Basic Vertebrate Fauna Survey and Risk Assessment

Menzies Mining Project

Prepared for: Brightstar Resources

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EXECUTIVE SUMMARY

Brightstar Resources Ltd proposes to remine historical mines that are currently in care and maintenance. The project area includes the Lady Harriet, Lady Shenton, First Hit, Yunndaga and Selkirk mines on tenements M29/0014, M29/0154, M29/0153, M29/0184 and M29/0088. The Menzies Gold project area assessed was 1,645ha and is immediately west and south-west of the Menzies town site in the northern Goldfields.

Based on a field assessment, the following seven broad fauna habitats are present in the project area:

- Bushy shrubland;
- Casuarina woodland;
- Eucalypt woodland;
- Open grassland;
- Shrubland on a ridge;
- Shrubland; and
- Previously disturbed areas.

Much of the project area is highly disturbed by multiple mining pits, waste dumps, vehicle tracks, and built infrastructure. The vegetation density varies appreciably across the project area with many patches of bare ground.

The fauna habitats in the project area are degraded and similar to adjacent areas, so habitat loss is unlikely to significantly impact the vertebrate fauna in a bioregional context.

The Southern Whiteface (listed as Vulnerable under the *EPBC Act*) has been recorded in other fauna surveys in the adjacent areas, so it will likely be present in the project area. This small bush bird is relatively abundant in this part of the Goldfields and will move if disturbed, so vegetation clearing and further operations in the area are unlikely to impact this species significantly. The project area contains some low rocky ridges, which are small and isolated, so they are unlikely to support the Priority 4 Long-tailed Dunnart.

The impacts associated with clearing the vegetation in the project area in a landscape or bioregional context on the vertebrate fauna are likely low as there are vast tracts of similar habitat in adjacent areas.

An EPBC referral is not recommended as the recommissioning of historical mining operations is unlikely to impact a species of conservation significance significantly.

It is recommended that:

- An induction program that includes a component on managing fauna is mandatory for staff working in the project area;
- Information on protecting fauna and reporting deaths and sightings of feral fauna or fauna species of conservation significance should be incorporated into the induction program;
- Where possible, access routes are aligned to existing roads, tracks or follow the boundaries of broad-scale vegetation associations in the area;
- Where possible, avoid the small rocky hills and ridges;
- clearing vegetation is undertaken outside the Southern Whiteface breeding season of April to September but can be influenced by rainfall events, which could trigger breeding activity;
- if clearing is to occur in the Southern Whiteface breeding season, a zoologist familiar with the species will search the area for active nests before vegetation clearing is undertaken. This will appreciably reduce the probability of an active Southern Whiteface nest being disturbed;
- if an active Southern Whiteface nest(s) is found, then a 250m buffer is implemented around the nest site until all chicks have fledged; and

- A vertebrate fauna management and monitoring plan is prepared, identifying management actions to mitigate the potential impacts and a monitoring program to assess ongoing operations.

1. INTRODUCTION

1.1 BACKGROUND

Brightstar Resources Ltd (i.e. Brightstar) propose to remine historical mining areas currently in care and maintenance and immediately to the west and south-west of the Menzies town site (Figure 1). The project area includes the Lady Harriet, Lady Shenton, First Hit, Yunndaga and Selkirk mines on tenements M29/0014, M29/0154, M29/0153, M29/0184 and M29/0088.

The project area assessed in this report comprised a total area of 1,645ha (Figure 2) and includes multiple pits, mine shafts, waste dumps, and infrastructure developed during previous mining activities.

Brightstar commissioned Terrestrial Ecosystems to undertake a Basic vertebrate fauna survey and risk assessment for the proposed Menzies gold project area. This assessment aimed to inform the government environmental regulators on the potential impacts of vegetation clearing and mining activity on the vertebrate fauna assemblage to enable the proposed development to be adequately assessed. The methodology broadly follows that described in the Environmental Protection Authority (EPA; 2020) *Technical Guidance Terrestrial Fauna Surveys*.

