city, fauna are less abundant near urbanised areas.

3.1.1 Mitchell Landscapes

Desktop based mapping found the proposal is located within the Barrier Ranges and Barrier Downs Mitchell Landscape unit (**Figure 3-1**).

3.1.1.1 Barrier Ranges

This Landscape unit is characterised by densely dissected ranges mainly of lower to middle Proterozoic metamorphic rocks. Metamorphic rock types include gneiss, schist, amphibolite and pegmatites. Elevation ranges from 30m to 200m across the Landscape unit.

Soils consist of rock outcrop and lithosols on upper slopes. Red texture-contrast soils are locally calcareous on contour banded steps on lower slopes. Shallow reddish-brown calcareous stony loamy sands are located on calcareous sandstone. Drainage tracts have reddish brown and yellowish-brown texture-contrast soils with coarse sands (Mitchell, 2002).

3.1.1.2 Barrier Downs

The Barrier Downs Landscape unit is a complex landscape, consisting of low strike ridges of rock outcrop, slopes and outwash areas along the Barrier Ranges. It is characterised by steeply rolling lowlands on pre-Cambrian dolomite and calcareous shale; with steeply dipping Devonian sandstone and conglomerate. Drainage lines are deeply incised and local elevation varies from 30m.

Soils consist of lithosols or shallow calcareous sandy loams on ridges. On contour banded slopes soils alternate from stony red desert loams and stone-free red clays, to solonized brown soils on long slopes. Dunes consist of deep clayey sand. While drainage tracts have stony reddish-brown calcareous sandy loams, and alluvial flats have brown self-mulching cracking clays (Mitchell, 2002).

3.1.2 Waterways

The study area contains multiple unnamed first and one second Strahler order waterways of Willa Willyong Creek (above Strahler fifth order) (see **Figure 3-2**). The access road intersects with an unnamed first order tributary of Willa Willyong Creek. No waterways in the study area are considered to be Key Fish Habitat.

3.1.3 Land use

The study area has a long and comprehensive history of surface and sub-surface disturbance relating to past and present mining activities since the late 1800s. This extensive disturbance has lowered biodiversity in the area, however, it has also created niche habitat through the development of an artificial underground shaft system. Land use surrounding the subject site is a mixture of urban, transport and conservation reserve (**Figure 3-3**).

3.1.4 Climate

The study area is located within the Broken Hill Complex Bioregion, which generally has a hot, dry climate and lies within the NSW arid zone. Average climate statistics from Broken Hill Airport monitoring station show temperatures range from an average monthly maximum temperature of 33.4°C in January; to an average monthly minimum temperature of 4.7°C in July. Average annual rainfall in the region is low with an annual average of 253.2mm. Average monthly rainfall of the study area is the highest in January with 28.9mm and lowest in June with 15.5mm

Figure 3-1: Mitchell landscapes of the study area

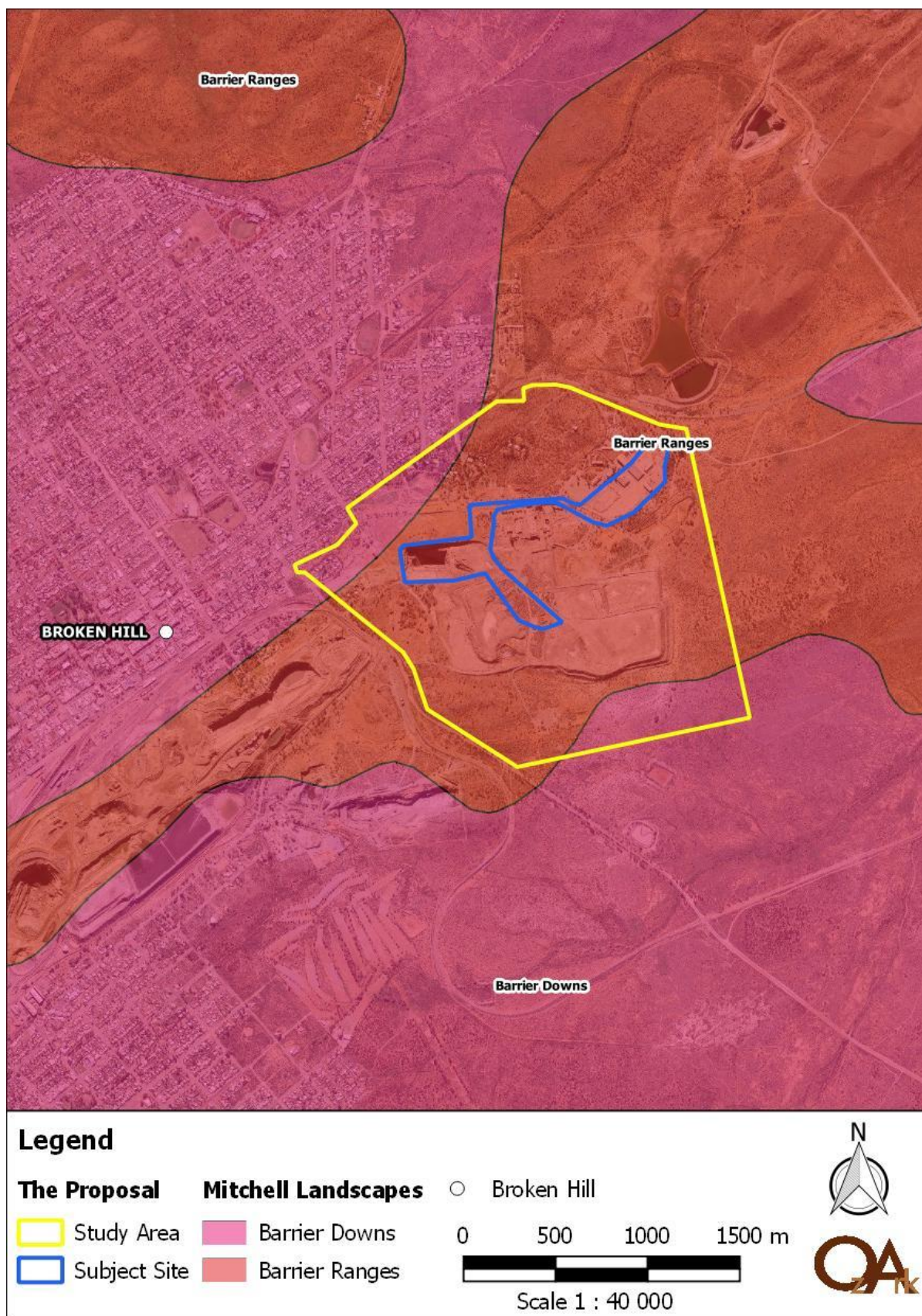


Figure 3-2: Waterways of the study area

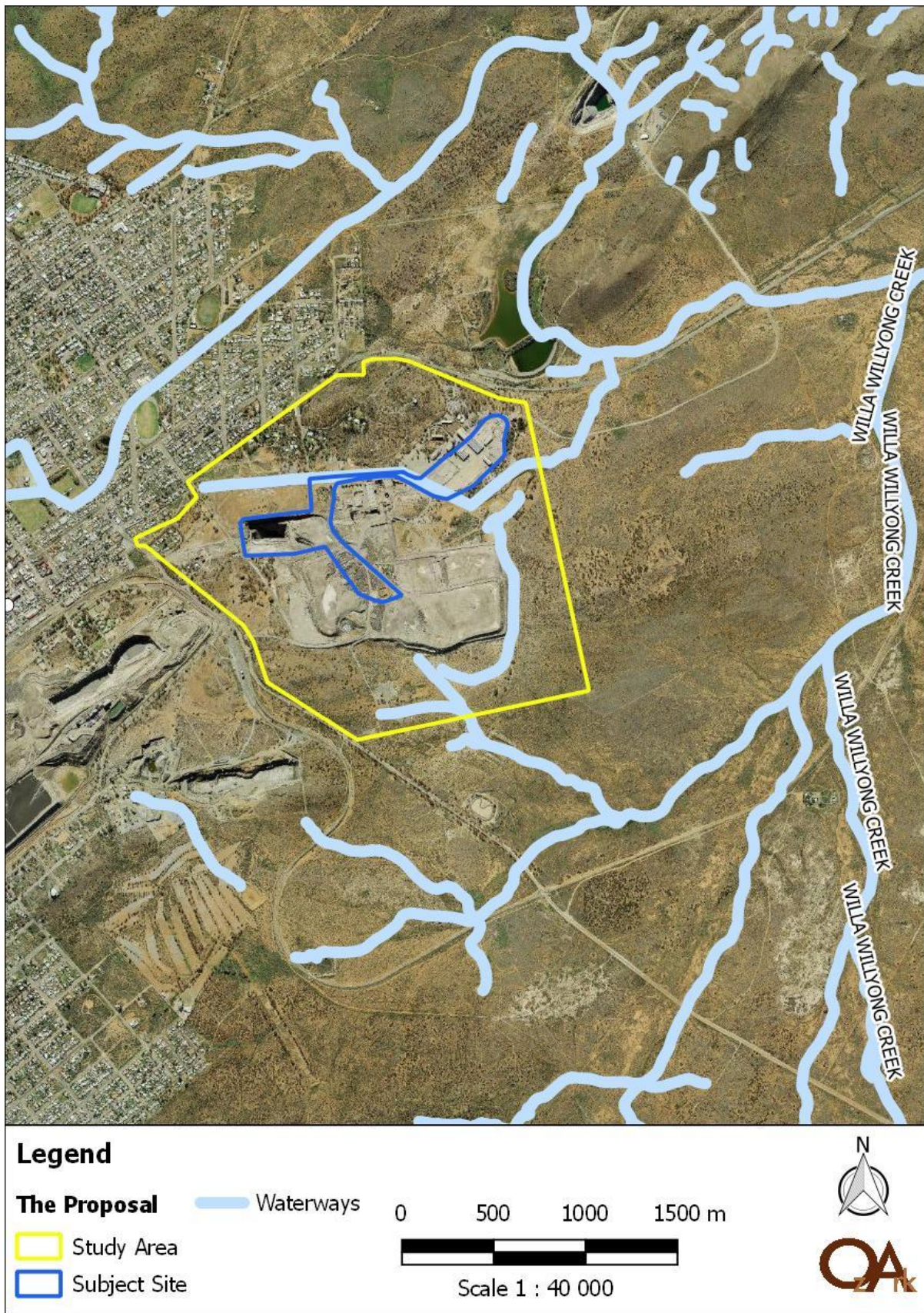
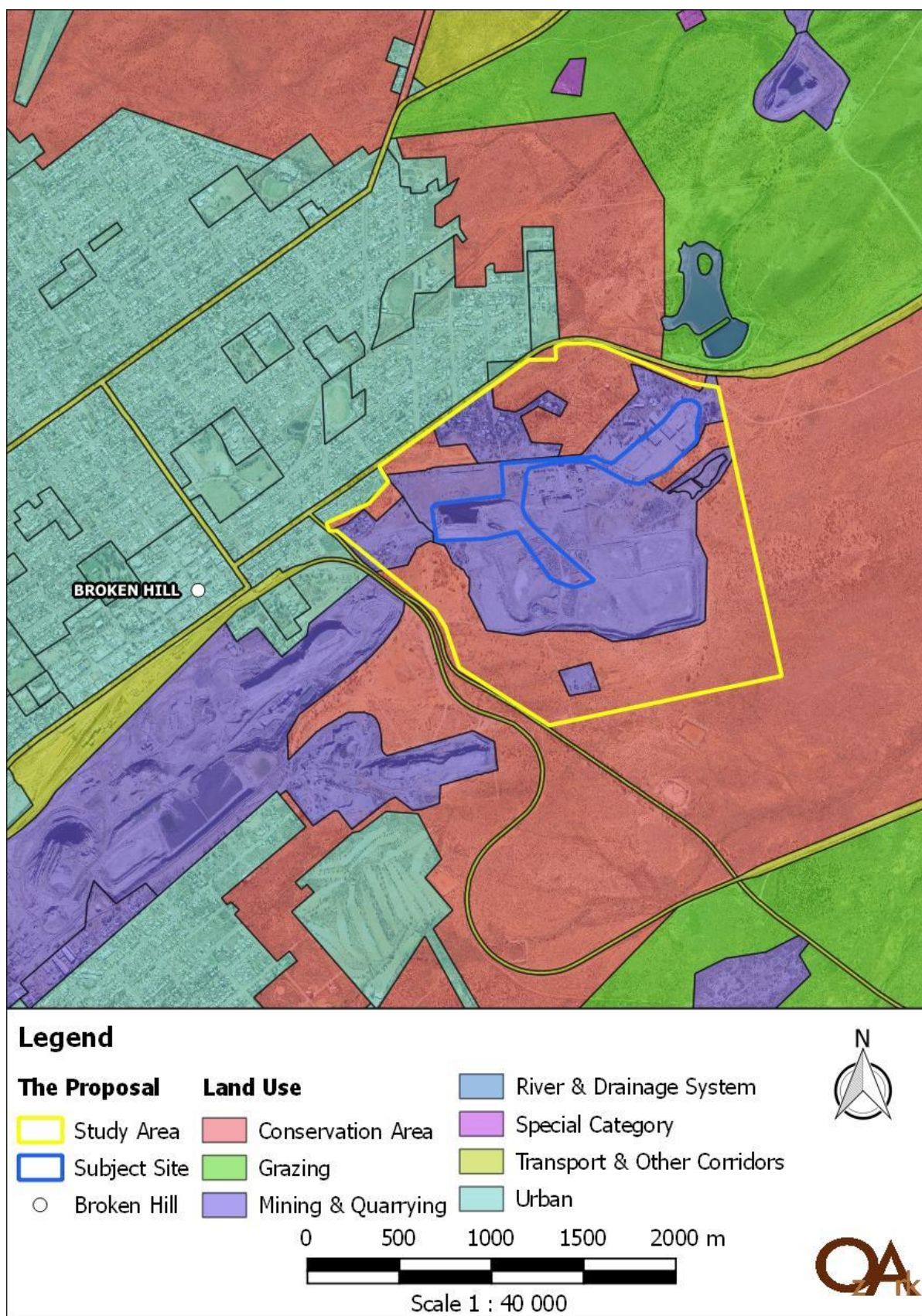


Figure 3-3: Land use of the study area



3.2 Ecological communities

3.2.1 Terrestrial communities

3.2.1.1 Vegetation

Desktop studies from vegetation mapping of the study area places the study area in *Acacia aneura* – *Acacia tetragonophylla* tall shrubland (map unit 27) (**Figure 3-4**). This is an open shrubland consisting of small acacias with extensive open areas and areas with dead shrubs (Pickard & Norris, 1994). As the study area has been extensively cleared for mining operations this vegetation type is no longer present.

BBAM (OEH, 2014) was used to provide landscape value of vegetation in the study area in **Table 3-1**.

Table 3-1: Value of vegetation in the landscape

Criteria	Value
Size and shape of the proposal	The study area covers 386ha of land within Lot 7313 DP1185108.
Location and position in the landscape (National Committee on Soil and Terrain 2009)	The study area is located on a flat landscape.
Percentage vegetation cover in a 100 ha circle centred on the study area	20%
Percentage vegetation cover in 1000 ha circle centred on the study area	30%
Connectivity value	The study area is adjacent to the Willyama Common reserve, which surrounds the city of Broken Hill. The Willyama Common (9340ha) is connected to the Living Desert State Park (2400ha) and is considered a single patch.
Nearest remnant vegetation (distance, size and connectivity)	Willyama Common, Living Desert State Park and adjoining vegetated reserves add up to 1715ha. This patch is surrounded by agricultural land with remnant vegetation.
Distance to nearest large vegetation remnant greater than 1000 ha	0km – adjacent to Willyama Common.

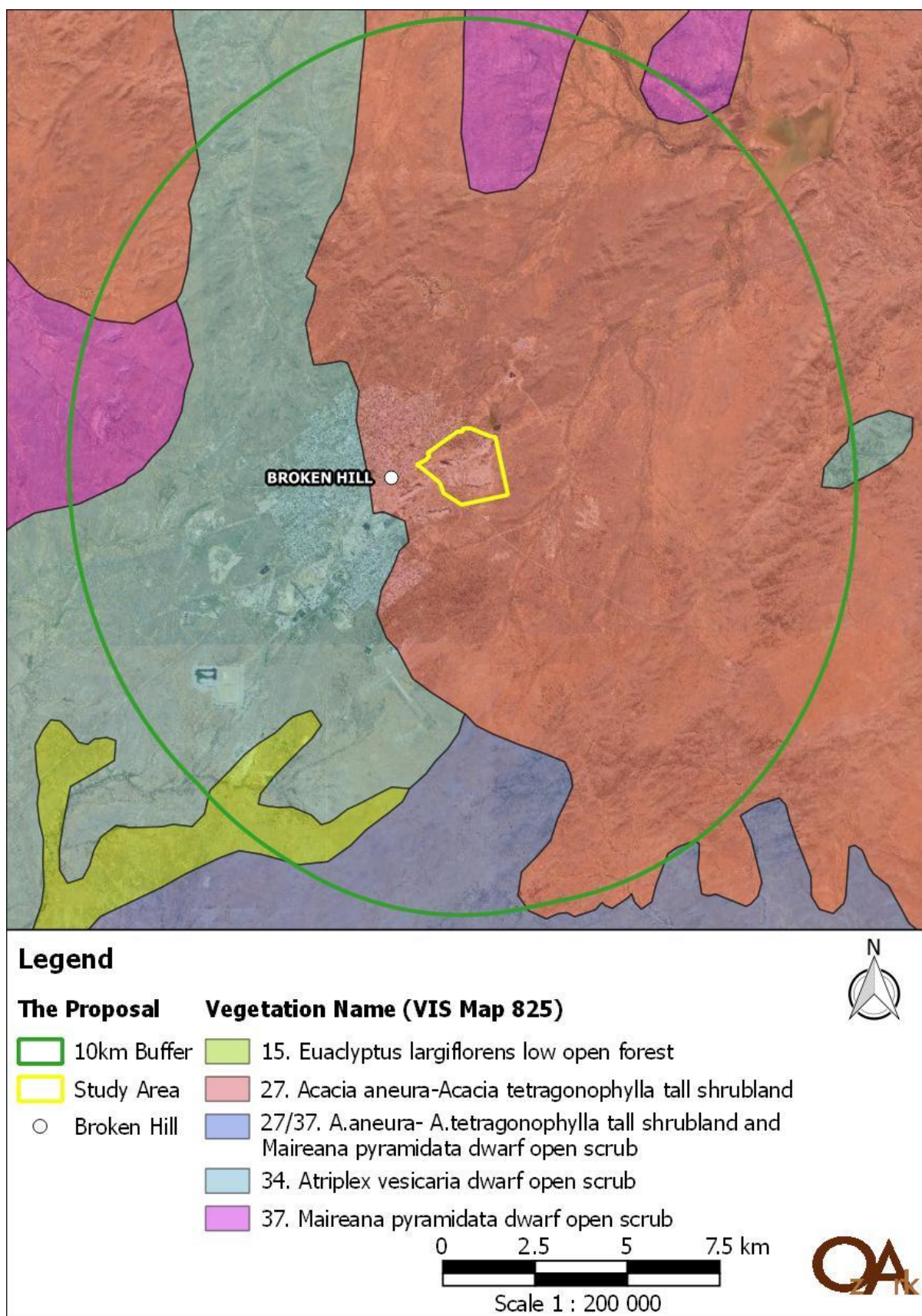
3.2.1.2 Recorded vegetation communities

The flora species recorded during the field survey have been selectively planted in the 1950s. No original vegetation persists from normal operation of the mine. Therefore vegetation of the subject site is not consistent with the mapped vegetation communities and it does not fall under the definition of any vegetation community.