1.2 SCOPE OF WORKS AND PROJECT OBJECTIVES

A Basic fauna survey and risk assessment involves undertaking a desktop review and site visit. The objectives of this fauna risk assessment were to:

- indicate the vertebrate fauna assemblage (reptiles, amphibians, mammals, and birds) on and near the project area so that potential impacts on the fauna and fauna assemblage might be adequately assessed;
- identify the presence and/or potential risk of impacts on species of conservation significance that are present or likely to be present in the project area;
- assess the impact and environmental risks associated with the proposed development on the fauna assemblage;
- determine if any additional surveys are required to assess the potential impact on fauna assemblages in the project area, including impacts on species of conservation significance; and
- make recommendations that avoid, mitigate, or minimise potential impacts on resident fauna.

To achieve these objectives, Terrestrial Ecosystems:

- reviewed Terrestrial Ecosystems' database (includes Atlas of Living Australia) to identify potential vertebrate fauna within the area;
- searched the DBCA's Threatened and Priority Species database;
- searched the Commonwealth Government database of fauna of national environmental significance to identify species potentially occurring within the area that are protected under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* or international migratory bird agreements (JAMBA/CAMBA);
- reviewed previous fauna surveys conducted near the project area;
- undertook a four day site investigation to identify available fauna habitat types and the possible presence of conservation significant species (e.g. Malleefowl);
- discussed the likelihood of *EPBC Act 1999* and *Biodiversity Conservation Act (BC Act) 2016* listed species being present in the project area; and
- provided management recommendations to avoid, mitigate and minimise potential impacts on the fauna in the project area.

2. EXISTING ENVIRONMENT

2.1 LOCATION OF THE PROJECT AREA

The project area is in the Murchison 1 (MUR1 – East Murchison subregion) IBRA bioregion. It includes the remains of an existing mining operation in care and maintenance. This operation included multiple pits and shafts, waste dumps, a haul road and other tracks, and built infrastructure.

Cowan (2001) described the subregion as mostly dominated by mulga woodlands, which are often rich in ephemerals; hummock grasslands, saltbush shrublands, and haloscarcia shrublands. This now very dated report recorded no threatened ecological communities near the project area.

Cowan (2001) listed the major threatening processes for species of conservation significance as fox and cat predation. In addition, cattle grazing and mining activity over many years have significantly degraded small parcels of land dotted throughout the landscape.

2.2 LAND USE HISTORY

The dominant land uses for the bioregion are native pasture to support grazing and unallocated crown land, and to a much lesser extent mining (Cowan 2001)The surrounding areas have been extensively explored for minerals, and there are many operational and non-operational mining projects in the bioregion.

2.3 CLIMATE

The project area is characterised as semi-arid. Menzies, which is adjacent to the project area, has an annual rainfall of approximately 254mm, although this varies considerably from year to year. The highest mean maximum and minimum temperatures in Menzies are in January, with an average of 35.1°C and 19.7°C, respectively (Bureau of Meteorology, 2024). The lowest mean daily maximum and minimum temperatures occur in July (Chart 1). The average monthly rainfall is heaviest from January to March.

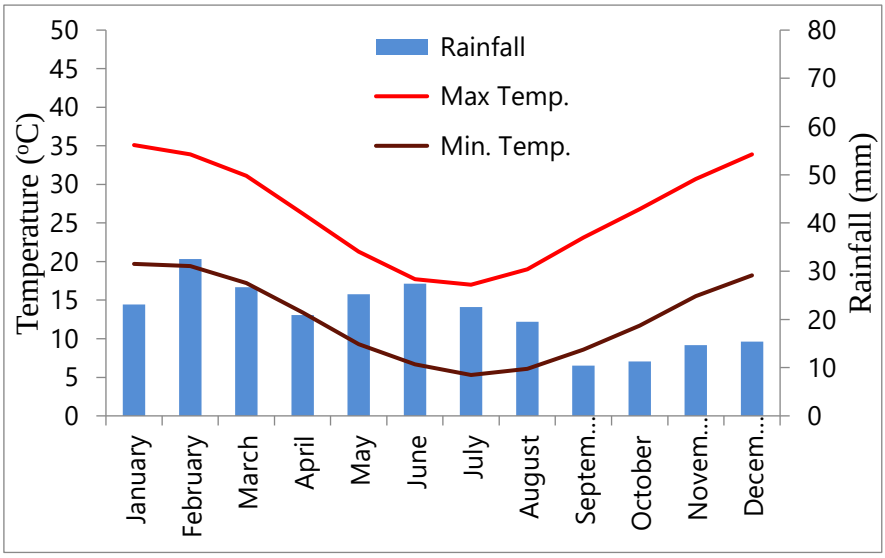

Chart 1. Climatic averages for Menzies

2.4 REGIONAL BIOLOGICAL FAUNA CONTEXT OF THE PROJECT AREA

Numerous vertebrate fauna surveys have been undertaken near the project area. These include:

- Bell, D.T., Bell, R.C. and Loneragan, W.A. (2007) Winter bird assemblages across an arid gradient in south-west Western Australia, *Journal of the Royal Society of Western Australia*, 90, 219-227.
- Cowan, M.A. and How, R.A. (2004) Comparisons of ground vertebrate assemblages in arid Western Australia in different seasons and decades, *Records of the Western Australian Museum*, 22, 91-100.
- Dell, J and How, R.A. (1988) Vertebrate fauna in The biological survey of the eastern goldfields of Western Australia Part 5: Edjudina - Menzies Study Area, *Records of the Western Australian Museum*, Supplement No. 31. pp 38-68.
- Ecologia Environment (2007) *Jump Up Dam Fauna Assessment*, Unpublished report for Heron Resources Limited, Perth.
- Hart and Associates, (2000) *Anaconda Nickel Ltd, Cawse Expansion Project, Fauna Survey*, Unpublished report for Anaconda Nickel Ltd, Perth.
- Keith Lindbeck and Associates (2012) *Central Yilgarn Iron Project (CYIP) Fauna Assessment*, Unpublished report for Jupiter Mines Ltd, Perth.
- McKenzie, N. L., Rolfe, J. K. and Youngson, W. K. (1992) Vertebrate fauna. In: The Biological Survey of the Eastern Goldfields of Western Australia; Part 8; Kurnalpi - Kalgoorlie Study Area. *Records of the Western Australian Museum*, Supplement No 41, 37-65.
- Ninox Wildlife Consulting (1998) *A Vertebrate Fauna Survey of the Murrin Expansion Project*. Unpublished report for Anaconda Nickel Ltd, Perth.
- Thompson, S.A. (2004) *Mine site rehabilitation index using reptile assemblage as a bio-indicator*, PhD Thesis, Edith Cowan University, Perth plus additional data collected after the PhD project.

In addition, individual records for fauna contained in the Atlas of Living Australia and the Western Australian Museum collection have also been accessed.

The most relevant fauna assessments are the ones undertaken by Thompson, S.A. (2004) which include in excess of 120,000 trap nights of data in habitats similar to that in the project area, Cowan and How (2004), Dell and How (1988) and Ninox Wildlife Consulting (1998). These fauna surveys provide a near-complete list of the vertebrate species likely to be found in the project area. The composition of vertebrate fauna assemblages varies from habitat to habitat and site to site within the bioregion, however, the survey data contained in the attached appendices provide a good indication of the vertebrate fauna assemblage that is likely to be found in the project area. These data, therefore, provide a good regional context and indicate the extent of fauna assemblage variation that might be anticipated from site to site and temporally.

2.5 FAUNA SPECIES AT RISK

Cowan (2001) reported the fauna species at risk in the East Murchison subregion as Bilby (*Macrotis lagotis*), Marsupial Mole (*Notoryctes typhlops*), Mulgara (*Dasycercus cristicauda / blythi*), Malleefowl (*Leipoa ocellata*), Princess Parrot (*Polytelis alexandrae*), Slender-billed Thornbill (*Acanthiza iredalei iredalei*), Great Desert Skink (*Liopholis kintorei*) and Peregrine Falcon (*Falco peregrinus*). Since then, the Night Parrot (*Pezoporus occidentalis*), and Southern Whiteface (*Aphelocephala leucopsis*) have been added to the Commonwealth threatened species list for the bioregion. This report assesses the potential for these species to be found in the project area and the potential impact the proposed development might have on these species and other fauna of conservation significance.