3.2.1.3 Threatened terrestrial ecological communities

Desktop review of the mapped vegetation of the study area also found the vegetation was not associated with any Endangered Ecological Communities (EECs).

Figure 3-4: OEH based vegetation mapping of the study area



3.2.1.4 Aquatic communities

Desktop search found the waterways of the study area are not mapped as key fish habitat.

3.2.1.5 Threatened aquatic ecological communities

The waterways of the study area are not associated with any aquatic EECs.

3.2.2 Groundwater dependant ecosystems

Desktop studies found the study area is mapped by the Bureau of Meteorology (BoM) Atlas of Groundwater Dependant Ecosystems (GDEs) as not having interactions with GDEs (**Appendix D**).

3.3 Flora

3.3.1 Recorded flora

Field survey results recorded 15 flora species in the subject site (**Appendix A**). Of the 15, there were:

- No threatened flora.
- Twelve native flora species.
- Three exotic flora species.

The ground cover was generally low, with an absence of ground stratum species and patches of exposed soil (**Plate 3-1**).

Plate 3-1: Example of typical ground cover



3.3.2 Noxious weeds

Green Cestrum (*Cestrum parqui*) was the only noxious weed recorded during the field survey. Green Cestrum is a Regionally Controlled Weed, which requires continuous suppression and must be destroyed if found.

3.4 Fauna

3.4.1 Recorded fauna

Analysis of the bat recordings from the field survey positively identified three bat species:

- Gould's Wattled Bat (*Chalinolobus gouldi*).
- Inland Freetail Bat (*Mormopterus (Ozimops) planiceps*).
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) (vulnerable TSC Act).

None of these bat species are listed as threatened under the EPBC Act and the Yellow-bellied Sheathtail-bat is the only TSC Act listed threatened species.

Calls recorded for all bat species were low in quantity, this may be due to:

- Rainfall which resulted in bats not being active during the survey.
- The survey occurring in winter, when bats are in a state of torpor.
- Only a small population of bats occupying the mine shaft.

Given the high temperature of Broken Hill and the depth of the mine shaft, resulting in a high ambient temperature, it is unlikely the mine shaft was cold enough for bat species to be in topor. Secondly, rainfall did not impact on the survey for all five nights to cause such a low call result. Given this evidence, it indicates the mine shaft is not important breeding habitat for any bat species present.

The Yellow-bellied Sheathtail-bat is listed as a vulnerable species under the TSC Act. Only one call on one night was recorded for this species. OzArk has completed six bat surveys (most of which had three consecutive nights of surveying) in the Western NSW region since 2009 (see **Appendix A**). The Yellow-bellied Sheathtail-bat has only been recorded once in autumn in Mutawintji National Park. Therefore it is known the Yellow-bellied Sheathtail-bat is active in the region during colder months and it is unlikely for this species to be using the mineshaft for important habitat.

3.4.2 Habitat types

Habitat types for other fauna species is limited due to existing land disturbance and mining land use. Fallen logs and ground-stratum vegetation were absent from most of the study area, except for small patches of grasses scattered across the study area. This limits the use of the study area for many species including Robins and native rodents.

3.5 Threatened species, populations and communities

A desktop search of OEH BioNet Atlas found 28 listed terrestrial species have been previously recorded within 10km of the study area (**Table 3-2** and **Figure 3-5**).

Figure 3-5: Threatened species within 10km of the study area

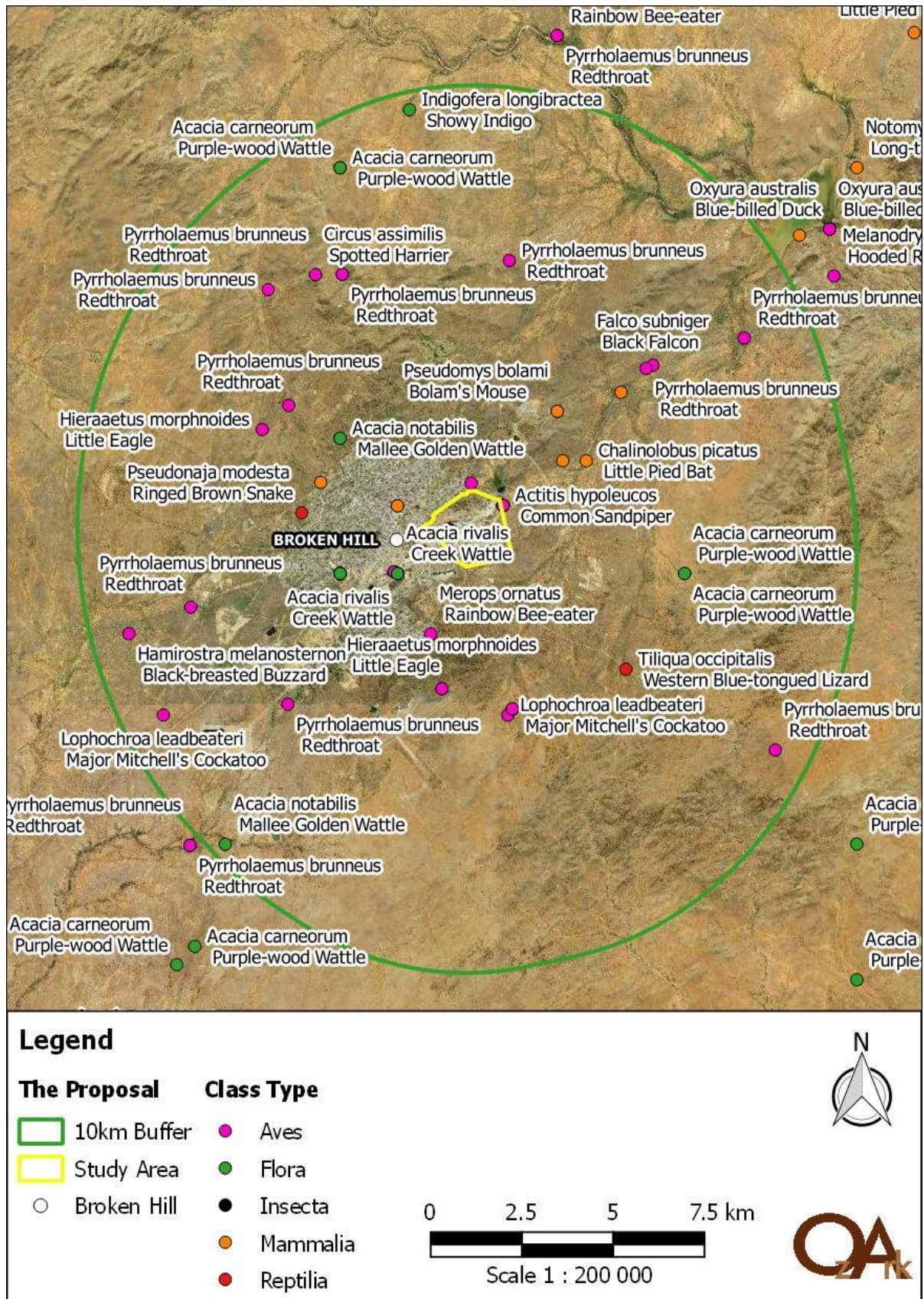


Table 3-2: Threatened species identified within 10km of the study area

Class Name	Scientific Name	Common Name	NSW Status	Comm Status	No. of Sightings
Flora	<i>Acacia carneorum</i>	Purple-wood Wattle	Vulnerable	Vulnerable	16
Aves	<i>Pyrrholaemus brunneus</i>	Redthroat	Vulnerable		14
Flora	<i>Acacia notabilis</i>	Mallee Golden Wattle	Endangered		4
Aves	<i>Hieraaetus morphnoides</i>	Little Eagle	Vulnerable		4
Flora	<i>Acacia rivalis</i>	Creek Wattle	Endangered		3
Aves	<i>Calamanthus campestris</i>	Rufous Fieldwren	Vulnerable		3
Mammalia	<i>Chalinolobus picatus</i>	Little Pied Bat	Vulnerable		3
Aves	<i>Merops ornatus</i>	Rainbow Bee-eater	Protected	JAMBA*	3
Aves	<i>Oxyura australis</i>	Blue-billed Duck	Vulnerable		3
Aves	<i>Circus assimilis</i>	Spotted Harrier	Vulnerable		2
Aves	<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	Vulnerable category 2 sensitive species		2
Mammalia	<i>Pseudomys bolami</i>	Bolam's Mouse	Endangered		2
Reptilia	<i>Tiliqua occipitalis</i>	Western Blue-tongued Lizard	Vulnerable		2
Aves	<i>Actitis hypoleucos</i>	Common Sandpiper	Protected	CAMBA# JAMBA* ROKAMBA+	1
Aves	<i>Arenaria interpres</i>	Ruddy Turnstone	Protected	CAMBA# JAMBA* ROKAMBA+	1
Aves	<i>Burhinus grallarius</i>	Bush Stone-curlew	Endangered		1
Aves	<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	Vulnerable		1
Aves	<i>Epthianura albifrons</i>	White-fronted Chat	Vulnerable		1
Aves	<i>Falco subniger</i>	Black Falcon	Vulnerable		1
Aves	<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	Vulnerable category 3 sensitive species		1
Flora	<i>Indigofera longibractea</i>	Showy Indigo	Endangered		1
Mammalia	<i>Leporillus conditor</i>	Greater Stick-nest Rat	Extinct	Vulnerable	1
Mammalia	<i>Notomys fuscus</i>	Dusky Hopping-mouse	Endangered	Vulnerable	1
Aves	<i>Pezoporus occidentalis</i>	Night Parrot	Extinct	Endangered	1
Reptilia	<i>Pseudonaja modesta</i>	Ringed Brown Snake	Endangered		1
Aves	<i>Rostratula australis</i>	Australian Painted Snipe	Endangered	Endangered	1
Mammalia	<i>Sminthopsis macroura</i>	Stripe-faced Dunnart	Vulnerable		1
Aves	<i>Tringa nebularia</i>	Common Greenshank	Protected	CAMBA# JAMBA* ROKAMBA+	1

Key

= China-Australia Migratory Bird Agreement (CAMBA), * = Japan-Australia Migratory Bird Agreement (JAMBA) + = Republic Of Korea-Australia Migratory Bird Agreement (ROKAMBA). All of these bird species are migratory bird species which frequent Australia and are protected under the EPBC Act.

3.5.1 Likelihood of occurrence - threatened biota

An assessment of likelihood of occurrence for listed species, populations, communities and migratory species identified from database searches was compiled (**Appendix B**). Three terms of likelihood for occurrence (based on database results or other records, presence or absence of suitable habitat, features of the study area, results of the field survey and professional judgement) were used to determine the likelihood of occurrence:

- “Unlikely” = a very low to low probability a species uses the study area. An assessment of significance under the EPBC or TSC or FM Acts is not required for this species.
- “Likely” / ‘Potential’ = a medium to high probability a species uses the study area. An assessment of significance under the EPBC or TSC or FM Acts is required for this species.
- “Yes” = the species was or has been observed on the study area. An assessment of significance under the EPBC or TSC or FM Acts is required for this species.

A review of habitat requirements and database search records for each listed species, populations and ecological communities predicted to occur in the study area concluded two threatened bats have potential to be impacted by the proposal (**Table 3-3**).

Table 3-3: Listed species predicted to be affected by the proposal

Scientific name	Common name	NSW status	C'wealth status	Occurrence	Records in 10 km?
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V		Known	Yes
<i>Chalinolobus picatus</i>	Little Pied Bat	V		Known	Yes

Key

V = Vulnerable, E = Endangered, EEC = Endangered Ecological Community

The TSC Act seven part tests for each of these species was completed (**Appendix C**) and found the proposal would not constitute a significant impact to these species.

4 Potential impact

4.1 Direct impact

4.1.1 Impact to native vegetation

The proposal is expected to clear around one hectare of native vegetation for construction of the new section of the access road. The proposal would increase dust levels during work which has potential to suppress plant growth and be a vector for soil borne disease. This is unlikely given the near continuous history of mining in the study area.

4.1.2 Impact to endangered ecological communities

No terrestrial or aquatic EECs are present in the study area.

4.1.3 Impact to groundwater dependent communities

GDEs are not present in the study area, therefore there will be no GDEs impacted by the proposal.

4.1.4 Impact to hollow bearing trees

There will be no hollow bearing trees impacted by the proposal.

4.1.5 Fragmentation of habitat

The study area is adjacent to the Willyama Common. Vegetation clearing of one hectare by the proposal is within predominately cleared mine site boundary. This hectare of vegetation is not connected to the Willyama Common, therefore, there will be no fragmentation of habitat.

4.1.6 Soils and drainage

Soils would be disturbed in any location where vegetation removal will occur and at the Cosmopolitan Open Cut. Disturbed soils have the potential to move off the study area and impact waterways if not appropriately managed. Soil disturbance is not expected to negatively impact the environment in the long term.

The unnamed Strahler first order waterway which traverses the access road will not be affected by the proposal. The creation of the new section of the access road is approximately 30m away from the 10m protected vegetated riparian zone. The remainder of the access road which is within this 10m zone is existing, therefore there is no impact to the waterway.

4.2 Indirect impact

4.2.1 Operational noise

Operational noise during construction can disturb fauna or prevent them using habitat surrounding the study area. As this is already an operational mine, additional noise from the proposal is not expected to impact local fauna.

4.2.2 Weeds

Soil disturbance may result in new weed populations. Introduction or spread of weeds through the study area is associated with the following proposal work:

- Removing native vegetation.
- Excavation, stripping and construction.

If safeguards in **Section 5** are followed the risk of weed colonisation in the study area will be minimised.

4.3 Impact on Key Threatening Processes

There are three Key Threatening Processes (KTP's) at the NSW State and Federal level which will be negligibly exacerbated by the proposal. The proposal will consist of minor vegetation clearing and is not consistent with the objectives outlined in the OEH 21 priority actions to help redress the clearing of native vegetation in NSW. Removal of native vegetation for the proposal provides an opportunity for exotic perennial grasses to colonise the area. The proposal is expected to negligibly contribute to anthropogenic climate change as would any development involving vegetation clearing and use of machinery.

The OEH, DoE and DPI Fisheries list of KTPs was reviewed and seven KTPs are active within the study areas. Three of these will be exacerbated by the proposal:

- Clearing of native vegetation.
- Anthropogenic climate change.
- Invasion of native plant communities by exotic perennial grasses.

A summary of the proposed impacts relating to the relevant key threatening processes is given in **Table 4-1**.

Table 4-1: Review of proposed impacts to key threatening processes

Key Threatening Process	TSC Act	FM Act	EPBC Act	KTP present in study area?	Exacerbated?
Aggressive exclusion of birds by noisy miners (<i>Manorina melanoccephala</i>)	✓		✓	No	No
Alteration of habitat following subsidence due to longwall mining	✓			No	No
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands	✓	✓		No	No
Anthropogenic climate change	✓	✓	✓	Yes	Negligible
Bushrock removal	✓			No	No
Clearing of native vegetation	✓		✓	Yes	Negligible
Competition and grazing by the feral European rabbit (<i>Oryctolagus cuniculus</i>)	✓		✓	No	No
Competition and habitat degradation by feral goats (<i>Capra hircus</i>)	✓		✓	No	No
Competition from feral honey bees (<i>Apis mellifera</i>)	✓			No	No
Death or injury to marine species following capture in shark control programs on ocean beaches	✓	✓		No	No
Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments	✓		✓	No	No
Forest Eucalypt dieback associated with over-abundant psyllids and bell miners	✓			No	No
Herbivory and environmental degradation caused by feral deer	✓			No	No

Key Threatening Process	TSC Act	FM Act	EPBC Act	KTP present in study area?	Exacerbated?
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	✓			No	No
Hook and line fishing in areas important for the survival of threatened fish species		✓		No	No
Importation of red imported fire ants (<i>Solenopsis invicta</i>)	✓		✓	No	No
Incidental catch (bycatch) of Sea Turtle during coastal otter-trawling operations within Australian waters north of 28 degrees South			✓	No	No
Incidental catch (or bycatch) of seabirds during oceanic longline fishing operations			✓	No	No
Infection by psittacine circoviral (beak and feather) disease affecting endangered psittacine species and populations	✓		✓	No	No
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	✓		✓	No	No
Infection of native plants by <i>Phytophthora cinnamomi</i>	✓		✓	No	No
Introduction and Establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae	✓			No	No
Introduction of non-indigenous fish and marine vegetation to the coastal waters of New South Wales		✓		No	No
Introduction of the large earth bumblebee (<i>Bombus terrestris</i>)	✓			No	No
Invasion and establishment of exotic vines and scramblers	✓			No	No
Invasion and establishment of Scotch broom (<i>Cytisus scoparius</i>)	✓			No	No
Invasion and establishment of the cane toad (<i>Bufo marinus</i>)	✓		✓	No	No
Invasion of native plant communities by African Olive <i>Olea europaea</i> L. subsp. <i>cuspidata</i>	✓			No	No
Invasion of native plant communities by exotic perennial grasses	✓			Yes	Negligible
Invasion of native plant communities by <i>Chrysanthemoides monilifera</i> (bitou bush and boneseed)	✓			No	No
Invasion of northern Australia by Gamba Grass and other introduced grasses			✓	No	No
Invasion of the yellow crazy ant (<i>Anoplolepis gracilipes</i> (Fr. Smith)) into NSW	✓		✓	No	No
Invasion, establishment and spread of Lantana camara	✓			No	No

Key Threatening Process	TSC Act	FM Act	EPBC Act	KTP present in study area?	Exacerbated?
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	✓		✓	No	No
Loss of hollow-bearing trees	✓			Yes	No
Loss or degradation (or both) of sites used for hill-topping by butterflies	✓			No	No
Novel biota and their impact on biodiversity			✓	No	No
Predation and hybridisation of feral dogs (<i>Canis lupus familiaris</i>)	✓			No	No
Predation by exotic rats on Australian offshore islands of less than 1000 km ² (100,000 ha)			✓	No	No
Predation by the European red fox (<i>Vulpes vulpes</i>)	✓		✓	Yes	No
Predation by the feral cat (<i>Felis catus</i>)	✓		✓	Yes	No
Predation by the ship rat (<i>Rattus rattus</i>) on Lord Howe Island	✓		✓	No	No
Predation by <i>Gambusia holbrooki</i> Girard, 1859 (plague minnow or mosquito fish)	✓			No	No
Predation, habitat degradation, competition and disease transmission by feral pigs (<i>Sus scrofa</i>)	✓		✓	No	No
Removal of dead wood and dead trees	✓			Yes	No
The degradation of native riparian vegetation along New South Wales water courses		✓		No	No
The introduction of fish to fresh waters within a river catchment outside their natural range		✓		No	No
The removal of large woody debris from NSW rivers and streams		✓		No	No

4.4 Matters of National Environmental Significance

Under the environmental assessment provisions of the EPBC Act, the Matters of National Environmental Significance (MNES) and impacts on Commonwealth land are required to be considered to assist in determining whether the proposal should be referred to the Australian Government DoE. No MNES will be impacted by the proposed works (**Table 4-2**).

Table 4-2: Impacts to Matters of National Environmental Significance

Factor	Impact
Any impact on a World Heritage property?	NIL
Any impact on a National Heritage place?	The proposal is part of the city of Broken Hill which is a National Heritage place. As the proposal is an expansion of the existing mine, there will be no impact on the city.
Any impact on a wetland of international importance?	NIL
Any impact on a listed threatened species or communities?	NIL
Any impacts on listed migratory species?	NIL

Factor	Impact
Any impact on a Commonwealth marine area?	NIL
Does the proposal involve a nuclear action (including uranium mining)?	NIL
Additionally, any impact (direct or indirect) on Commonwealth land?	NIL
Any impact on a water resource, in relation to coal seam gas development and large coal mining development?	NIL

4.5 Cumulative impact

Reestablishment of mining activities at the Cosmopolitan Open Cut is not expected to have any cumulative impact to the environment.

4.6 Significance of potential impact

Management of ecological items is determined on the basis of their assessed significance as well as the likely impact of the proposal. Significance of a species, population or community is determined by appointed NSW and National Scientific Committees; with cultural and public significance are considerations within the significance determination process. Within the framework of an impact assessment, impact to listed significant items must be assessed at a state level (under the FM Act and TSC Act), and if also nationally listed, under the EPBC Act. The following sections identify state or nationally listed threatened species and then determines if the impact is 'significant'.

4.6.1 NSW Legislation

The habitat assessment identified two bat species or their habitats listed under the TSC or FM Acts may potentially be affected by the proposal (**Appendix B**).

Table 4-3 gives an overview of the results of the assessments of significance and shows a *Species Impact Statement* is not required:

- 1) In the case of a threatened species, the Proposal is not likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.
- 2) In the case of an endangered population, the Proposal is not likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.
- 3) In the case of an endangered ecological community or critically endangered ecological community:
 - i. The Proposal is not likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
 - ii. The Proposal is not likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.
- 4) In relation to the habitat of a threatened species, population or ecological community:
 - i. The extent to which habitat is likely to be removed or modified as a result of the Proposal, and
 - ii. That an area of habitat is not likely to become fragmented or isolated from other areas of habitat as a result of the Proposal, and
 - iii. The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

- 5) That the Proposal is not likely to have an adverse effect on critical habitat (either directly or indirectly).
- 6) That the Proposal is not consistent with the objectives or actions of a recovery plan or threat abatement plan.
- 7) That the Proposal constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Table 4-3: Summary of the findings of TSC Act 7-Part Tests

Threatened species, or communities		7-Part Test Questions							Likely significant impact?
		1	2	3	4	5	6	7	
Bats									
<i>Chalinolobus picatus</i>	Little Pied Bat	N	X	X	N	N	Y	Y	No
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	N	X	X	N	N	Y	Y	No

Notes: Y= Yes (negative impact), N= No (no or positive impact), P = Potential, X= not applicable, ?= unknown impact.

4.6.2 Commonwealth Legislation

The EPBC Act protects nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as matters of national environmental significance. The EPBC Act policy *Statement Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (SEWHA 2009) forms the basis of determining if impact to protected matters is significant.

The habitat assessment identified no threatened species listed under the EPBC Act which may potentially be affected by the proposal.

5 Environmental safeguards

The proposal has followed the principles of 'avoid, minimise, mitigate' to reduce the impact of the proposal on local biodiversity values.

5.1 Avoid impact

The following avoidance measures have been made:

- Alignment of the access road will primarily follow the existing access road.
- Impact of Cosmopolitan Open Cut operation will not extend past the existing surface level boundary.
- Areas outside of the subject site (direct impact area) within the mine site study area (see **Figure 1-3**) will not be disturbed by surface activities of the proposal.

5.2 Minimise impact

The implementation of avoidance actions has reduced the overall impact of the proposal and as such, no minimisation methods have been recommended.

5.3 Mitigate impact

The following mitigation measures in **Table 5-1** have been suggested to lower the potential impact of the proposal.

Table 5-1: Summary of environmental safeguards

Impact	Environmental safeguards	Responsibility	Timing
General	1. All personnel would be inducted to be aware that any impact to threatened species has legislative consequences whether deliberate or accidental; without development approval under the EP&A Act. Evidence of all personnel receiving an induction would be kept on file (signed induction sheets etc.). 2. A profile for each of the subject species previously recorded within 10km of the study area will be shown to personnel during inductions. Pictures of these species would be included in the profile to assist staff in avoiding these species. 3. Any change in design outside the assessed impact footprint within the study area will require further ecological survey.	Proponent	Pre-construction, construction, operation
Clearing and prevention of over-clearing	4. All personnel would be inducted to be aware any stand of native vegetation outside the subject site has legislative consequences if deliberately or accidentally impacted without approval under Part 4 or 5 of the EP&A Act. Evidence of all personnel receiving an induction would be kept on file (signed induction sheets). 5. Where possible, vegetation to be removed would be mulched on-site and re-used to stabilise disturbed areas. 6. Prior to clearing, inspect trees for bird nests	Contractor	Pre-construction

Impact	Environmental safeguards	Responsibility	Timing
	before pushing or felling to ensure the nests are vacant. Inspection would occur immediately before pushing or felling. If a bird is in the nest, clear the trees around it first to see if the animal will disperse. If the bird is a nestling all measures would be taken to collect the bird and remove to a safe location. 7. Trees with nests are to be “knocked” and watched for movement of fauna for at least 15 minutes, before felling occurs. 8. Parts of trees from tree felling can be placed in areas of native vegetation to be retained. This will provide habitat complexity in the form of fallen timber to increase species diversity.		
Soil Management	9. Erosion and sediment controls in line with Landcom’s Managing Urban Stormwater, Soils & Construction Guidelines (The Blue Book. Landcom 2004) are required.	Contractor	Pre construction
Introduction and spread of noxious weeds and pathogens	10. If declared noxious weeds are identified during construction they would be managed according to the requirements of the <i>Noxious Weeds Act 1993</i>. 11. Construction machinery (bulldozers, excavators, trucks, loaders and graders) would be cleaned using a high-pressure washer (or other suitable device) before entering and exiting work sites. 12. All pesticides would be used in accordance with the requirements on the label. Any person carrying out pesticide (including herbicide) application would be trained to do so and have the proper certificate of completion/competency or statement of attainment issued by a registered training organisation.	Contractor	Construction
Introduction of invasive fauna	13. All food scraps and rubbish are to be appropriately disposed of in sealed containers to prevent providing forage habitats for foxes, rats, dogs and cats.	Contractor	Construction
Disturbance to fallen timber, dead wood and bush rock	14. Any fallen timber, dead wood and bush rock (if present) encountered on site would be left in situ or relocated to a suitable place nearby. Rock would be removed with suitable machinery so as not to damage the underlying rock or result in excessive soil disturbance.	Contractor	Construction

6 Summary of Approvals

No specific licences, permits, approvals and notifications have been identified as being required for the construction, maintenance and operation of the proposal under Part 4.1 of the EP&A Act.

7 Conclusion

This ecological assessment was based on a combination of database review and field survey. Of note, the field survey recorded one noxious weed (Green Cestrum (*Cestrum parqui*)) and one threatened bat (Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*)) in the study area. Database searches predicted two threatened bat species had potential to be affected by the proposal. Seven-part tests were completed for these species and found the proposal would not constitute a significant impact on these species.

Minor vegetation clearing of planted native flora will occur as part of the proposal and is not considered a significant loss of habitat. One unnamed Strahler first order waterway traverses the access road impact footprint, however, the waterway will not be impacted as the road already exists. Therefore, no additional permits, approvals or permits are required.

Where possible, impact to the environment has been avoided through use of existing access roads to access to proposal. Additional safeguards and mitigation measures have been provided to minimise harm to the environment. If these are implemented then the proposal is unlikely to have a significant impact to species, populations and communities listed under the EPBC, TSC or FM Acts.

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Appendix A: Field survey results

BAT CALL ANALYSIS

Broken Hill North Mine

Broken Hill NSW

June 2016

Methods for species identification

Bats produce a wide range of different shaped pulses which can all be broken down into standard components for comparison (Pennay *et al.* 2004). In relation to the analysis of those microchiropteran (microbat) calls obtained, it is noted that some insectivorous bat species have distinctive echolocation calls that are unlikely to be confused with those of other species. Other bat species overlap in both call frequency and structure making identification difficult. Poor quality calls confound the issues of identifying species with similar call frequencies.

Species nomenclature

Species names used in this summary follow Churchill (2008), except for Mormopterus (Ozimops) species, which follow Reardon *et al.* (2014).

Call identification

Call identification is based on existing call descriptions and keys presented in Reinhold *et al.* (2001) and Pennay *et al.* (2004) as well as reference calls collected in south-eastern Queensland and northern New South Wales. Species' identification was further refined by considering probability of occurrence based on distributional information presented in Churchill (2008) and Van Dyck & Strahan (2008) and spatial data stored on the OEH Bionet and Atlas of Living Australia.

Reporting standard

This report follows the nationally accepted standards for the interpretation and reporting of bat echolocation data (Reardon 2003). More recent versions these reporting standards are available from the Australasian Bat Society on-line at <http://www.ausbats.org.au/>.

Survey effort and identification rate summary

A total of 13 call sequences were recorded during the survey. Of these, 6 could not be identified confidently to species or genus level (see **Table 1**). Calls with less than three pulses were not identified. Survey effort is shown in **Table 2**.

Table 1: Bat species and passes recorded during the sampling periods.

No.	Scientific name	Common Name	Broken Hill North Mine				
			16-06-16	17-06-16	18-06-16	19-06-16	20-06-16
Bat calls positively identified							
1	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat					1
2	<i>Mormopterus (O.) petersi</i>	Inland Freetail Bat					5
3	<i>Saccolaimus flaviventris</i> #	Yellow-bellied Sheathtail Bat		1			
Bat calls not positively identified							
-	<i>Chalinolobus gouldi</i> or <i>Scotorepens balstoni</i> or <i>Mormopterus (O.) petersi</i>		3				2
-	Unknown / not enough pulses						1
	TOTAL CALLS		3	1	0	0	9

species listed under the *NSW Threatened Species Conservation Act 1995*.

* species listed under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*.

Table 2: Survey Effort.

Device	Description	Date and Time Set	Date and Time Removed	Nights
Songmeter SM3	In front of gated mine shaft for a zinc/silver mine.	16 June 2016	20 June 2016	5
Total effort (nights)				5

Results / Discussion

Three species of microbat were recorded in the Subject Site (**Table 3**) including *Saccolaimus flaviventris* listed as vulnerable under the *NSW Threatened Species Conservation Act* (TSC Act).

Bats use different habitat throughout the year for daily torpor use, winter hibernation, stopovers during long migrations, or, for forming breeding and nursing colonies.

During winter, microbats enter hibernation or extended torpor bouts. Torpor bouts may last for more than 2 weeks and up to 5 days in subtropical areas, but some species forage during warm weather in winter (Geiser and Kortner 2010). This explains the reduced levels of bat activity and low volume of calls in the subject site. It is possible that cave dependent species (including threatened species) may be using the cave structure for winter hibernation. If impact were to occur to the mine shaft, a spring survey is recommended to ensure the shaft does not contain important breeding habitat for threatened or common bat species.

Notes: species calls not readily identifiable

Scotorepens balstoni or *M. (O.) petersi* or *M. (O.) planiceps* or *Chalinobus gouldii*

These species have characteristic frequencies (Fc) overlapping in the range 28-33kHz. Mormopterus species *M. (O.) petersi* / *M. (O.) planiceps* can be differentiated from *Chalinobus gouldi* by steep pulses and a lack of alternation which is usually present in *C. gouldii* calls at these frequencies. Mormopterus spp. calls are mostly flat pulses with no alternation. *S. Balstoni* can generally be differentiated by the lack of alternation in the call between 30 and 35Hz. When no determining call features are present however these species cannot be reliably separated.

Unidentified bat calls

Some calls lacked sufficient detail for attribution to species level (not enough pulses, noisy or weak calls). These unidentified bat calls are unlikely to represent any additional species (based on call parameters) than those detailed in this report.

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OzArk Previous Bat Surveys in Western NSW Unincorporated Area

No. of species	Scientific name	Common Name	Poiltah Lake 150 km sth of Broken Hill (HW22) GDAz54 557763, 6335819	Churinga' 70km South of Mutawintji NP GDAz54 666131, 6488711	Mutawintji National Park GDAz54 624015, 6538316		Purnamoota Station GDAz54 537207,6492310		Broken Hill North Mine GDAz54 545529, 6464658
			7.5.2009	15.11.2014	31.4.2015	26.11.2015	31.4.2015	30.11.2015	16.06.2016
Bat calls positively identified									
1	<i>Austronomus australis</i>	White-striped freetail bat	x	x	x	x	x	x	
2	<i>Chalinolobus gouldii</i>	Gould's Wattles Bat			x				x
3	<i>Chalinolobus morio</i>	Chocolate Wattled Bat		x		x	x		
4	<i>Chalinolobus picatus</i> #	Little Pied Bat	x	x	x	x		x	
5	<i>Mormopterus (O.) petersi</i>	Inland Freetail Bat	x	x	x	x	x	x	x
6	<i>M.(O.) planiceps</i>		x	x	x			x	
7	<i>Nyctophilus sp.</i>	Long-eared Bat species	x	x	x	x			
8	<i>Saccolaimus flaviventris</i> #	Yellow-bellied Sheath-tailed bat			x				x
9	<i>Scotorepens balstoni</i>	Inland Broadnosed Bat	x	x		x		x	
10	<i>Scotorepens greyii</i>	Little Broad-nosed Bat		x		x		x	
11	<i>Vespadelus vulturnus</i>	Little Forest Bat	x	x	x	x		x	
12	<i>Vespadelus baverstockii</i> #	Inland Forest Bat	x		x				
			8	9	9	8	3	7	3

= TSC Act listed species

Recorded Flora

Scientific Name	Common Name	Type
<i>Callistemon spp.</i>		Native
<i>Erodium cicutarium</i>	Common Storksbill	Exotic
<i>Eucalyptus gillii?</i>	Curly Mallee	Native
<i>Cestrum parqui</i>	Green Cestrum	Noxious
<i>Acacia aneura</i>	Mulga	Native
<i>Atriplex nummularia</i>	Old Man Saltbush	Native
<i>Nothoscordum inodorum</i>	Onion weed	Exotic
<i>Calotis cuneifolia</i>	Purple Burr-daisy	Native
<i>Solanum esuriale</i>	Quena	Native
<i>Eucalyptus camaldulensis</i>	River Red Gum	Native
<i>Senna artemisioides</i>	Silver Cassia	Native
<i>Hakea leucoptera subsp. leucoptera</i>	Silver Needlewood	Native
<i>Eucalyptus cladocaly</i>	Sugar Gum	Native
<i>Dodonaea viscosa subsp. cuneate</i>	Wedge-Leaf Hop Bush	Native
<i>Myoporum montanum</i>	Western Boobialla	Native

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Appendix B: Habitat assessment table

Full profile

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Animal> Bats	<i>Chalinolobus picatus</i>	Little Pied Bat	Vulnerable		Known		Yes	The Little-Pied Bat is found in inland Queensland and NSW (including Western Plains and slopes) extending slightly into South Australia and Victoria. Occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine forest and mallee and Bimbil box woodlands. Roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings. Can tolerate high temperatures and dryness but need access to nearby open water.	Study area contains suitable habitat	Potential
Animal> Bats	<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	Vulnerable	Vulnerable		May occur	No	Overall, the distribution of the Corben's Long-eared Bat coincides approximately with the Murray Darling Basin with the Pilliga Scrub region being the distinct stronghold for this species. Inhabits a variety of vegetation types, including mallee, bullock Allocasuarina leuhmanni and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. Roosts in tree hollows, crevices, and under loose bark.	Study area does not contain suitable habitat	Unlikely
Animal> Bats	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	Vulnerable		Known		No	The Yellow-bellied Sheath-tail-bat is a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range - most of Victoria, south-western NSW and adjacent South Australia - it is a rare visitor in late summer and autumn. There are scattered records of this species across the New England Tablelands and North West Slopes. Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	Species recorded in bat survey	Yes