3. METHODOLOGY

3.1 DATABASE SEARCHES

A review of the *EPBC Act 1999* online list of threatened species was undertaken to identify species of conservation interest to the Commonwealth Government under the *EPBC Act* (Appendix A). In addition, a desktop search of the Terrestrial Ecosystems' fauna survey database was undertaken to develop an appreciation of the vertebrate fauna assemblages in relevant sections of the bioregion near the project area.

Other more general texts were also used to provide supplementary information on vertebrate fauna in the bioregion, including Tyler et al. (2000) for frogs; Storr et al. (1983, 1990, 1999, 2002) and Thompson and Thompson (2010) for reptiles; Johnstone and Storr (1998, 2004) for birds; and Van Dyck and Strahan (2008) for mammals.

Collectively, these sources of information were used to create lists of species that were expected to utilise the project area and broader bioregion. It should be noted that these lists will include species that have been recorded in the general region but are possibly vagrants, and they will not generally be found in the project area due to a lack of suitable habitat (e.g. water and shore birds). Vagrants can be recorded almost anywhere. Many records are historical, and the species are no longer in the local area (e.g. Bilby). Many bird, mammal, reptile, and amphibian species have specific habitat requirements that may be present in the general area but not in the project area. Also, the ecology of many of these species is often poorly understood. It can sometimes be difficult to indicate species whose specific habitat requirements are absent in the project area. Therefore, many species will be included in the lists produced from database searches but will not be present in the actual project area.

There are errors in most databases, including Atlas of Living Australia and the Western Australian Museum (WAM) collection. These errors occur because of a misidentification of individuals, taxonomic name changes, and incorrect coordinates entering the database. Terrestrial Ecosystems could not verify the primary records, so it has used the information provided. Readers should appreciate that species lists, and fauna surveys reported in the appendices may include these errors.

3.2 RECONNAISSANCE SURVEY

The project area was searched on foot, and UTV to search for species of conservation significance between 15-18 November 2021. The reconnaissance survey was also used to record fauna habitat types in the project area.

3.3 FAUNA HABITAT ASSESSMENT

The fauna habitat assessment was undertaken for the project area. This field assessment had two foci:

- assess fauna habitat types and their condition; and
- assess the possible presence of and record evidence of species of conservation significance so that mitigation and management strategies might be implemented to reduce potential impacts.

The fauna habitat assessors stopped at multiple locations within the project area and recorded a suite of factors about the fauna habitat and its condition. This information included a description of the habitat structure, habitat condition, landform, soils and vegetation and time since the last fire (Table 1).

Table 1. Variables assessed during the rapid habitat assessment

Observer's Name:	
Coordinates of the location as UTM (GDA94):	
Fire history – options	
☐ > 5 years	
☐ 1-5 years	
☐ < 1 year	
Landform – options	
☐ Beach	☐ Lower slope
☐ Clay plain	☐ Mid slope
☐ Cliff	☐ Ridge
☐ Creek line	☐ River
☐ Dam	☐ Rocky outcrop / breakaway
☐ Drainage line	☐ Salt lake
☐ Dune crest	☐ Sand dune
☐ Dune slope	☐ Sand plain
☐ Dune swale	☐ Stony plain
☐ Escarpment	☐ Swamp
☐ Flat	☐ Undulating
☐ Gorge	☐ Upper slope
☐ Gully	☐ Wetland
☐ Intertidal / mangrove	☐ Water hole
☐ Lake / lake edge	
Habitat quality – options	
☐ *High-quality fauna habitat*—These areas closely approximate the vegetation mix and quality that would have been in the area before any disturbance. The habitat is connected to other habitats and likely contains the most natural vertebrate fauna assemblage.	
☐ *Very good fauna habitat*—These areas show minimal signs of disturbance (e.g., grazing, clearing, fragmentation, weeds) and generally retain many of the characteristics of the habitat if it had not been disturbed. The habitat is connected to other habitats, and fauna assemblages in these areas will likely be minimally affected by disturbance.	
☐ *Good fauna habitat*—These areas showed signs of disturbance (e.g., grazing, clearing, fragmentation, weeds) but generally retained many of the characteristics of the habitat if it had not been disturbed. The habitat has connectivity with other habitats, and fauna assemblages in these areas are likely to be affected by disturbance.	
☐ *Disturbed fauna habitat*– These areas showed signs of significant disturbance. Many of the trees, shrubs, and undergrowth have been cleared. These areas may be in the early succession and regeneration stages. Areas may show signs of significant grazing, containing weeds or damaged by vehicles or machinery. Habitats are fragmented or have limited connectivity with other fauna habitats. Fauna assemblages in these areas will likely differ significantly from what might be expected in the area had the disturbance not occurred.	
☐ *Highly degraded fauna habitat* – These areas often have a significant loss of vegetation, an abundance of weeds, and many vehicle tracks or are completely cleared. Limited or no fauna habitat connectivity. Fauna assemblages in these areas will likely significantly differ from what might have been in the pre-disturbance area.	