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Animal > Birds	<i>Amytornis textilis modestus</i>	Thick-billed Grasswren (eastern subspecies)	Critically Endangered	Vulnerable	Predicted	Likely	No	The Thick-billed Grasswren was thought to be extinct in NSW until recently located in the Packsaddle area. May still occur at other locations in Upper Western Region. Sedentary, usually inhabiting dense, low saltbush, cottonbush, bluebush and nitre-bush areas on sandy plains or depressions in gibber; also occurs along watercourses in clumps of Canegrass; when disturbed, individuals take refuge in any available cover, including piles of old flood debris along dry sandy watercourses and down rabbit burrows.	Study area does not contain suitable habitat	Unlikely
Animal > Birds	<i>Apus pacificus</i>	Fork-tailed Swift	Protected			Likely	No	In NSW, the Fork-tailed Swift is recorded in all regions. Many records occur east of the Great Divide, however, a few populations have been found west of the Great Divide. The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. The sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Animal> Birds	<i>Ardeotis australis</i>	Australian Bustard	Endangered		Known		No	The Australian Bustard mainly occurs in inland Australia and is now scarce or absent from southern and south-eastern Australia. In NSW, they are mainly found in the north-west corner and less often recorded in the lower western and central west plains regions. Occasional vagrants are still seen as far east as the western slopes and Riverine plain. Breeding now only occurs in the north-west region of NSW. Mainly inhabits tussock and hummock grasslands, though prefers tussock grasses to hummock grasses; also occurs in low shrublands and low open grassy woodlands; occasionally seen in pastoral and cropping country, golf courses and near dams. Breeds on bare ground on low sandy ridges or stony rises in ecotones between grassland and protective shrubland cover; roosts on ground among shrubs and long grasses or under trees.	Study area does not contain suitable habitat	Unlikely
Animal> Birds	<i>Burhinus grallarius</i>	Bush Stone-curlew	Endangered		Known		Yes	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber.	Study area does not contain suitable habitat	Unlikely
Animal> Birds	<i>Calamanthus campestris</i>	Rufous Fieldwren	Vulnerable		Known		Yes	In NSW most records of the Rufous Fieldwren are of the subspecies <i>isabellinus</i> and are centred in the Broken Hill/Mutawintji/Fowlers Gap area. There are records near the Murray River, but these remain unconfirmed though suitable habitat probably does occur. These records may refer to the subspecies <i>campestris</i> which otherwise occurs between extreme north west Victoria (Lake Tyrrell) and eastern Western Australia (Balladonia). Overall the limits of this species' distribution in NSW is poorly known, and it is potentially under-surveyed. Inhabits low shrublands, particularly saltbush and bluebush communities, and also areas around inland saline lakes.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Animal > Birds	<i>Certhionyx variegatus</i>	Pied Honeyeater	Vulnerable		Known		No	Inhabits wattle shrub, primarily Mulga (<i>Acacia aneura</i>), mallee, spinifex and eucalypt woodlands, usually when shrubs are flowering; feeds on nectar, predominantly from various species of emu-bushes (<i>Eremophila</i> spp.); also from mistletoes and various other shrubs (e.g. <i>Grevillea</i> spp.); also eats saltbush fruit, berries, seed, flowers and insects. Widespread throughout acacia, mallee and spinifex scrubs of arid and semi-arid Australia. Occasionally occurs further east, on the slopes and plains and the Hunter Valley, typically during periods of drought.	Study area does not contain suitable habitat	Unlikely
Animal > Birds	<i>Circus assimilis</i>	Spotted Harrier	Vulnerable		Known		Yes	The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population. Occurs in grassy open woodland including <i>Acacia</i> and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Animal > Birds	<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	Vulnerable		Known		Yes	The Brown Treecreeper is endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. It is less commonly found on coastal plains and ranges. The western boundary of the range of the species runs approximately through Corowa, Wagga Wagga, Temora, Forbes, Dubbo and Inverell. The eastern subspecies lives in eucalypt woodlands through central NSW and in coastal areas with drier open woodlands. Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey; also found in mallee and River Red Gum (<i>Eucalyptus camaldulensis</i>) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging.	Study area does not contain suitable habitat	Unlikely
Animal > Birds	<i>Daphoenositta chrysoptera</i>	Varied Sittella	Vulnerable		Known		No	The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Animal > Birds	<i>Epthianura albifrons</i>	White-fronted Chat	Vulnerable		Known		Yes	The distribution of the White-fronted Chat extends across the southern half of Australia, from the southernmost areas of Queensland to southern Tasmania and across to Western Australia as far north as Carnarvon (Barrett et al. 2003). Found mostly in temperate to arid climates and very rarely seen in sub-tropical areas, the White-fronted Chat occupies foothills and lowlands below 1000 m above sea level (North 1904; Higgins et al. 2001; Barrett et al. 2003). In New South Wales the White-fronted Chat occurs mostly in the southern half of the state, occurring in damp open habitats along the coast, and near waterways in the western part of the state (Higgins et al. 2001). Along the coastline, White-fronted Chats are found predominantly in saltmarsh vegetation although they are also observed in open grasslands and sometimes in low shrubs bordering wetland areas. These birds are unlikely to fly over urbanised areas.	Study area does not contain suitable habitat	Unlikely
Animal > Birds	<i>Falco hypoleucos</i>	Grey Falcon	Endangered		Known		No	The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Animal> Birds	<i>Falco subniger</i>	Black Falcon	Vulnerable		Known		Yes	The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres. Populations are likely to occur in most substantial reserve of flat, open habitats in the arid and semi-arid zones, particularly those with riparian habitats. The Black Falcon inhabits woodland, shrubland and grassland in the arid and semi-arid zones, especially wooded (eucalyptdominated) watercourses; it also uses agricultural land with scattered remnant trees. The Falcon is often associated with streams or wetlands, visiting them in search of prey. It uses standing dead trees as lookout posts.	Study area does not contain suitable habitat	Unlikely
Animal> Birds	<i>Gallinago hardwickii</i>	Latham's Snipe	Protected			May occur	No	Latham's Snipe is a non-breeding visitor to south-eastern Australia, and is a passage migrant through northern Australia. The species has been recorded along the east coast of Australia from Cape York Peninsula through to south-eastern South Australia. In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity. The structure and composition of the vegetation that occurs around these wetlands is not important in determining the suitability of habitat (Naarding 1983).	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Animal> Birds	<i>Grus rubicunda</i>	Brolga	Vulnerable		Predicted		No	The Brolga was formerly found across Australia, except for the south-east corner, Tasmania and the south-western third of the country. It is still abundant in the northern tropics, but very sparse across the southern part of its range. Though Brolgas often feed in dry grassland or ploughed paddocks or even desert claypans, they are dependent on wetlands too, especially shallow swamps, where they will forage with their head entirely submerged.	Study area does not contain suitable habitat	Unlikely
Animal> Birds	<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	Vulnerable		Known		Yes	The Black-breasted Buzzard is found sparsely in areas of less than 500mm rainfall, from north-western NSW and north-eastern South Australia to the east coast at about Rockhampton, then across northern Australia south almost to Perth, avoiding only the Western Australian deserts. Lives in a range of inland habitats, especially along timbered watercourses which is the preferred breeding habitat. Also hunts over grasslands and sparsely timbered woodlands.	Study area does not contain suitable habitat	Unlikely
Animal> Birds	<i>Hieraaetus morphnoides</i>	Little Eagle	Vulnerable		Known		Yes	The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	Study area does not contain suitable habitat	Unlikely
Animal> Birds	<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	Vulnerable		Known		Yes	This Cockatoo is found across the arid and semi-arid inland, from south-western Queensland south to north-west Victoria, through most of South Australia, north into the south-west Northern Territory and across to the west coast between Shark Bay and about Jurien. In NSW it is found regularly as far east as about Bourke and Griffith, and sporadically further east than that. Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water. Feeds mostly on the ground, especially on the seeds of native and exotic melons and on the seeds of species of saltbush, wattles and cypress pines.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Animal> Birds	<i>Lophoictinia isura</i>	Square-tailed Kite	Vulnerable		Predicted		No	The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland.	Study area does not contain suitable habitat	Unlikely
Animal> Birds	<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	Vulnerable		Known		No	The Hooded Robin is widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. However, it is common in few places, and rarely found on the coast. Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. Often perches on low dead stumps and fallen timber or on low-hanging branches, using a perch-and-pounce method of hunting insect prey.	Study area does not contain suitable habitat	Unlikely
Animal> Birds	<i>Motacilla cinerea</i>	Grey Wagtail	Protected			May occur	No	The Grey Wagtail has non-breeding habitat only in Australia. It has a strong association with water, particularly rocky substrates along water courses but also lakes and marshes.	Study area does not contain suitable habitat	Unlikely
Animal> Birds	<i>Motacilla flava</i>	Yellow Wagtail	Protected			May occur	No	Occurs throughout Australia. Can be found in a range of land uses including pastures, wetlands, shrublands, grasslands and man made environments.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Animal> Birds	<i>Neophema splendida</i>	Scarlet-chested Parrot	Vulnerable		Known		No	The Scarlet-chested Parrot has been found in Scotia Mallee (Tarawi NR, Scotia Sanctuary) in NSW. Inhabits semi-arid areas with mallee and mulga scrublands/open woodlands with spinifex and saltbush ground covers. Occurs in both recently burnt and older growth mallee.	Study area does not contain suitable habitat	Unlikely
Animal> Birds	<i>Oxyura australis</i>	Blue-billed Duck	Vulnerable		Known		Yes	The Blue-billed Duck is endemic to south-eastern and south-western Australia. It is widespread in NSW, but most common in the southern Murray-Darling Basin area. Birds disperse during the breeding season to deep swamps up to 300 km away. It is generally only during summer or in drier years that they are seen in coastal areas. The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover. It will fly if disturbed, but prefers to dive if approached.	Study area does not contain suitable habitat	Unlikely
Animal> Birds	<i>Pedionomus torquatus</i>	Plains-wanderer	Endangered	Critically Endangered	Known	May occur	No	The vast majority (>99%) of records of Plains-wanderers in NSW over the past 30 years come from an area of the western Riverina bounded by Hay and Narrandera on the Murrumbidgee River in the north, the Cobb Highway in the west, the Billabong Creek in the south, and Urana in the east. Even within its western Riverina stronghold, the Plains-wanderer has a very patchy distribution. Plains-wanderers live in semi-arid, lowland native grasslands that typically occur on hard red-brown soils. These grasslands support a high diversity of plant species, including a number of state and nationally threatened species. Habitat structure appears to play a more important role than plant species composition. Preferred habitat of the Plains-wanderer typically comprises 50% bare ground, 10% fallen litter, and 40% herbs, forbs and grasses. Most of the grassland habitat of the Plains-wanderer is <5 cm high, but some vegetation up to a maximum of 30 cm is important for concealment, as long as grass tussocks are spaced 10-20 cm apart. The average home range of a single bird is about 12 ha. Breeding pairs have overlapping home ranges that total approximately 18 ha.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Animal> Birds	<i>Pezoporus occidentalis</i>	Night Parrot	Presumed Extinct	Endangered		Extinct	Yes	The distribution of the Night Parrot has not been well documented as all but one specimen (in 1990) have been recorded in the 19th century. It is known to be restricted to arid and semi-arid Australia. The Night Parrot is known to occur within Spinifex grasslands in stony or sandy areas and samphire and chenopod associations on floodplains, salt lakes and clay pans. Suitable habitat is characterized by the presence of large and dense clumps of Spinifex, and it may prefer mature spinifex that is long and unburnt. The Night Parrot appears to be highly nomadic, moving in response to availability of food and water.	Study area does not contain suitable habitat	Unlikely
Animal> Birds	<i>Phaps histrionica</i>	Flock Bronzewing	Endangered		Known		No	The Flock Bronzewing is likely to occur north of Broken Hill and west of Cobar when conditions are right. The extensive Mitchell grasslands around Brewarrina and Goodooga should also provide suitable habitat. Observed in a variety of vegetation types, including grassy plains, saltbush, spinifex and open mulga. Its preferred habitat is tussock grassland, particularly Mitchell grassland. They need to drink daily and may be seen adjacent to water, e.g. at stock tanks, bore drains and pools in water courses.	Study area does not contain suitable habitat	Unlikely
Animal> Birds	<i>Pomatostomus halli</i>	Hall's Babbler	Vulnerable		Predicted		No	Halls Babbler occurs in central-eastern Australia, from Cobar north into south-western Queensland, particularly along or west of the Warrego River. These birds have been recorded from the White Cliffs area through to the Culgoa River, Nocoleche Nature Reserve, Sturt National Park and Mutawintji National Park. Recently recorded in Mulga groves near Ledknapper Creek (1993) and near Mt Gunderbooka (1994). Inhabits dry Acacia scrub, mainly Mulga, with a grassy understorey including spinifex, on ridges and plains with either sandy or stony soils. Occasionally occurs in open dry Eucalyptus (Bimblebox) woodland, and mulga- or eucalypt-lined watercourses.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Animal> Birds	<i>Pyrrholaemus brunneus</i>	Redthroat	Vulnerable		Known		Yes	The Redthroat is confined to the far west of the state, with populations known from four main areas: ulloo Overflow to the east of Tibbooburra, Sturt NP and Broken Hill extending at least as far north as Mutawintji NP. The two areas in the south west of NSW are in chenopod shrublands (particularly Old Man Saltbush) to the north of Penarie, 25 kilometres north of Balranald and around the Great Darling Anabranch (particularly around Nearie Lake NR) to the north of Wentworth. The species has been recorded mainly in chenopod shrublands including Old Man Saltbush, Black Bluebush and Dillon Bush shrublands. Around Broken Hill it appears to be associated with the denser vegetation, particularly Acacias, found in drainage lines that run from the rocky hills.	Study area does not contain suitable habitat	Unlikely
Animal> Birds	<i>Rostratula australis</i>	Australian Painted Snipe	Endangered	Endangered	Known	Likely	Yes	Most records of the Australian Painted Snipe are from the south east, particularly the Murray Darling Basin, with scattered records across northern Australia and historical records from around the Perth region in Western Australia. In NSW many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella. Other important locations with recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Animal> Birds	<i>Stictonetta naevosa</i>	Freckled Duck	Vulnerable		Known		No	The Freckled Duck is found primarily in south-eastern and south-western Australia, occurring as a vagrant elsewhere. It breeds in large temporary swamps created by floods in the Bulloo and Lake Eyre basins and the Murray-Darling system, particularly along the Paroo and Lachlan Rivers, and other rivers within the Riverina. The duck is forced to disperse during extensive inland droughts when wetlands in the Murray River basin provide important habitat. The species may also occur as far as coastal NSW and Victoria during such times. Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds.	Study area does not contain suitable habitat	Unlikely
Animal> Birds	<i>Tyto novaehollandiae</i>	Masked Owl	Vulnerable		Predicted		No	The Masked Owl extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. There is no seasonal variation in its distribution. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	Study area does not contain suitable habitat	Unlikely
Animal>Fish	<i>Bidyanus bidyanus</i>	Silver Perch	Vulnerable		Known		No	Only one remaining secure and self sustaining population occurs in NSW in the central Murray River downstream of Yarrawonga weir, as well as several anabranches and tributaries.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Animal>Fish	<i>Maccullochella peelii</i>	Murray Cod	Protected	Vulnerable	Known	May occur	No	The Murray Cod was historically distributed throughout the Murray-Darling Basin (the Basin), with the exception of the upper reaches of some tributaries. The distribution of the Murray Cod occurs in the following bioregions according to the Interim Biogeographic Regionalisation for Australia (IBRA7) (DSEWPaC 2012ae): Murray-Darling Depression, Riverina, NSW South Western Slopes, South Eastern Highlands, Cobar Peneplain, Darling Riverine Plains, Brigalow Belt South and Nandewar. The Murray Cod utilises a diverse range of habitats from clear rocky streams, such as those found in the upper western slopes of NSW (including the ACT), to slow-flowing, turbid lowland rivers and billabongs. Murray Cod are frequently found in the main channels of rivers and larger tributaries. The species is, therefore, considered a main-channel specialist. Murray Cod tend to occur in floodplain channels and anabranches when they are inundated.	Study area does not contain suitable habitat	Unlikely
Animal>Fish	<i>Tandanus tandanus</i>	Freshwater Catfish	Endangered Population		Known		No	Eel Tailed Catfish are naturally distributed throughout the Murray-Darling Basin and in the Eastern drainages NSW north of Newcastle. Eel Tailed Catfish numbers in the Murray-Darling Basin have declined due to a range of impacts including invasive species, habitat degradation, cold water pollution and fishing pressures and are now virtually absent from the Murray, Murrumbidgee and Lachlan catchments.	Study area does not contain suitable habitat	Unlikely
Animal> Marsupials	<i>Antechinomys laniger</i>	Kultarr	Endangered		Predicted		No	The Kultarr is widespread across arid and semi-arid NSW but present in very low numbers. Recent records have come primarily from the Cobar and Brewarrina region. nhabits open country, especially claypans among Acacia woodlands. Nocturnal, sheltering by day in hollow logs or tree-stumps, beneath saltbush and spinifex tussocks, in deep cracks in the soil and in the burrows of other animals.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Animal>Marsupials	<i>Macrotis lagotis</i>	Bilby	Presumed Extinct		Known		No	Before European settlement the Greater Bilby was found on over 70% of the Australian mainland; the species now only occurs in less than 20% of its former range (Southgate 1990a). Wild Bilby populations are now restricted predominantly to the Tanami Desert, Northern Territory (Johnson & Southgate 1990), the Great Sandy and Gibson Deserts, Western Australia (Friend 1990), and an outlying population between Boulia and Birdsville in south-west Queensland (Gordon et al. 1990). The species historically occurred in NSW and throughout South Australia, and is being reintroduced into these States. Extant population of the Greater Bilby occur in a variety of habitats, usually on landforms with level to low slope topography and light to medium soils. It occupies three major vegetation types; open tussock grassland on uplands and hills, mulga woodland/shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas (Southgate 1990b). In the Tanami Desert the Greater Bilby is less abundant on dune and sand substrate than on laterite/rock features or drainage/calcrete substrates.	Study area does not contain suitable habitat	Unlikely
Animal>Marsupials	<i>Sminthopsis macroura</i>	Stripe-faced Dunnart	Vulnerable		Known		Yes	The Stripe-faced Dunnart is found throughout much of inland central and northern Australia, extending into central and northern NSW, western Queensland, Northern Territory, South Australia and Western Australia. They are rare on the NSW Central West Slopes and North West Slopes with the most easterly records of recent times located around Dubbo, Coonabarabran, Wyallda and Ashford. Native dry grasslands and low dry shrublands, often along drainage lines where food and shelter resources tend to be better. They shelter in cracks in the soil, in grass tussocks or under rocks and logs. Co-occupies areas with the more common Fat-tailed Dunnart, but prefers relatively ungrazed habitats with greater diversity and healthier understorey vegetation.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Animal>Reptiles	<i>Antaresia stimsoni</i>	Stimson's Python	Vulnerable		Known		No	The Stimson's Python occurs in north-west NSW, from Bourke and Gundabooka National Park in the east to Broken Hill and Wilcannia in the south. A terrestrial and semi-arboreal species that inhabits a wide range of arid and semi-arid environments including rock outcrops, sandy plains and dunefields where it is associated with larger trees and termite mounds. The species occupies a broad spectrum of habitats includes woodlands, shrublands (including Acacia and chenopods) and hummock grasslands, where rocky outcrops provide caves and deep crevices and where tree-lined watercourses provide numerous low hollows and fallen trees.	Study area does not contain suitable habitat	Unlikely
Animal>Reptiles	<i>Aspidites ramsayi</i>	Woma	Vulnerable		Known		No	The Woma occurs in north-western NSW, east to about Louth and Bourke. It was last recorded in these eastern districts in the late 1890s, and in 1983 from the Tibooburra region. Terrestrial, inhabiting subtropical to temperate deserts and sandy plains, as well as dunefields and deep cracking black soil plains in semi-arid areas. Occurs in hummock grasslands, shrublands or woodlands and shelters in animal burrows, hollow logs or under grass hummocks.	Study area does not contain suitable habitat	Unlikely
Animal>Reptiles	<i>Ctenophorus mirrityana</i>	Barrier Range Dragon	Endangered		Known		No	The Barrier Range Dragon is currently known from three highly restricted and fragmented sites near Mutawintji National Park and Broken Hill. Restricted to rock outcrops in ranges and gorges. It is absent from apparently suitable habitat in NSW.	Study area does not contain suitable habitat	Unlikely
Animal>Reptiles	<i>Ctenotus brooksi</i>	Wedgesnout Ctenotus	Vulnerable		Predicted		No	The Wedgesnout Ctenotus is known from few records, all from Sturt and Paroo-Darling National Parks. It is likely that the Wedgesnout Ctenotus also occurs in similar habitat adjacent to these reserves. Occurs in arid and semi-arid habitats and may be highly specialised, as it has only been recorded from large unconsolidated sand dunes and not from the low consolidated red sand ridges. Prefers areas of loose sand interspersed with vegetation on and near the crests of dunes and in NSW it is probably restricted to habitats containing spinifex or other clumping grassland communities.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Animal>Reptiles	<i>Cyclodomorphus melanops elongatus</i>	Mallee Slender Blue-tongue Lizard	Endangered		Known		No	The Mallee Slender Blue-tongue Lizard is restricted to the far south west with records scattered from mallee areas either side of the Darling River (including the Scotia mallee and Mungo and Mallee Cliffs National Parks). Recent surveys have detected this species in spinifex occurring on rocky hillsides to the north west of Broken Hill, a range extension over 100 kilometres in NSW. In NSW, animals inhabit mallee/spinifex communities on a sandy or mixed sand/gravel substrate (plains, ridges or hillslopes). It is assumed that the species seeks refuge in vegetation clumps such as spinifex and in fallen timber and leaf litter.	Study area does not contain suitable habitat	Unlikely
Animal>Reptiles	<i>Delma australis</i>	Marble-faced Delma	Endangered		Known		No	In NSW, the Marble-faced Delma appears to be restricted to temperate mallee woodlands or spinifex grasslands but elsewhere is also found in chenopod shrublands, heathlands and buloke associated with mallee habitats or eucalypt lined watercourses. The species occupies areas with a sandy substrate but may also utilise cracking red loam soils, but has also recently been recorded in spinifex on rocky hillsides. Found in deep leaf litter, under rocks, logs, fallen timber or in grass clumps such as spinifex. This species is widely distributed from Western Australia, through much of South Australia extending in to the southern Northern Territory and in north western Victoria and south western NSW. In NSW, most records are either from the Scotia mallee west of the Darling River in the far south west or from the central Murray centred on Round Hill and Nombinnie Nature Reserves.	Study area does not contain suitable habitat	Unlikely
Animal>Reptiles	<i>Diplodactylus platyurus</i>	Eastern Fat-tailed Gecko	Endangered		Known		No	The Eastern Fat-tailed Gecko is known from a small number of specimens detected at three locations: Sturt National Park, Nocoleche Nature Reserve and Wanaaring Nature Reserve and a single record from Mutawintji National Park. Habitat constraints are unknown, although the species' rarity suggests that it is highly specialised in its use of habitat. The recent record collected from Sturt National Park was from riverine habitat (R.A. Sadler, pers. comm.). It is also known to shelter in vertical spider burrows and cracks in the ground.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Animal>Reptiles	<i>Lerista xanthura</i>	Yellow-tailed Plain Slider	Vulnerable		Predicted		No	Since the 1970s, the Yellow-tailed Plain Slider has only been recorded from Kinchega, Sturt and Mutawintji National Parks, Tarawi Nature Reserve, and one record from Broken Hill. Occurs in a variety of semi-arid and arid habitats. Occurs on grassed alluvial sands and sand dunes, including dry open woodlands and spinifex-dominated red sand plains. The species is fossorial and usually found in loose soil or sand beneath stones, logs and other surface debris.	Study area does not contain suitable habitat	Unlikely
Animal>Reptiles	<i>Lucasium stenodactylum</i>	Crowned Gecko	Vulnerable		Predicted		No	The Crowned Gecko is known from four separate locations in the state's far west. These are Sturt National Park, Mutawintji National Park, Loch Lilly, 125km south of Broken Hill, and Thurloo Downs, 145km east of Tibooburra. Habitat preferences largely unknown. In NSW, the species has been reported from red sand habitats and elsewhere from savannah woodland and stony areas with shrubs.	Study area does not contain suitable habitat	Unlikely
Animal>Reptiles	<i>Pseudonaja modesta</i>	Ringed Brown Snake	Endangered		Known		Yes	The Ringed Brown Snake is thought to occupy the north-west portion of the state having been recorded from Tarawi Nature Reserve, 140km south of Broken Hill, Silverton, Tibooburra, Wanaaring and from Kilberoo, 140km north-west of Bourke. Recent surveys have identified a large population in the Scotia Sanctuary-Tarawi NR region. Occurs in a variety of vegetation types including woodlands, shrublands, mallee and grasslands. By night it shelters in ground debris or abandoned animal burrows. Typically inhabits drier areas including rocky outcrops and dry watercourses.	Study area does not contain suitable habitat	Unlikely
Animal>Reptiles	<i>Strophurus elderi</i>	Jewelled Gecko	Vulnerable		Predicted		No	The Jewelled Gecko is found in a range of habitats throughout the arid areas of central Australia, though all have Spinifex present as the ground layer. Restricted to habitats containing spinifex on red sandy plains or dunes and to a lesser extent stony hills. Spinifex may occur as a dominant groundcover with little to no overstorey vegetation or in association with mallee, cypress pine or acacia woodlands.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Animal>Reptiles	<i>Tiliqua occipitalis</i>	Western Blue-tongued Lizard	Vulnerable		Known		Yes	The Western Blue-tongued Lizard has scattered records across central western and western NSW. Inhabits plains, swales, ranges and sometimes dunes of loamy or clayey/sandy soils vegetated by woodlands, especially mallee, shrublands (including chenopods), heaths or hummock grasslands. Preferred vegetation type appears to be mixed mallee/Triodia communities.	Study area does not contain suitable habitat	Unlikely
Animal>Rodents	<i>Leggadina forresti</i>	Forrest's Mouse	Vulnerable		Known		No	Forrest's Mouse is sparsely distributed across arid and semi-arid inland Australia. In north west NSW, it has been recorded from Sturt National Park, Tibooburra, Fowler's Gap, Mutawintji National Park (as subfossil remains), and from near Wilcannia. The species has also recently been recorded from Ledknapper Nature Reserve, and Culgoa National Park near Weilmoringle. Forrest's Mouse occurs in arid and semi-arid plains habitats, especially tussock grassland and chenopod shrubland. Also mulga or savannah woodlands, claypans and sandy ridges.	Study area does not contain suitable habitat	Unlikely
Animal>Rodents	<i>Notomys fuscus</i>	Dusky Hopping-mouse	Endangered		Known		Yes	The Dusky Hopping-mouse was rediscovered in Sturt National Park in the State's far north west corner in 2003. Since then, the species has been recorded from around 50km south of Sturt National Park, and from around 80km north of Broken Hill. Most records are from sand dunes, hills and ridges associated with perennial Sandhill Canegrass (<i>Zygochloa paradoxa</i>), Dillon Bush (<i>Nitraria billardierei</i>) and Acacia species, characteristic of the Simpson Strzelecki Dunefields Bioregion. In contrast, the southern-most record in NSW was from the Broken Hill Complex Bioregion, and collected in Bluebush (<i>Maireana pyramidata</i>) chenopod shrubland near a drainage line with River Red Gums (<i>Eucalyptus camaldulensis</i>), Prickly Wattle (<i>Acacia victoriae</i>) and Western Boobiala (<i>Myoporum montanum</i>).	Study area does not contain suitable habitat	Unlikely
Animal>Rodents	<i>Notomys longicaudatus</i>	Long-tailed Hopping-mouse	Presumed Extinct		Known		No	No living Long-tailed Hopping Mice have either been seen or trapped since 1901, and the species is considered extinct. The species was once widespread throughout arid and semiarid country where the vegetation included acacia and eucalypt woodlands, hummock grassland and low shrubland.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Animal>Rodents	<i>Pseudomys bolami</i>	Bolam's Mouse	Endangered		Known		Yes	Bolam's Mouse records in NSW are centred on the Scotia Mallee including Tarawi Nature Reserve, Nanya Station, Scotia Sanctuary and surrounding properties. A smaller number of records have also been made on leasehold land to the south east of Mungo National Park. Recorded in a wide variety of habitats, with a preference for chenopod shrubland plains or low mallee woodland where there is a developed understorey of Acacia, Dodonaea or Eremophila species. It seems to especially favour plains areas, spillways and along valley bottoms where loam or clay soils occur. It has been recorded in four broad vegetation types in Tarawi Nature Reserve: Mallee-spinifex, Mallee shrubland, Belah woodland and Mixed open shrubland/woodland.	Study area does not contain suitable habitat	Unlikely
Animal>Rodents	<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse	Vulnerable		Known		No	The Sandy Inland Mouse is widely but very sparsely distributed over the arid and semi-arid zones of inland Australia. NSW occurrences are only in the far north-west where it is known from seven widely-scattered localities including Fowlers Gap, Sturt National Park, Tibbooburra, east of Enngonia, Mutawintji National Park (as subfossil remains), just east of Mutawintji National Park and near Kajuligah Nature Reserve (north of Ivanhoe). Occurs in a very wide range of open vegetation types including coolibah or Acacia woodlands, tall open shrublands (especially Mulga scrub) and hummock grasslands. Mostly on sands (plains and dunes) and sandy loams, but also in areas of cracking earth soils and gibber plains.	Study area does not contain suitable habitat	Unlikely
Animal>Rodents	<i>Rattus villosissimus</i>	Long-haired Rat	Vulnerable		Predicted		No	Strongholds for the Long-haired Rat are north-west of NSW, with plagues spreading south and east along river channels. Otherwise, the species is found in scattered localities in low numbers. Sustained in mesic, densely vegetated sites. During plagues can be found in virtually all inland habitats. Following extended periods of above average rainfall or flood this species can breed rapidly. Resulting populations disperse widely, then die away abruptly as food is depleted and water evaporates.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Community>Threatened Ecological Communities	<i>Acacia loderi shrublands</i>	Acacia loderi shrublands	Endangered Ecological Community		Known		No	The Acacia loderi Woodland is known from the Broken Hill Complex, Murray-Darling Depression, Cobar Peneplain, Riverina, Mulga Lands and Darling Riverine Plains Bioregions. Sites occur from south-western NSW to north-western Victoria and eastern South Australia. In NSW, the community is mainly confined to south-western NSW, extending east to Hillston and north to White Cliffs. The major stands occur between Broken Hill, Ivanhoe and Wilcannia, while isolated stands occur beyond these areas. Remnants are found on solonized brown and duplex soils on level to undulating plains or on calcareous red earths; at Kinchega National Park remnants are restricted to level areas on solonized brown soils; typical habitat has a rainfall range of 240mm to 280mm.	Study area does not contain suitable habitat	Unlikely
Community>Threatened Ecological Communities	<i>Porcupine Grass - Red Mallee - Gum Coolabah hummock grassland/low sparse woodland in the Broken Hill Complex Bioregion</i>	Porcupine Grass - Red Mallee - Gum Coolabah hummock grassland/low sparse woodland in the Broken Hill Complex Bioregion	Critically Endangered Ecological Community		Known		No	This community occurs on thin red sandy loam soils of primarily aeolian origin, deposited (possibly during the last glacial maximum) over rocky outcrops of the Willyama complex. It occurs on rocky hills in the Umberumberka Range section of the Barrier Range, north of Silverton. It is known from two areas of approximately 300ha and 200ha on leasehold land; it is not known from any conservation reserves.	Study area does not contain suitable habitat	Unlikely
Plant>Herbs and Forbs	<i>Atriplex infrequens</i>	A saltbush	Vulnerable		Predicted		No	This saltbush is confined to the NSW far western plains. North western records recorded from east of Tibooburra, south east of Brewarrina and near Wilcannia with isolated collections from the Pooncarie area in the south. Population structure and disturbance regimes are not known. Atriplex infrequens is associated with broad drainage tracts, clay flats and possibly occasionally inundated habitats. Very little ecological information is available for this species so its critical habitat components can only be speculated as relatively undisturbed and ungrazed drainage lines and flats	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Plant>Herbs and Forbs	<i>Convolvulus tedmoorei</i>	Bindweed	Endangered		Known		No	Bindweed is known from two areas on the Murrumbidgee and Darling River floodplains in central-western NSW (from Toganmain Station, Darlington Point, and from a locality 8km north-west of Louth); and two other records from east of Broken Hill on the road to Wilcannia, and from the Menindee Road, Scarsdale. Grows in self-mulching grey clay soils on the floodplains of the Darling and Murrumbidgee Rivers. Disturbance regimes are not known, although the species may require periodic flooding of its habitat to maintain the wet conditions suitable for seed set and germination.	Study area does not contain suitable habitat	Unlikely
Plant>Herbs and Forbs	<i>Dysphania platycarpa</i>	Dysphania platycarpa	Endangered		Predicted		No	Found only in the far north-western plains of NSW in the Broken Hill district. Localities include Sturt NP and Yantara Lake. Grows on heavy soils near ephemeral water, generally in clay or mud by fresh water. Recorded in Sturt National Park from previously flooded flats within the sandplain. Interstate habitats include claypan margins, sand above the Samphire level of a flooded clay flat, and in Gidgee scrub.	Study area does not contain suitable habitat	Unlikely
Plant>Herbs and Forbs	<i>Eleocharis obicis</i>	Spike-Rush	Vulnerable		Known		No	Found near Condobolin and Hay, as well as being known from an old collection from the Barrier Range near Broken Hill. The later collection was made on the Lachlan River floodplain at Micabil, near Condobolin. Grows in ephemerally wet situations such as roadside mitre drains and depressions, usually in low-lying grasslands. Sites include depressions with heavy clay soils on the Lachlan River floodplain, with Eragrostis australasica, Atriplex vesicaria and A. nummularia shrublands, low-lying claypans near an irrigation channel, and a shallow open ditch on a low ridge with Eucalyptus populnea in red sandy soil over clay.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Plant>Herbs and Forbs	<i>Erodiohyllum elderi</i>	Koonamore Daisy	Endangered		Known		No	The Koonamore Daisy occurs south from the Broken Hill district, at localities including Mazar Station south of Broken Hill and just east of the South Australian border. Grows in flat open areas on sandy calcareous soils. In central Australia, it grows mainly on alluvial floodplains. Commonly recorded from Mulga shrubland with chenopods in SA and WA. Soils include red sand, brown clay, texture-contrast soil on a scalded floodplain, and red loam to sandy loam with quartz. Associated vegetation includes Acacia aneura shrubland with A. burkittii and Dissocarpus paradoxus.	Study area does not contain suitable habitat	Unlikely
Plant>Herbs and Forbs	<i>Lepidium monoplocoides</i>	Winged Peppercress	Endangered		Known		No	The Winged Peppercress occurs on seasonally moist to waterlogged sites, on heavy fertile soils, with a mean annual rainfall of around 300-500 mm. Widespread in the semi-arid western plains regions of NSW.	Study area does not contain suitable habitat	Unlikely
Plant>Herbs and Forbs	<i>Swainsona flavicarinata</i>	Yellow-Keeled Swainsona	Endangered		Known		No	The Yellow-Keeled Swainsona is not common in NSW, having an outlier population in the Broken Hill-Menindee district in the far western plains. Grows in deep red sand, recorded from a roadside on a treeless plain in NSW. In central Australia, the species grows in Mulga communities on red earths and on stony soils supporting Bladder Saltbush. Also found on sandy plains and ridges, in grassland, and in watercourses and floodplains near creeks or rock holes. Associated species include Acacia murrayana, A. aneura, Maireana aphylla, Atriplex vesicaria, Triodia, Solanum and Euphorbia spp.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Plant>Herbs and Forbs	<i>Swainsona murrayana</i>	Slender Darling Pea	Vulnerable		Known		No	Found throughout NSW, it has been recorded in the Jerilderie and Deniliquin areas of the southern riverine plain, the Hay plain as far north as Willandra National Park, near Broken Hill and in various localities between Dubbo and Moree. The species has been collected from clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and loams. Grows in a variety of vegetation types including bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with Maireana species. Plants have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated. The species may require some disturbance and has been known to occur in paddocks that have been moderately grazed or occasionally cultivated.	Study area does not contain suitable habitat	Unlikely
Plant>Herbs and Forbs	<i>Swainsona viridis</i>	Creeping Darling Pea	Endangered		Predicted		No	Uncommon in the Broken Hill and Silverton districts in the far north-western plains of NSW. Grows in dry, sandy or stony areas on the banks or in the beds of creeks. Found in the Broken Hill area on sandy soils near watercourses. Also collected along a roadside sandplain in sandy-loam soil.	Study area does not contain suitable habitat	Unlikely
Plant> Shrubs	<i>Acacia carneorum</i>	Purple-wood Wattle	Vulnerable	Vulnerable	Known	Likely	Yes	The Purple-wood Wattle occurs in the far western plains, south from west of Tibooburra to the Menindee area. Grows in grassland and woodland in red, sandy soil; also found in Mulga communities on sand dunes, level sandy sites and alluvial accumulations along watercourses; recorded from inland semi-arid Acacia and Casuarina shrublands and woodlands. Preferred soils are shallow, calcareous and loamy, and include brown earths, crusty alkaline soils and neutral red duplex soils; confined to red-earth dune soils in Kinchega NP as a dominant or occasionally co-dominant, usually on dune crests or slopes. Associated species include Alectryon oleifolius, Casuarina cristata, C. pauper, Maireana pyramidata, Eucalyptus socialis and Enchyleana tomentosa.	Study area does not contain suitable habitat	Unlikely

Species Classification			Legislative Protection		Occurrence		Previously Recorded	Species Profile	OzArk Determination	
Class Name	Scientific Name	Common Name	TSC Act	EPBC Act	OEH	DoE	Within 10 km	Habit Description	Likelihood	Affected
Plant> Shrubs	<i>Acacia notabilis</i>	Mallee Golden Wattle	Endangered		Known		Yes	The Mallee Golden Wattle occurs west from Menindee in the far western plains of NSW. Early collections come from Byrnedale Station near Menindee and a locality south of Broken Hill. Grows in mallee communities and open woodland on stony and rocky hills; soils types include brown lateritic loam, red clay-loam, shallow stony sands and red silty gravelly sand. Associated species include <i>Eucalyptus camaldulensis</i> , <i>E. gracilis</i> , <i>E. socialis</i> , <i>E. calycogona</i> , <i>E. leptophylla</i> , <i>Melaleuca uncinata</i> , <i>Acacia</i> spp., <i>Sclerolaena diacantha</i> and <i>Beyeria opaca</i> .	Study area does not contain suitable habitat	Unlikely
Plant> Shrubs	<i>Acacia rivalis</i>	Creek Wattle	Endangered		Known		Yes	The Creek Wattle is a SA species. There is a possibility that the species did not occur naturally in New South Wales but has become naturalised in a restricted area near Broken Hill. In NSW, <i>Acacia rivalis</i> is confined to woodland communities bordering ephemeral creeks and streams and along watercourses. It grows in a variety of stony soils, often with limestone content. Associated species include <i>Callitris glaucophylla</i> , <i>Eucalyptus camaldulensis</i> , <i>Acacia victoriae</i> , <i>A. tetragonophylla</i> , <i>Hakea edneana</i> and <i>Eremophila</i> spp.	Study area does not contain suitable habitat	Unlikely
Plant> Shrubs	<i>Indigofera longibractea</i>	Showy Indigo	Endangered		Known		Yes	The Showy Indigo is restricted to an area just north of Broken Hill known as the Waukeroo Hills. Found on rocky hills and creek beds, growing in limited numbers in shallow stony soils among rock outcrops. Across its range it occupies a variety of rocky habitats, ranging from creeks to scree slopes and ridges. Soils are skeletal and sandy.	Study area does not contain suitable habitat	Unlikely

Appendix C: TSC Act assessment of significance

- 1) In the case of a threatened species, the Proposal is not likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.
- 2) In the case of an endangered population, the Proposal is not likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.
- 3) In the case of an endangered ecological community or critically endangered ecological community:
 - i. The Proposal is not likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
 - ii. The Proposal is not likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.
- 4) In relation to the habitat of a threatened species, population or ecological community:
 - i. The extent to which habitat is likely to be removed or modified as a result of the Proposal, and
 - ii. That an area of habitat is not likely to become fragmented or isolated from other areas of habitat as a result of the Proposal, and
 - iii. The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.
- 5) That the Proposal is not likely to have an adverse effect on critical habitat (either directly or indirectly).
- 6) That the Proposal is not consistent with the objectives or actions of a recovery plan or threat abatement plan.
- 7) That the Proposal constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Key:

X = The development will not impact critical habitat.