Habitat structure – combined into habitat description	
Upper stratum	
☐ Tall open woodland	☐ Scattered tall trees
☐ Tall woodland	☐ Scattered trees
☐ Open woodland	☐ Scattered low trees
☐ Woodland	☐ Low closed forest
☐ Open forest	☐ Low open forest
☐ Closed forest	☐ Low woodland
☐ Tall closed forest	☐ Low open woodland
☐ Tall open forest	
Middle stratum	
☐ Shrubland	☐ Open heath
☐ Tall shrubland	☐ Low closed heath
☐ Tall open shrubland	☐ Low open heath
☐ Low shrubland	☐ Tall closed scrub
☐ Scattered low shrubs	☐ Tall open scrub
☐ Low open shrubland	☐ Scattered tall shrubs
☐ Scattered tall shrubs	☐ Open shrubland
☐ Closed heath	☐ Scattered shrubs
Lower stratum	
☐ Closed hummock grassland	☐ Closed tussock grassland / sedgeland / herbland
☐ Mid-dense hummock grassland	☐ Tussock grass land / sedgeland / herbland
☐ Hummock grassland	☐ Open tussock grassland / sedgeland / herbland
☐ Open hummock grassland	☐ Scattered tussock / grasses / sedges / herbs
☐ Scattered hummock grassland	☐ Very open tussock grassland / herbland
Soil Type – options	
☐ Sand	☐ Silty loam
☐ Loamy sand	☐ Sand clay loam
☐ Clayey sand	☐ Clay
☐ Clay loam	☐ Peat / organic
☐ Silty clay loam	☐ Stony
☐ Sandy loam	
Soil colour - options	
☐ Black	☐ Red
☐ Brown	☐ White
☐ Grey	☐ Yellow
☐ Orange	

Surface stones – options			
☐	None	☐	Boulders (>250mm)
☐	Pebbles (0-50mm)	☐	Rocks
☐	Cobbles (51-250)		

3.4 SURVEY AND REPORTING STAFF

Drs Scott and Graham Thompson undertook the site investigation and fauna habitat assessment between 15-18 November 2021. Dr S Thompson completed the fauna habitat mapping, and Dr G Thompson prepared the report. Dr S Thompson reviewed the report before it was sent to the client.

Senior scientists have appropriate, relevant post-graduate qualifications, extensive experience in conducting vertebrate fauna surveys and assessments, have published research articles on biodiversity, fauna assemblages, species of conservation significance, trapping techniques, and temporal variations in trapped fauna assemblages and are therefore appropriately trained and experienced to undertake the survey and prepare the assessment. Both Drs Thompson have undertaken multiple assessments in the region and are familiar with the habitats and fauna assemblages in the bioregion.

Dr Scott Thompson is the only environmental practitioner in Western Australia with independent specialist certification (CEnvP – Ecology Specialist) combined with post-graduate tertiary qualifications and is a licensed pest management technician (LPMT). This unique set of skills and qualifications ensures Scott undertakes fauna surveys, assessments, and control programs to the highest standard and quality assurance. The qualifications and experience of the survey and reporting personnel are shown in Table 2.

Table 2. Project personnel and their qualifications

Name	Qualifications	Experience	Role
Dr Scott Thompson	BSc. (Env. Sc.), MSc. (Env. Mngt.), PhD (Env. Sc./Mngt), Cert III (Vertebrate Pest Mngt), Cert IV (WHS). CEnvP (Ecology Specialist)	> 20 years	Principal zoologist Survey coordinator, field survey, fauna habitat mapping and report review.
Dr Graham Thompson	Post Grad. Dip. (Zool.), PhD (Zoology), Cert III (Vertebrate Pest Mngt),	> 20 years	Principal zoologist. Field surveys and report preparation.

3.5 TAXONOMY AND NOMENCLATURE

Taxonomy and nomenclature for fauna species used in this report are generally based on the WA Museum (WAM) species lists. Terrestrial Ecosystems has presumed that the fauna identifications referred to in the appendices or in reports used to provide local and regional comparative data were correct, and we have only corrected obvious records where the nomenclature was known to be incorrect.

3.6 LIMITATIONS

This Basic vertebrate fauna survey and risk assessment is based on information in the Commonwealth Government database and other published and unpublished fauna survey data for the bioregion and a site visit. It is acknowledged that multiple surveys conducted in different seasons, repeated over several years, are necessary to appreciate the fauna assemblage in the project area fully.

Lists of species potentially in and around the project area have been compiled from WAM records, Atlas of Living Australia, and reports of fauna surveys undertaken nearby. Some records in the Atlas of Living Australia and the WAM are very old, and those species are no longer present in the area. Terrestrial Ecosystems have not been able to verify the primary data and, therefore, cannot vouch for the accuracy of these records. All these data sources are known to contain errors, which should be considered when reading this assessment. These errors occur because of a misidentification of individuals, taxonomic name changes, and incorrect coordinates entered into the database.

The *EPBC Act* online matters of national environmental significance (MNES) database for terrestrial fauna includes historical records. It places a wide buffer around previously known locations of threatened species in its database. A search of this database will invariably include species that are either locally extinct or were never present in parts of the search area.

The EPA's (2020) *Technical Guidance - Terrestrial vertebrate fauna surveys for environmental impact assessment* suggested that many variables may limit fauna surveys. Limitations associated with each of these variables are assessed in Table 3.

Table 3. Fauna survey limitations and constraints

Possible limitations	Constraint	Comment
Availability of data and information	Yes, negligible	Vertebrate fauna survey data is available for similar habitats near the project area.
Competency/experience of the survey team, including experience in the bioregion surveyed	No	The field zoologists and authors of this report have appropriate post-graduate qualifications, have undertaken multiple surveys and assessments in the Goldfields, have published a book and multiple refereed journal articles based on fauna surveys in the region and are familiar with the vertebrate fauna in this bioregion.
Scope of the survey, e.g. where faunal groups were excluded from the survey	N/A	The survey scope met the requirements of a Basic vertebrate fauna assessment.
Timing, weather and season	No	The weather was suitable for a site visit.
Disturbance that may have affected results, e.g. fire, flood	No	Disturbances in the project area have been factored into this assessment.
The proportion of fauna identified, recorded or collected	N/A	
Adequacy of the survey intensity and proportion of survey achieved, e.g. the extent to which the area was surveyed	No	The survey intensity was adequate for its intended purpose
Access problems	No	The site was accessible during the assessment
Problems with data and analysis, including sampling biases	N/A	This report collated and commented on data from other reports.

N/A = not applicable, Significant = major impact on outcome of the assessment, Moderate = impacted parts of the assessment, Negligible = almost no impact on the assessment.

4. RESULTS

4.1 FAUNA HABITAT

Based on fauna habitat assessments in the field and vegetation mapping completed by Western Botanical (2021), the project area supports the following seven broad fauna habitats (Figure 2; Appendix D):

- Bushy shrubland;
- Casuarina woodland;
- Eucalypt woodland;
- Open grassland;
- Shrubland on a ridge;
- Shrubland; and
- Previously disturbed areas.

The density of vegetation varied across the project area, and the condition of the fauna habitats varied from degraded to good, with the more degraded areas due to infrastructure, historical exploration activity, cattle grazing, and roads. There was evidence of rabbits and other feral fauna in the area.