+ = The proposal is not consistent with objectives or actions of a recovery plan or threat abatement plan.

= The proposed development constitutes or is part of a key threatening process:

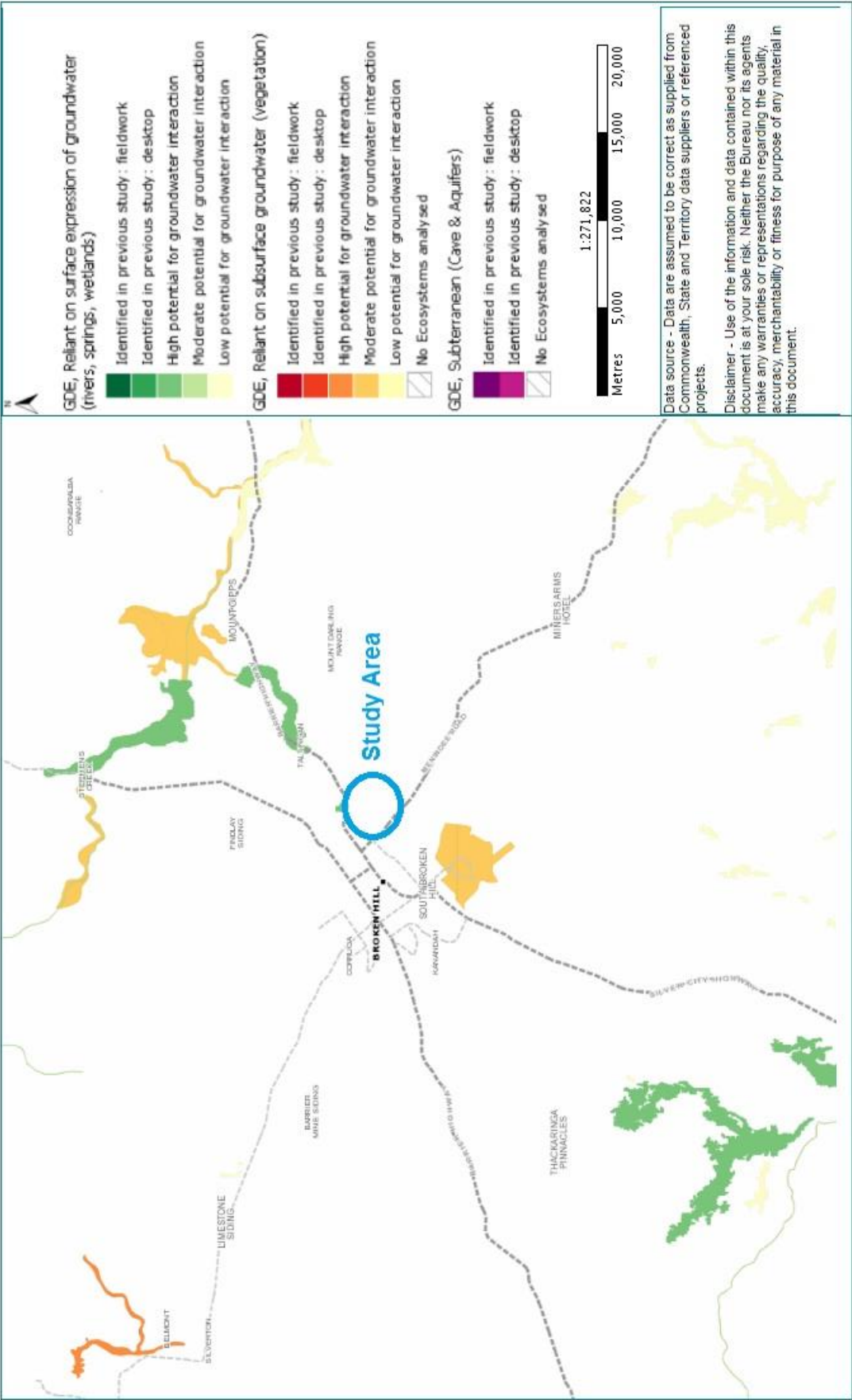
- Clearing of native vegetation.
- Anthropogenic climate change.
- Invasion of native plant communities by exotic perennial grasses.

Species		7-Part Test Questions					
Scientific Name	Common Name	1	2/3	4	5	6	7
Bats							
<i>Chalinolobus picatus</i>	Little Pied Bat	Yellow-bellied Sheathtail-bat has been recorded in the subject site (see Appendix A for bat call analysis) and the Little Pied Bat has not. The Little Pied Bat been previously recorded within 10km of the study area, based on the OEH BioNET database. Call analysis of the Yellow-bellied Sheathtail-bat found a single call on a single night, which indicates an individual is using the mine shaft as opposed to a viable local population. Therefore the proposal is not likely to place a viable local population at risk of extinction.	N/A	Both bat species have the potential to roost in trees and manmade structures in the subject site. The proposal has the potential to cause direct habitat removal and indirect impact (vibration and noise) to the mine shaft. The proposal will shorten the mine shaft through further open cut operations, not remove the mine shaft all together. Therefore there will still be useful habitat remaining for these bat species. Due to the low numbers of calls recorded of the Yellow-bellied Sheathtail-bat and no calls for the Little Pied Bat, it is unlikely the mine shaft is used for maternal roosting. Foraging habitat in the study area is likely due to the presence of insects from industrial lighting at night. The species mobility would enable them to relocate easily to alternative habitats if need be.	X	+	#
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat						

Appendix D: Database search results

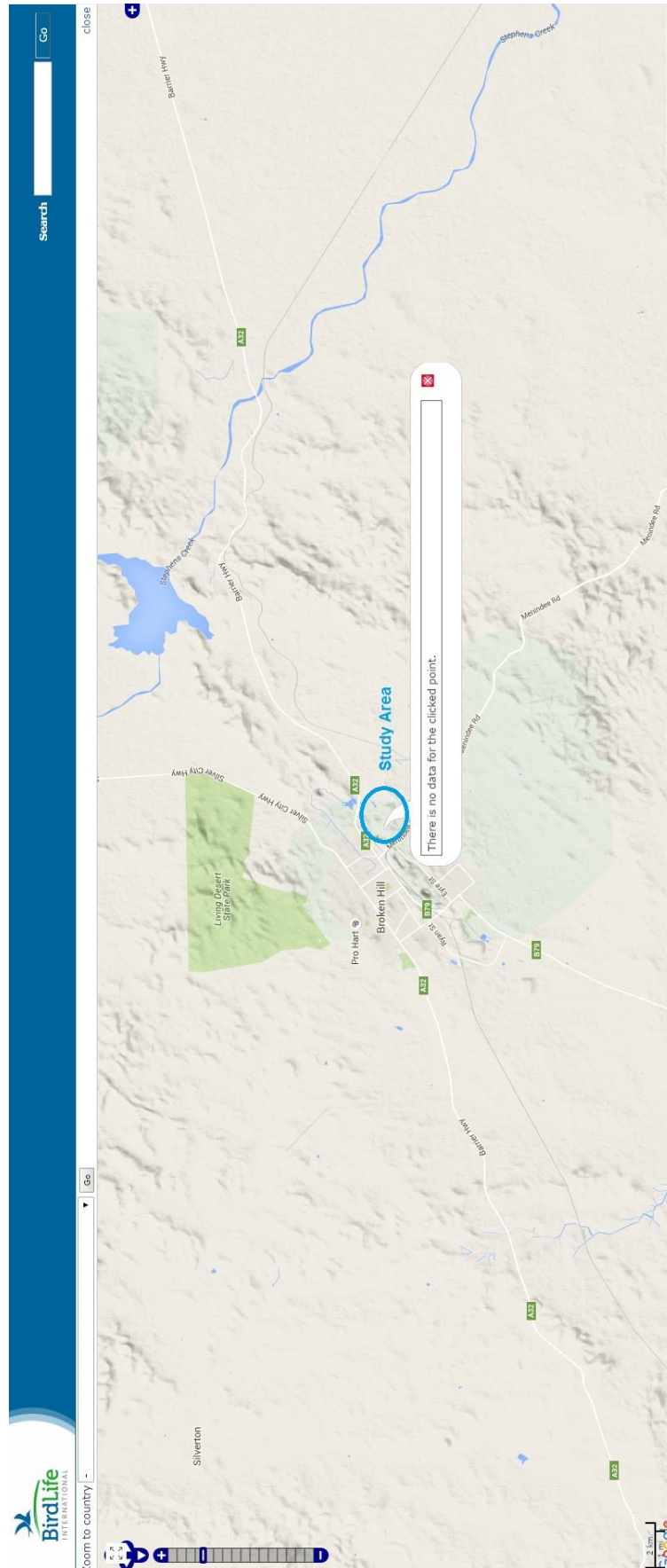
Ground water dependant ecosystems (Source: BoM)

Groundwater Dependent Ecosystem Map Report



Date: 12 July, 2016

Important bird habitat near the study area (blue)



Primary Industries (Fishing and Aquaculture)

PRIMARY INDUSTRIES
Fishing and Aquaculture

Home » Fishing » Species protection » Records

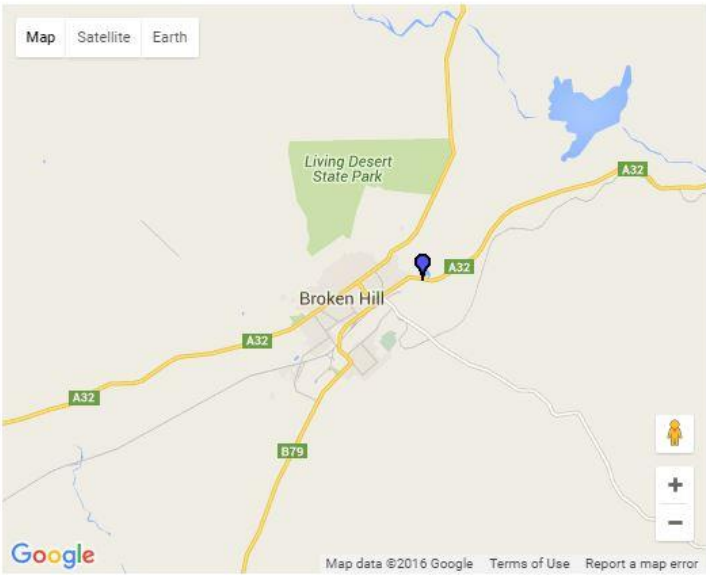


Note: The Google map is not currently operational, although mapping data can be retrieved by using the Records search in the right panel. The viewer will soon be replaced with new mapping for threatened species.

Records for this map are from the NSW Department of Primary Industries research surveys, they do not indicate the entire distribution of the species and there may be errors and omissions.

To view the records using Google Earth you must download and install the Google Earth Plugin.

Map Satellite Earth



Map data ©2016 Google Terms of Use Report a map error

Records search

Step 1
Select an area type to search by:
* Statewide
* Catchment Management Authority
* Local Government Area
LGA: BROKEN HILL

Step 2
Select a species:
Freshwater catfish
Murray cod
Silver perch

Step 3
Select a time period:
☐ pre 1980
☐ post 1980
☒ all records
Search



NOTE: The map depicts the expected distribution of this species in NSW. The records indicate locations where the species has been found.

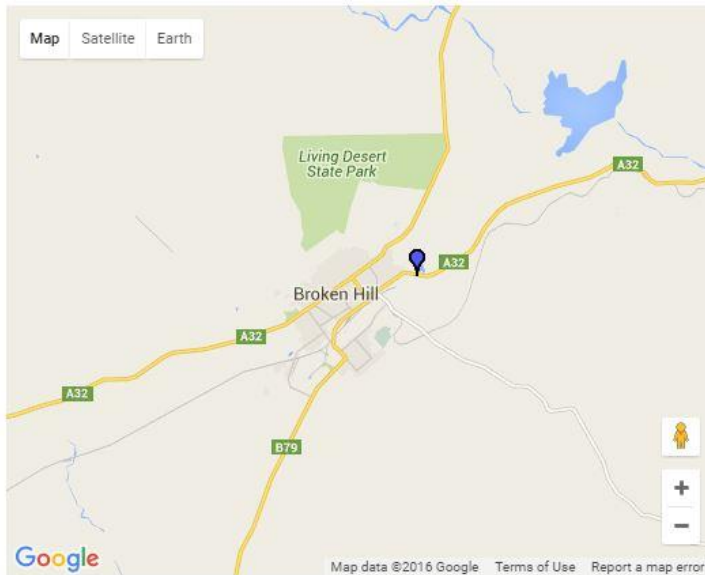
PRIMARY INDUSTRIES Fishing and Aquaculture



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Note: The Google map is not currently operational, although mapping data can be retrieved by using the Records search in the right panel. The viewer will soon be replaced with new mapping for threatened species.

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Records search

Step 1

Select an area type to search by:

- ☐ Statewide
- ☐ Catchment Management Authority
- ☐ Local Government Area

LGA:

Step 2

Select a species:

- Freshwater catfish
- ☒ Murray cod
- Silver perch

Step 3

Select a time period:

- ☐ pre 1980
- ☐ post 1980
- ☒ all records

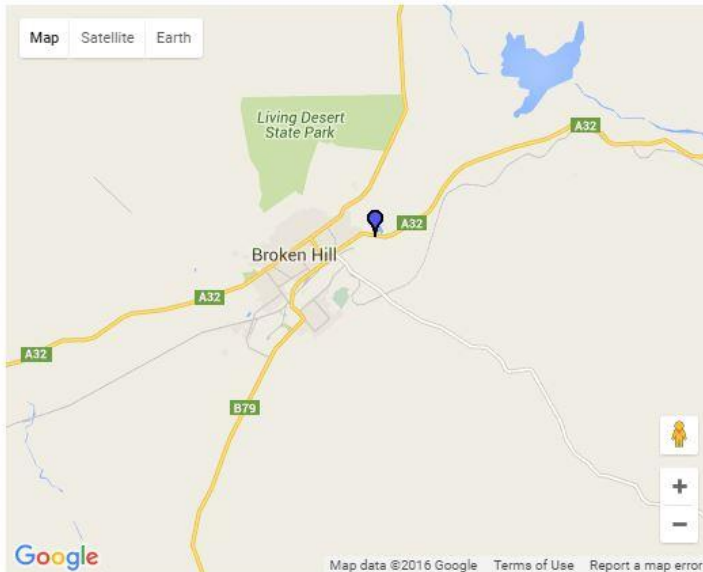
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Records search

Step 1

Select an area type to search by:

- * [Statewide](#)
- * [Catchment Management Authority](#)
- * [Local Government Area](#)

LGA:

Step 2

Select a species:

- Freshwater catfish
- Murray cod
- Silver perch

Step 3

Select a time period:

- ☐ pre 1980
- ☐ post 1980
- ☒ all records

Search results from NSW OEH Threatened Species Database (Western – Barrier Range sub-region and Lower Murray Darling – Barrier Range sub-region)