Table 4. Relationship between vegetation associations and fauna habitats

Veg code	Vegetation association	Description	Fauna habitats
LIRS	Lateritic ironstone ridge *Acacia* shrublands	Lateritic ironstone ridges with mixed *Acacia* shrublands.	Shrubland on ridge
CpAsS	Casuarina pauper - *Acacia sibirica* shrublands	Stoney rises and plains with moderate to abundant mixed mantles of greenstone, quartz and ironstone pebbles cobbles, supporting prominent *Casuarina pauper* overstoreys with *Acacia sibirica*.	Casuarina woodland
CPBS	Calcyphytic pearl bluebush (*Maireana sedifolia*) shrublands	Stoney plains and slopes of greenstone hills supporting *Maireana sedifolia*.	Bushy shrubland
EsSafS	*Eremophila scoparia - Senna artemisioides* subsp. *filifolia* shrublands	Alluvial plains with sparse overstories and dominant *Eremophila scoparia* and *Senna artemisioides* midstoreys.	Bushy shrubland
PSAS	Sago bush (*Maireana pyramidata*) low shrubland	Alluvial plains with red earths or duplex soils on hardpan dominated by *Maireana pyramidata*.	Bushy shrubland
EclW	Calcrete platform *Eucalyptus cleandiorum* woodlands	Low precipitated calcrete platforms supporting dominant *Eucalyptus clelandiorum* overstoreys with chenopod low shrublands.	Eucalpyt woodland
EolW	Calcareous plain *Eucalyptus oleosa - Acacia* woodlands	Very gently undulating to level plains with dominant *Eucalyptus oleosa* overstory, and *Acacia aneura, Eremophila oppositifolia, Eremophila scoparia* midstory.	Eucalpyt woodland
EcoW	Calcareous plain *Eucalyptus concinna - Acacia* woodlands	Very gently undulating to level plains with dominant *Eucalyptus concinna* overstory, and *Acacia aneura, Eremophila oppositifolia, Eremophila scoparia* midstory.	Eucalypt woodland
OG	Open grassland	Alluvial plains dominated grasses and low chenopods.	Open grassland
DRMS	Drainage tract Mulga shrublands	Narrow unincised linear drainage zones receiving concentrated run-on, supporting *A. aneura* tall shrublands.	Shrubland
GHAS-As	Greenstone hill *Acacia sibirica* shrublands	Hills and low rises of red earths on greenstone or basalt indurated by iron, supporting *Acacia sibirica*.	Shrubland
GHAS-Ac	Greenstone hill *Acacia collegialis* shrublands	Summits of greenstone and basalt hills dominated by *Acacia collegialis*.	Shrubland
EceW	Greenstone hill *Eucalyptus celastroides* woodlands	Eroding greenstone or basalt hill slopes supporting dominant *Eucalyptus celastroides* overstoreys with poorly developed mid and sub-strata.	Eucalypt woodland
HPMS	Hardpan mulga shrublands	Level to very gentle inclined plains subject to sheet flow, often with mantles of fine ironstone gravel, supporting scattered to moderately close *Acacia aneura* tall shrublands.	Shrubland
	Disturbed		Previously disturbed

Images of the fauna habitat types are shown in Plates 1-14.

Plate 1. Bushy shrubland

Plate 2. Bushy shrubland

Plate 3. Casuarina woodland

Plate 4. Casuarina woodland

Plate 5. Eucalypt woodland

Plate 6. Eucalypt woodland

Plate 7. Open grassland

Plate 8. Open grassland

Plate 9. Shrubland on a ridge

Plate 10. Shrubland on a ridge

Plate 11. Shrubland

Plate 12. Shrubland

Plate 13. Previously disturbed area

Plate 14. Previously disturbed area

The results of the rapid habitat assessment are provided in Appendix D. Images of the habitat at each of these assessment points provide a more comprehensive overview of the habitats in the project area and along the infrastructure corridor.

4.1.1 Malleefowl

The project area was searched for Malleefowl mounds and tracks. Malleefowl are predominantly ground-dwelling species and walk a considerable distance each day foraging for insects and seeds. Their tracks are distinctive, and in areas of soft sand or on sand tracks, their presence is easily detected. No Malleefowl mounds or tracks were observed during the site visit, and there was little habitat in the project area suitable for Malleefowl.

Given anthropogenic disturbance in the project area over a period of many years, it was not anticipated that Malleefowl would be recorded in the project area.

4.1.2 Feral fauna

Rabbit scats (Plate 15) and dog prints (Plate 16) were recorded at multiple locations in the project area. A domestic/stray dog was recorded in the project area, so it is unknown whether the dog prints are from domestic/stray dogs wandering in the area or wild dogs.