Scientific name	Common name	Type	NSW status	Occurrence
<i>Chalinolobus picatus</i>	Little Pied Bat	Animal>Bats	Vulnerable	Known
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	Animal>Bats	Vulnerable	Known
<i>Amytornis textilis modestus</i>	Thick-billed Grasswren (eastern subspecies)	Animal>Birds	Critically Endangered	Predicted
<i>Ardeotis australis</i>	Australian Bustard	Animal>Birds	Endangered	Known
<i>Burhinus grallarius</i>	Bush Stone-curlew	Animal>Birds	Endangered	Known
<i>Calamanthus campestris</i>	Rufous Fieldwren	Animal>Birds	Vulnerable	Known
<i>Certhionyx variegatus</i>	Pied Honeyeater	Animal>Birds	Vulnerable	Known
<i>Circus assimilis</i>	Spotted Harrier	Animal>Birds	Vulnerable	Known
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	Animal>Birds	Vulnerable	Known
<i>Daphoenositta chrysoptera</i>	Varied Sittella	Animal>Birds	Vulnerable	Known
<i>Epthianura albifrons</i>	White-fronted Chat	Animal>Birds	Vulnerable	Known
<i>Falco hypoleucos</i>	Grey Falcon	Animal>Birds	Endangered	Known
<i>Falco subniger</i>	Black Falcon	Animal>Birds	Vulnerable	Known
<i>Grus rubicunda</i>	Brolga	Animal>Birds	Vulnerable	Predicted
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	Animal>Birds	Vulnerable	Known
<i>Hieraaetus morphnoides</i>	Little Eagle	Animal>Birds	Vulnerable	Known
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	Animal>Birds	Vulnerable	Known
<i>Lophoictinia isura</i>	Square-tailed Kite	Animal>Birds	Vulnerable	Predicted
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	Animal>Birds	Vulnerable	Known
<i>Neophema splendida</i>	Scarlet-chested Parrot	Animal>Birds	Vulnerable	Known
<i>Oxyura australis</i>	Blue-billed Duck	Animal>Birds	Vulnerable	Known
<i>Pedionomus torquatus</i>	Plains-wanderer	Animal>Birds	Endangered	Known
<i>Phaps histrionica</i>	Flock Bronzewing	Animal>Birds	Endangered	Known
<i>Pomatostomus halli</i>	Hall's Babbler	Animal>Birds	Vulnerable	Predicted
<i>Pyrholaemus brunneus</i>	Redthroat	Animal>Birds	Vulnerable	Known
<i>Rostratula australis</i>	Australian Painted Snipe	Animal>Birds	Endangered	Known
<i>Stictonetta naevosa</i>	Freckled Duck	Animal>Birds	Vulnerable	Known
<i>Tyto novaehollandiae</i>	Masked Owl	Animal>Birds	Vulnerable	Predicted
<i>Antechinomys laniger</i>	Kultarr	Animal>Marsupials	Endangered	Predicted
<i>Macrotis lagotis</i>	Bilby	Animal>Marsupials	Presumed Extinct	Known
<i>Sminthopsis macroura</i>	Stripe-faced Dunnart	Animal>Marsupials	Vulnerable	Known
<i>Antaresia stimsoni</i>	Stimson's Python	Animal>Reptiles	Vulnerable	Known
<i>Aspidites ramsayi</i>	Woma	Animal>Reptiles	Vulnerable	Known
<i>Ctenophorus mirrityana</i>	Barrier Range Dragon	Animal>Reptiles	Endangered	Known
<i>Ctenotus brooksi</i>	Wedgesnout Ctenotus	Animal>Reptiles	Vulnerable	Predicted
<i>Cyclodomorphus melanops elongatus</i>	Mallee Slender Blue-tongue Lizard	Animal>Reptiles	Endangered	Known
<i>Delma australis</i>	Marble-faced Delma	Animal>Reptiles	Endangered	Known

Scientific name	Common name	Type	NSW status	Occurrence
<i>Diplodactylus platyurus</i>	Eastern Fat-tailed Gecko	Animal>Reptiles	Endangered	Known
<i>Lerista xanthura</i>	Yellow-tailed Plain Slider	Animal>Reptiles	Vulnerable	Predicted
<i>Lucasium stenodactylum</i>	Crowned Gecko	Animal>Reptiles	Vulnerable	Predicted
<i>Pseudonaja modesta</i>	Ringed Brown Snake	Animal>Reptiles	Endangered	Known
<i>Strophurus elderi</i>	Jewelled Gecko	Animal>Reptiles	Vulnerable	Predicted
<i>Tiliqua occipitalis</i>	Western Blue-tongued Lizard	Animal>Reptiles	Vulnerable	Known
<i>Leggadina forresti</i>	Forrest's Mouse	Animal>Rodents	Vulnerable	Known
<i>Notomys fuscus</i>	Dusky Hopping-mouse	Animal>Rodents	Endangered	Known
<i>Notomys longicaudatus</i>	Long-tailed Hopping-mouse	Animal>Rodents	Presumed Extinct	Known
<i>Pseudomys bolami</i>	Bolam's Mouse	Animal>Rodents	Endangered	Known
<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse	Animal>Rodents	Vulnerable	Known
<i>Rattus villosissimus</i>	Long-haired Rat	Animal>Rodents	Vulnerable	Predicted
<i>Acacia loderi shrublands</i>	Acacia loderi shrublands	Community>Threatened Ecological Communities	Endangered Ecological Community	Known
<i>Porcupine Grass - Red Mallee - Gum Coolabah hummock grassland/low sparse woodland in the Broken Hill Complex Bioregion</i>	Porcupine Grass - Red Mallee - Gum Coolabah hummock grassland/low sparse woodland in the Broken Hill Complex Bioregion	Community>Threatened Ecological Communities	Critically Endangered Ecological Community	Known
<i>Atriplex infrequens</i>	A saltbush	Plant>Herbs and Forbs	Vulnerable	Predicted
<i>Convolvulus tedmoorei</i>	Bindweed	Plant>Herbs and Forbs	Endangered	Known
<i>Dysphania platycarpa</i>	Dysphania platycarpa	Plant>Herbs and Forbs	Endangered	Predicted
<i>Eleocharis obicis</i>	Spike-Rush	Plant>Herbs and Forbs	Vulnerable	Known
<i>Erodiohyllum elderi</i>	Koonamore Daisy	Plant>Herbs and Forbs	Endangered	Known
<i>Lepidium monoplacoides</i>	Winged Peppergrass	Plant>Herbs and Forbs	Endangered	Known
<i>Swainsona flavicarinata</i>	Yellow-Keeled Swainsona	Plant>Herbs and Forbs	Endangered	Known
<i>Swainsona murrayana</i>	Slender Darling Pea	Plant>Herbs and Forbs	Vulnerable	Known
<i>Swainsona viridis</i>	Creeping Darling Pea	Plant>Herbs and Forbs	Endangered	Predicted
<i>Acacia carneorum</i>	Purple-wood Wattle	Plant>Shrubs	Vulnerable	Known
<i>Acacia notabilis</i>	Mallee Golden Wattle	Plant>Shrubs	Endangered	Known
<i>Acacia rivalis</i>	Creek Wattle	Plant>Shrubs	Endangered	Known
<i>Indigofera longibractea</i>	Showy Indigo	Plant>Shrubs	Endangered	Known
<i>Infection by Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species and populations</i>	Infection by Psittacine circoviral (beak and feather) disease affecting endangered psittacine species	Threat>Disease	Key Threatening Process	Predicted
<i>Infection of frogs by amphibian chytrid causing the disease chytridiomycosis</i>	Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	Threat>Disease	Key Threatening Process	Predicted
<i>Infection of native plants by Phytophthora cinnamomi</i>	Infection of native plants by Phytophthora cinnamomi	Threat>Disease	Key Threatening Process	Predicted
<i>Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands</i>	Alteration to the natural flow regimes of rivers, streams, floodplains & wetlands.	Threat>Habitat Loss/Change	Key Threatening Process	Predicted
<i>Anthropogenic Climate Change</i>	Human-caused Climate Change	Threat>Habitat Loss/Change	Key Threatening Process	Predicted

Scientific name	Common name	Type	NSW status	Occurrence
<i>Bushrock removal</i>	Bushrock Removal	Threat>Habitat Loss/Change	Key Threatening Process	Predicted
<i>Clearing of native vegetation</i>	Clearing of native vegetation	Threat>Habitat Loss/Change	Key Threatening Process	Predicted
<i>High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition</i>	Ecological consequences of high frequency fires	Threat>Habitat Loss/Change	Key Threatening Process	Predicted
<i>Loss of Hollow-bearing Trees</i>	Loss of Hollow-bearing Trees	Threat>Habitat Loss/Change	Key Threatening Process	Predicted
<i>Loss or degradation (or both) of sites used for hill-topping by butterflies</i>	Loss and/or degradation of sites used for hill-topping by butterflies	Threat>Habitat Loss/Change	Key Threatening Process	Predicted
<i>Removal of dead wood and dead trees</i>	Removal of dead wood and dead trees	Threat>Habitat Loss/Change	Key Threatening Process	Predicted
<i>Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners</i>	Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners	Threat>Other Threat	Key Threatening Process	Predicted
<i>Competition and grazing by the feral European Rabbit, Oryctolagus cuniculus (L.)</i>	Competition and grazing by the feral European rabbit	Threat>Pest Animal	Key Threatening Process	Predicted
<i>Competition and habitat degradation by Feral Goats, Capra hircus Linnaeus 1758</i>	Competition and habitat degradation by Feral Goats, Capra hircus Linnaeus 1758"	Threat>Pest Animal	Key Threatening Process	Predicted
<i>Competition from feral honey bees, Apis mellifera L.</i>	Competition from feral honeybees	Threat>Pest Animal	Key Threatening Process	Predicted
<i>Herbivory and environmental degradation caused by feral deer</i>	Herbivory and environmental degradation caused by feral deer	Threat>Pest Animal	Key Threatening Process	Predicted
<i>Importation of Red Imported Fire Ants Solenopsis invicta Buren 1972</i>	Importation of red imported fire ants into NSW	Threat>Pest Animal	Key Threatening Process	Predicted
<i>Introduction of the Large Earth Bumblebee Bombus terrestris (L.)</i>	Introduction of the large earth bumblebee (Bombus terrestris)	Threat>Pest Animal	Key Threatening Process	Predicted
<i>Invasion and establishment of the Cane Toad (Bufo marinus)</i>	Invasion and establishment of the Cane Toad	Threat>Pest Animal	Key Threatening Process	Predicted
<i>Invasion of the Yellow Crazy Ant, Anoplolepis gracilipes (Fr. Smith) into NSW</i>	Invasion of the yellow crazy ant (Anoplolepis gracilipes) into NSW	Threat>Pest Animal	Key Threatening Process	Predicted
<i>Predation and hybridisation by Feral Dogs, Canis lupus familiaris</i>	Predation and hybridisation by Feral Dogs, Canis lupus familiaris	Threat>Pest Animal	Key Threatening Process	Predicted
<i>Predation by Gambusia holbrooki Girard, 1859 (Plague Minnow or Mosquito Fish)</i>	Predation by the Plague Minnow (Gambusia holbrooki)	Threat>Pest Animal	Key Threatening Process	Predicted
<i>Predation by the European Red Fox Vulpes Vulpes (Linnaeus, 1758)</i>	Predation by the European Red Fox	Threat>Pest Animal	Key Threatening Process	Predicted
<i>Predation by the Feral Cat Felis catus (Linnaeus, 1758)</i>	Predation by feral cats	Threat>Pest Animal	Key Threatening Process	Predicted

Scientific name	Common name	Type	NSW status	Occurrence
<i>Predation, habitat degradation, competition and disease transmission by Feral Pigs, Sus scrofa Linnaeus 1758</i>	Predation, habitat degradation, competition and disease transmission by Feral Pigs (Sus scrofa)	Threat>Pest Animal	Key Threatening Process	Predicted
<i>Invasion and establishment of exotic vines and scramblers</i>	Invasion and establishment of exotic vines and scramblers	Threat>Weed	Key Threatening Process	Predicted
<i>Invasion and establishment of Scotch Broom (Cytisus scoparius)</i>	Invasion and establishment of Scotch Broom (Cytisus scoparius)"	Threat>Weed	Key Threatening Process	Predicted
<i>Invasion of native plant communities by African Olive Olea europaea subsp. cuspidata (Wall. ex G. Don) Cif.</i>	Invasion of native plant communities by African Olive Olea europaea subsp. cuspidata (Wall. ex G. Don) Cif.	Threat>Weed	Key Threatening Process	Predicted
<i>Invasion of native plant communities by Chrysanthemoides monilifera</i>	Invasion of native plant communities by bitou bush & boneseed	Threat>Weed	Key Threatening Process	Predicted
<i>Invasion of native plant communities by exotic perennial grasses</i>	Invasion of native plant communities by exotic perennial grasses"	Threat>Weed	Key Threatening Process	Predicted
<i>Invasion, establishment and spread of Lantana (Lantana camara L. sens. Lat)</i>	Invasion, establishment and spread of Lantana Lantana camara L. sens. lat)"	Threat>Weed	Key Threatening Process	Predicted
<i>Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants</i>	Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	Threat>Weed	Key Threatening Process	Predicted

Broken Hill LGA Noxious Weeds

Scientific Name	Common Name	Class
<i>Alhagi maurorum</i>	Camel thorn	4
<i>Alternanthera philoxeroides</i>	Alligator weed	2
<i>Ambrosia artemisiifolia</i>	Annual ragweed	5
<i>Ambrosia confertiflora</i>	Burr ragweed	5
<i>Amelichloa brachychaeta</i>	Espartillo - narrow kernel	5
<i>Amelichloa caudata</i>	Espartillo - broad kernel	5
<i>Andropogon gayanus</i>	Gamba grass	5
<i>Annona glabra</i>	Pond apple	1
<i>Argemone mexicana</i>	Mexican poppy	5
<i>Arundo donax</i>	Giant reed	4
<i>Asparagus aethiopicus</i>	Asparagus - ground asparagus	4
<i>Asparagus asparagoides</i>	Bridal creeper	4
<i>Asparagus declinatus</i>	Bridal veil creeper	1
<i>Asparagus plumosus</i>	Asparagus - climbing asparagus fern	4
<i>Asparagus species</i>	Asparagus weeds	4
<i>Asystasia gangetica</i> subsp. <i>micrantha</i>	Chinese violet	1
<i>Bassia scoparia</i>	Kochia	1
<i>Brassica barrelieri</i> subsp. <i>oxyrrhina</i>	Smooth-stemmed turnip	5
<i>Cabomba caroliniana</i>	Cabomba	5
<i>Carthamus leucocaulos</i>	Glaucous starthistle	5
<i>Cenchrus biflorus</i>	Gallon's curse	5
<i>Cenchrus brownii</i>	Fine-bristled burr grass	5
<i>Cenchrus echinatus</i>	Mossman River grass	5
<i>Cenchrus macrourus</i>	African feather grass	5
<i>Cenchrus setaceus</i>	Fountain grass	5
<i>Centaurea stoebe</i> subsp. <i>micranthos</i>	Spotted knapweed	1
<i>Centaurea X moncktonii</i>	Black knapweed	1
<i>Cestrum parqui</i>	Green cestrum	3
<i>Chromolaena odorata</i>	Siam weed	1
<i>Chrysanthemoides monilifera</i> subsp. <i>monilifera</i>	Boneseed	1
<i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i>	Bitou bush	3
<i>Clidemia hirta</i>	Koster's curse	1
<i>Cryptostegia grandiflora</i>	Rubber vine	1
<i>Cuscuta species</i>	Dodder	5
<i>Cylindropuntia rosea</i>	Prickly pear - Hudson pear	4
<i>Cynara cardunculus</i>	Artichoke thistle	5
<i>Cyperus esculentus</i>	Yellow nutgrass	5
<i>Cytisus scoparius</i> subsp. <i>scoparius</i>	Scotch broom	4
<i>Egeria densa</i>	Leafy elodea	4
<i>Eichhornia azurea</i>	Anchored water hyacinth	1
<i>Eichhornia crassipes</i>	Water hyacinth	2
<i>Equisetum species</i>	Horsetails	1
<i>Festuca gautieri</i>	Bear-skin fescue	5
<i>Genista linifolia</i>	Flax-leaf broom	4
<i>Gymnocoronis spilanthoides</i>	Senegal tea plant	1
<i>Harrisia species</i>	Harrisia cactus	4
<i>Helianthus ciliaris</i>	Texas blueweed	5
<i>Heteranthera reniformis</i>	Kidney-leaf mud plantain	1
<i>Hieracium species</i>	Hawkweeds	1
<i>Hydrocotyle ranunculoides</i>	Hydrocotyl	1
<i>Hymenachne amplexicaulis</i> and hybrids	Hymenachne	1

Scientific Name	Common Name	Class
<i>Lagarosiphon major</i>	Lagarosiphon	1
<i>Limnobium laevigatum</i>	Frogbit	1
<i>Limnobium spongia</i>	Spongeplant	1
<i>Limnocharis flava</i>	Yellow burrhead	1
<i>Ludwigia longifolia</i>	Long-leaf willow primrose	3
<i>Lycium ferocissimum</i>	African boxthorn	4
<i>Miconia species</i>	Miconia	1
<i>Mikania micrantha</i>	Mikania vine	1
<i>Mimosa pigra</i>	Mimosa	1
<i>Myriophyllum spicatum</i>	Eurasian water milfoil	1
<i>Nassella neesiana</i>	Chilean needle grass	4
<i>Nassella tenuissima</i>	Mexican feather grass	1
<i>Nassella trichotoma</i>	Serrated tussock	4
<i>Oenothera curtiflora</i>	Clockweed	5
<i>Opuntia aurantiaca</i>	Prickly pear - tiger pear	4
<i>Opuntia monacantha</i>	Prickly pear - smooth tree pear	4
<i>Opuntia stricta</i>	Prickly pear - common pear	4
<i>Opuntia tomentosa</i>	Prickly pear - velvety tree pear	4
<i>Orobancha species</i>	Broomrapes	1
<i>Oryza rufipogon</i>	Red rice	5
<i>Parkinsonia aculeata</i>	Parkinsonia	2
<i>Parthenium hysterophorus</i>	Parthenium weed	1
<i>Phyla canescens</i>	Lippia	4
<i>Picnemon acarna</i>	Soldier thistle	5
<i>Pistia stratiotes</i>	Water lettuce	1
<i>Prosopis species</i>	Mesquite	2
<i>Rubus fruticosus species aggregate</i>	Blackberry	4
<i>Sagittaria calycina</i> var. <i>calycina</i>	Arrowhead	4
<i>Sagittaria platyphylla</i>	Sagittaria	4
<i>Salix cinerea</i>	Grey sallow	2
<i>Salix nigra</i>	Black willow	2
<i>Salix species</i>	Willows	4
<i>Salvinia molesta</i>	Salvinia	2
<i>Scolymus hispanicus</i>	Golden thistle	5
<i>Senecio madagascariensis</i>	Fireweed	4
<i>Sisymbrium runcinatum</i>	African turnip weed - western	5
<i>Sisymbrium thellungii</i>	African turnip weed - eastern	5
<i>Solanum elaeagnifolium</i>	Silverleaf nightshade	4
<i>Solanum viarum</i>	Tropical soda apple	1
<i>Sonchus arvensis</i>	Corn sowthistle	5
<i>Sorghum halepense</i>	Johnson grass	4
<i>Sorghum x alnum</i>	Columbus grass	4
<i>Stachytarpheta cayennensis</i>	Cayenne snakeweed	5
<i>Stratiotes aloides</i>	Water soldier	1
<i>Striga species</i>	Witchweeds	1
<i>Tamarix aphylla</i>	Athel pine	5
<i>Toxicodendron succedaneum</i>	Rhus tree	4
<i>Trapa species</i>	Water caltrop	1
<i>Vachellia karroo</i>	Karoo thorn	1
<i>Vachellia nilotica</i>	Prickly acacia	1

Class	Type	Management
1	State Prohibited Weed	The plant must be eradicated from the land and that land must be kept free of the plant
2	Regionally Prohibited Weed	The plant must be eradicated from the land and that land must be kept free of the plant
3	Regionally Controlled Weed	he plant must be fully and continuously suppressed and destroyed and the plant must not be sold, propagated or knowingly distributed
4	Locally Controlled Weed	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed
5	Restricted Plant	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with

EPBC Protected matters report



Australian Government
Department of the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 12/07/16 11:25:27

[Summary](#)

[Details](#)

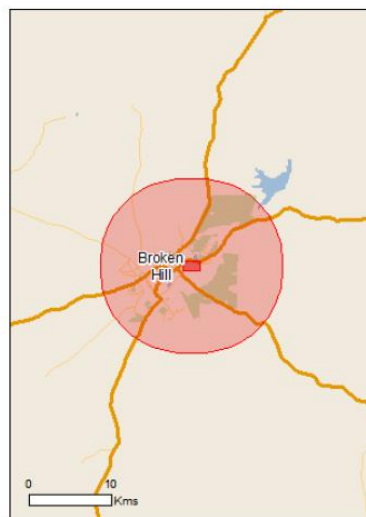
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

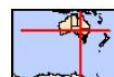
[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	7
Listed Migratory Species:	4

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	9
Commonwealth Heritage Places:	1
Listed Marine Species:	8
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	22
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

National Heritage Properties		[Resource Information]
Name	State	Status
Historic		
City of Broken Hill	NSW	Listed place

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Amytornis modestus		
Thick-billed Grasswren [84121]	Vulnerable	Species or species habitat likely to occur within area
Pedionomus torquatus		
Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area
Pezoporus occidentalis		
Night Parrot [59350]	Endangered	Extinct within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area

Fish		
Maccullochella peelii		
Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area

Mammals		
Nyctophilus corbeni		
Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area

Plants		
Acacia carneorum		
Needle Wattle, Dead Finish, Purple-wood Wattle [66685]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Migratory Terrestrial Species		
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Migratory Wetlands Species		
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [\[Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Airservices Australia
Commonwealth Land - Australian Broadcasting Commission
Commonwealth Land - Australian Postal Commission
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Director of War Service Homes
Commonwealth Land - Telstra Corporation Limited
Defence - BROKEN HILL TRAINING DEPOT

Commonwealth Heritage Places [\[Resource Information \]](#)

Name	State	Status
Historic		
Broken Hill Post Office	NSW	Listed place

Listed Marine Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Extra Information

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Carrichtera annua Ward's Weed [9511]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Cylindropuntia spp. Prickly Pears [85131]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-31.94543 141.48207,-31.94543 141.50164,-31.95461 141.50164,-31.95461 141.48207,-31.94543 141.48207

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [Office of Environment and Heritage, New South Wales](#)
- [Department of Environment and Primary Industries, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment, Water and Natural Resources, South Australia](#)
- [Parks and Wildlife Commission NT, Northern Territory Government](#)
- [Department of Environmental and Heritage Protection, Queensland](#)
- [Department of Parks and Wildlife, Western Australia](#)
- [Environment and Planning Directorate, ACT](#)
- [Birdlife Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- [Natural history museums of Australia](#)
- [Museum Victoria](#)
- [Australian Museum](#)
- [South Australian Museum](#)
- [Queensland Museum](#)
- [Online Zoological Collections of Australian Museums](#)
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
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- [Western Australian Herbarium](#)
- [Australian National Herbarium, Atherton and Canberra](#)
- [University of New England](#)
- [Ocean Biogeographic Information System](#)
- [Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [Geoscience Australia](#)
- [CSIRO](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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Appendix E: Terms and abbreviations

Terms and abbreviations used in this report

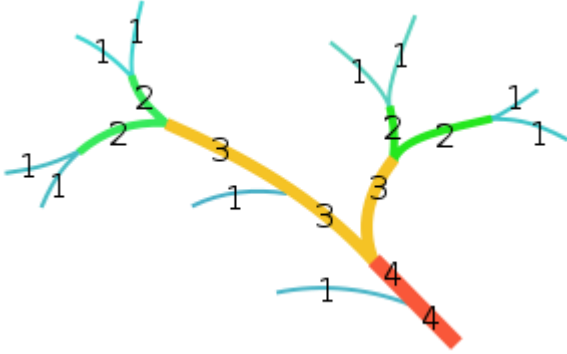
Abbreviation	Terminology	Description
	Assessment of significance	The Assessment of Significance refers to the factors that must be considered by decision makers to assess whether a proposal is likely to have a significant effect on threatened biodiversity. These mechanisms are contained in s5A of the EP&A Act and s94 of the TSC Act.
BoM	Australian Bureau of Meteorology	The Bureau of Meteorology is Australia's national weather, climate and water agency.
CAMBA	China-Australia Migratory Bird Agreement	A bilateral migratory bird agreement with China entered into in 1986. It provides an important mechanism for pursuing conservation outcomes for migratory birds, including migratory waterbirds.
CMA	Catchment Management Authority	Bodies established across New South Wales to ensure regional communities have a say in how natural resources are managed in their catchments. CMA's have now been replaced with LLS's.
	Consent authority	in relation to a development application or an application for a complying development certificate, means: The council having the function to determine the application, or If a provision of this Act, the regulations or an environmental planning instrument specifies a Minister, the Planning Assessment Commission, a joint regional planning panel or public authority (other than a council) as having the function to determine the application-that Minister, Commission, panel or authority, as the case may be.
	Critical habitat	Critical habitat is defined as an area crucial to the survival of an endangered species, population or ecological community. The declaration of critical habitat provides greater protection and stricter controls over activities in the area.
	Cumulative impacts	Impacts, when considered together, lead to a stronger impact than any impact in isolation.
	Direct impacts	Directly affect the habitat and individuals. They include, but are not limited to, death through predation, trampling, poisoning of the animal/plant itself and the removal of suitable habitat. When applying each factor, consideration must be given to all of the likely direct impacts of the proposed activity or development.
DoE	Australian Government Department of Environment.	The Department of the Environment designs and implements the Australian Government's policies and programmes to protect and conserve the environment, water and heritage and promote climate action.
DP	Deposited Plan	A plan of land deposited in Land and Property Information (part of the Land Management Authority) and used for legal identification purposes. They most commonly depict a subdivision of a parcel of land.
EEC	Endangered Ecological Community	An ecological community identified by relevant legislation likely to become extinct or is in immediate danger of extinction.
	Edge effects	A change in species composition, physical conditions or other ecological factors at the boundary between two ecosystems or the ecological changes carried out at the boundaries of ecosystems (including changes in species composition, gradients of moisture, sunlight, soil and air temperature, wind speed and other factors).
	Environment	The environment includes all aspects of the surroundings of humans, whether affecting any human as an individual or in his or her social groupings.
EPA	Environment Protection Authority	Their purpose is to improve environmental performance and waste management for NSW. The EPA works with community, business, industry and government to maintain a balance between protecting the environment, managing competing demands on the environment and supporting sustainable growth.

Abbreviation	Terminology	Description
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW).</i>	Provides the legislative framework for land use planning and development assessment in NSW.
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth).</i>	Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
EPI	Environmental Planning Instrument	Environmental planning instruments are fundamental documents governing development of land in NSW. They are made under Part 3 of the EP&A Act for the purposes of achieving any of the objects under that Act.
ESD	Ecologically sustainable development.	Development which uses, conserves and enhances the resources of the community so ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased.
FM Act	<i>Fisheries Management Act 1994 (NSW)</i>	The objects of this Act are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations. This Act protects aquatic habitats and species which are not protected under the TSC Act.
GDA	Geocentric Datum of Australia	The Geocentric Datum of Australia (GDA) is the latest Australian coordinate system, replacing the Australian Geodetic Datum (AGD). The GDA is a part of a global coordinate reference frame and is directly compatible with the Global Navigation Satellite Systems.
GDE	Groundwater Dependent Ecosystems	Six types of groundwater dependent ecosystems are conventionally recognised in Australia: Terrestrial vegetation relies the availability of shallow groundwater. Wetlands such as paperbark swamp forests and mound springs ecosystems. River base flow systems where a groundwater discharge provides a base flow component to the river's discharge. Aquifer and cave ecosystems where life exists independent of sunlight Terrestrial fauna, both native and introduced, dependant on groundwater as a source of drinking water. Estuarine and near shore marine systems, such as some coastal mangroves, salt marshes and sea grass beds, which rely on the submarine discharge of groundwater.
GIS	Geographic Information System	A geographic information system (GIS) is a system designed to capture, store, manipulate, analyse, manage, and present all types of spatial or geographical data.
GPS	Global Positioning System	A hand held device capable of applying location coordinates to digital objects such as photographs and GIS data such as lines or points.
	Habitat	The area occupied, or periodically or occasionally occupied, by any threatened species, population or ecological community and includes all the different aspects (both biotic and abiotic) used by species during the different stages of their life cycles.
IBRA	Interim Biogeographic Regionalisation of Australia	The Interim Biogeographic Regionalisation for Australia (IBRA) is a biogeographic regionalisation of Australia developed by the Australian Government's Department of the Environment. Each region is a land area made up of a group of interacting ecosystems repeated in similar form across the landscape.
	Indirect impacts	Occur when project-related activities affect species, populations or ecological communities in a manner other than direct loss. Indirect impacts can include loss of individuals through starvation, exposure, predation by domestic and/or feral animals, loss of breeding opportunities, loss of shade/shelter, deleterious hydrological changes, increased soil salinity,

Abbreviation	Terminology	Description
		erosion, inhibition of nitrogen fixation, weed invasion, fertiliser drift, or increased human activity within or directly adjacent to sensitive habitat areas. As with direct impacts, consideration must be given, when applying each factor, to all of the likely indirect impacts of the proposed activity or development.
JAMBA	Japan-Australia Migratory Bird Agreement	A bilateral migratory bird agreement with Japan entered into in 1974. It provides an important mechanism for pursuing conservation outcomes for migratory birds, including migratory waterbirds.
KTP	Key Threatening Process	A key threatening process is defined as a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities. A requirement of their listing on the TSC Act is that the process adversely affects two or more threatened species, populations or ecological communities, or may cause species, populations or ecological communities not threatened to become threatened.
LEP	Local Environmental Plan	A type of planning instrument made under Part 3 of the EP&A Act.
	Life cycle	The series or stages of reproduction, growth, development, ageing and death of an organism.
LG Act	<i>Local Government Act 1993</i>	The purposes of this Act are as follows: to provide the legal framework for an effective, efficient, environmentally responsible and open system of local government in New South Wales, to regulate the relationships between the people and bodies comprising the system of local government in New South Wales, to encourage and assist the effective participation of local communities in the affairs of local government, to give councils: the ability to provide goods, services and facilities, and to carry out activities, appropriate to the current and future needs of local communities and of the wider public the responsibility for administering some regulatory systems under this Act a role in the management, improvement and development of the resources of their areas, to require councils, councillors and council employees to have regard to the principles of ecologically sustainable development in carrying out their responsibilities.
LGA	Local Government Area	The relevant LGA is Governed by Council who are the determining authority for this development application.
LLS	Local Land Services	Launched in January 2014. Each LLS delivers services to farmers, landholders and the community across rural and regional New South Wales. LLS bring together agricultural production advice, biosecurity, natural resource management and emergency management into a single organisation.
	Local population	The population occurs in the study area. The assessment of the local population may be extended to include individuals beyond the study area if it can be clearly demonstrated contiguous or interconnecting parts of the population continue beyond the study area. The local population of a threatened plant species comprises those individuals occurring in the study area or the cluster of individuals extend into habitat adjoining and contiguous with the study area could reasonably be expected to be cross-pollinating with those in the study area. The local population of resident fauna species comprises those individuals known or likely to occur in the study area, as well as any individuals occurring in adjoining areas (contiguous or otherwise) are known or likely to utilise habitats in the study area. The local population of migratory or nomadic fauna species comprises those individuals likely to occur in the study area from time to time.

Abbreviation	Terminology	Description
	Local population (EEC)	The ecological community present within the study area. However, the local occurrence may include adjacent areas if the ecological community on the study area forms part of a larger contiguous area of the ecological community and the movement of individuals and exchange of genetic material across the boundary of the study area can be clearly demonstrated.
	Locality	The area within a 50 kilometre radius of the subject site.
MNES	Matters of national environmental significance.	Refers to the seven matters of national environmental significance outlined under the EPBC Act.
NOW	NSW Office of Water	The NSW Office of Water in the Department of Primary Industries is responsible for the management of the state's surface water and groundwater resources. The Department of Primary Industries is a division within NSW Trade and Investment. The Office of Water reports to the NSW Government for water policy and the administration of key water management legislation, including the <i>Water Management Act 2000</i> and <i>Water Act 1912</i> .
Noxious Weeds Act	<i>Noxious Weeds Act 1993</i> (NSW)	The objects of this Act are as follows: - to reduce the negative impact of weeds on the economy, community and environment of this State by establishing control mechanisms to: - prevent the establishment in this state of significant new weeds, and - prevent, eliminate or restrict the spread in this state of particular significant weeds, and - effectively manage widespread significant weeds in this state, - to provide for the monitoring of and reporting on the effectiveness of the management of weeds in this state.
NPW Act	<i>National Parks and Wildlife Act 1974</i> (NSW)	The objects of this Act are as follows: - The conservation of nature, including, but not limited to, the conservation of: - habitat, ecosystems and ecosystem processes, and - biological diversity at the community, species and genetic levels, and - landforms of significance, including geological features and processes, and - landscapes and natural features of significance including wilderness and wild rivers, The conservation of objects, places or features (including biological diversity) of cultural value within the landscape, including, but not limited to: - places, objects and features of significance to Aboriginal people, and - places of social value to the people of New South Wales, and - places of historic, architectural or scientific significance, - Fostering public appreciation, understanding and enjoyment of nature and cultural heritage and their conservation, - Providing for the management of land reserved under this Act in accordance with the management principles applicable for each type of reservation. The objects of this Act are to be achieved by applying the principles of ecologically sustainable development.
NV Act	<i>Native Vegetation Act 2003</i>	The objects of this Act are: - to provide for, encourage and promote the management of native vegetation on a regional basis in the social, economic and environmental interests of the State, and - to prevent broad scale clearing unless it improves or maintains environmental outcomes, and - to protect native vegetation of high conservation value having regard

Abbreviation	Terminology	Description
		to its contribution to such matters as water quality, biodiversity, or the prevention of salinity or land degradation, and - to improve the condition of existing native vegetation, particularly where it has high conservation value, and - to encourage the revegetation of land, and the rehabilitation of land, with appropriate native vegetation, In accordance with the principles of ecologically sustainable development.
OEH	Office of Environment and Heritage	The Office of Environment and Heritage (OEH) is a separate agency within the Planning and Environment cluster. OEH was formed on 4 April 2011 and works to protect and conserve the NSW environment, including the natural environment, Aboriginal country, culture and heritage and our built heritage, and manages NSW national parks and reserves.
PoEO Act	<i>Protection of the Environment Operations Act 1997</i>	The objects of this Act are as follows: - to protect, restore and enhance the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development, - to provide increased opportunities for public involvement and participation in environment protection, - to ensure the community has access to relevant and meaningful information about pollution, - to reduce risks to human health and prevent the degradation of the environment by the use of mechanisms promoting: - pollution prevention and cleaner production, - the reduction to harmless levels of the discharge of substances likely to cause harm to the environment, - the elimination of harmful wastes, - the reduction in the use of materials and the re-use, recovery or recycling of materials, - the making of progressive environmental improvements, including the reduction of pollution at source, - the monitoring and reporting of environmental quality on a regular basis, - to rationalise, simplify and strengthen the regulatory framework for environment protection, - to improve the efficiency of administration of the environment protection legislation, - to assist in the achievement of the objectives of the <i>Waste Avoidance and Resource Recovery Act 2001</i>.
RAMSAR	Convention on Wetlands of International Importance	The Ramsar Convention's broad aims are to halt the worldwide loss of wetlands and to conserve, through wise use and management, those remaining. This requires international cooperation, policy making, capacity building and technology transfer.
	Risk of extinction	The likelihood that the local population will become extinct either in the short-term or in the long-term as a result of direct or indirect impacts on the viability of that population.
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement	A bilateral migratory bird agreement with the Republic of Korea entered into in 2007. It provides an important mechanism for pursuing conservation outcomes for migratory birds, including migratory waterbirds.
RF Act	<i>Rural Fires Act 1997</i>	The objects of this Act are to provide: - for the prevention, mitigation and suppression of bush and other fires in local government areas (or parts of areas) and other parts of the State constituted as rural fire districts, and - for the co-ordination of bush firefighting and bush fire prevention throughout the State, and - for the protection of persons from injury or death, and property from damage, arising from fires, and - for the protection of infrastructure and environmental, economic, cultural, agricultural and community assets from damage arising from fires, and

Abbreviation	Terminology	Description
		for the protection of the environment by requiring certain activities referred to in paragraphs (a)-(c1) to be carried out having regard to the principles of ecologically sustainable development described in section 6 (2) of the <i>Protection of the Environment Administration Act 1991</i>.
SEPP 44	State Environmental Planning Policy No.44 – Koala Habitat	This Policy aims to encourage the proper conservation and management of areas of natural vegetation with habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline: - by requiring the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat, and - by encouraging the identification of areas of core koala habitat, and - by encouraging the inclusion of areas of core koala habitat in environment protection zones.
Significant impact		A 'significant impact' is an impact which is important, notable, or of consequence, having regard to its context or intensity.
SIS	Species Impact Statement	A document included with an Environmental Impact Statement which details a full description of the action proposed, including its nature, extent, location, timing and layout and, to the fullest extent reasonably practicable, the information referred to in this section. The requirements as to the contents of an SIS for different categories of protected species are given in section 110 of the TSC Act.
study area		Study area means the subject site and any additional areas which are likely to be affected by the proposal, either directly or indirectly. The study area should extend as far as is necessary to take all potential impacts into account.
Strahler stream order		Strahler stream order and are used to define stream size based on a hierarchy of tributaries. 
subject site		Encompasses all land which the Development Consent with apply to. This is the area to be impacted by the development and is the focus of this report.
Subject Species		Threatened species known to, or have the potential to utilise habitat within the subject site.
TSC Act	<i>Threatened Species Conservation Act 1995 (NSW)</i>	This Act provides for the protection of all threatened plants and animals native to NSW and their habitats (including endangered populations and ecological communities, and their habitats). Threatened 'fish' and marine vegetation are specifically excluded as these are covered by the <i>Fisheries Management Act 1994</i> .

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