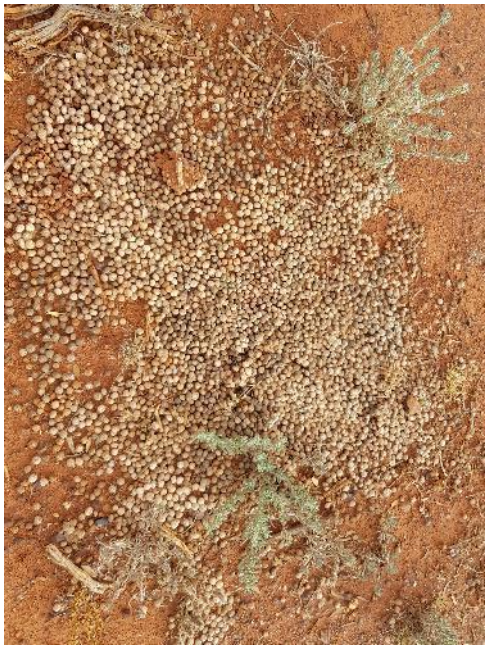

Plate 15. Rabbit scats

Plate 16. Dog tracks

4.1.3 Vertebrate fauna

Very few native vertebrate fauna were observed in the project area during the site assessment, suggesting that anthropogenic activity has appreciably reduced their abundance over an extended period.

4.1.4 Rubbish and deteriorating built infrastructure

There was an abundance of rubbish spread across the many sections of the project area, but mainly in the north and around old mine sites and a substantial quantity of deteriorating built infrastructure and machinery around the mining pits.

Plate 17. Rubbish from past anthropogenic activity

Plate 18. Deteriorating machinery

Plate 19. Deteriorating machinery

Plate 20. Deteriorating machinery

Plate 21. Uncapped exploration drill hole

Plate 22. Uncapped exploration drill hole

4.1.5 Uncapped exploration drill holes

There was evidence of uncapped drill holes at multiple locations. Uncapped drill holes with the openings at ground level are pit traps for small vertebrates, from which they cannot escape (Malnic 1997). It is important that when exploration activity associated with a drill hole has been concluded, the holes are appropriately capped. Typically, this is best achieved by maintaining a record of where drill holes are and who was responsible for securely capping them.

4.2 BIOREGIONAL VERTEBRATE FAUNA

Appendix B provides a summary of the fauna survey data available near the project area. There are appreciable differences in the recorded fauna assemblages within and among fauna surveys shown in Appendix B. These differences are partially due to the low survey effort often deployed, and they also reflect variations in soils and vegetation and temporal variations in the fauna assemblages.

Tables 5-8 provide a list of vertebrate species potentially found near the project area that have been compiled based on the fauna survey report results shown in Appendix B.

Table 5. Bird species recorded in areas adjacent to the project area

Family	Species	Common Name
Casuariidae	*Dromaius novaehollandiae*	Emu
Megapodiidae	*Leipoa ocellata*	Malleefowl
Phasianidae	*Coturnix pectoralis*	Stubble Quail
Anatidae	*Biziura lobata*	Musk Duck
	Stictonetta naevosa	Freckled Duck
	Cygnus atratus	Black Swan
	Tadorna tadornoides	Australian Shelduck
	Chenonetta jubata	Australian Wood Duck
	Malacorhynchus membranaceus	Pink-eared Duck
	Anas gracilis	Grey Teal
	Anas superciliosa	Pacific Black Duck
	Aythya australis	Hardhead
Podicipedidae	*Poliocephalus poliocephalus*	Hoary-headed Grebe
Columbidae	*Phaps chalcoptera*	Common Bronzewing
	Ocyphaps lophotes	Crested Pigeon
	Geopelia cuneata	Diamond Dove
Podargidae	*Podargus strigoides*	Tawny Frogmouth
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar
Apodidae	*Apus pacificus*	Fork-tailed Swift
Otididae	*Ardeotis australis*	Australian Bustard
Anhingidae	*Anhinga melanogaster*	Australasian Darter
Ardeidae	*Ardea pacifica*	White-necked Heron
	Egretta novaehollandiae	White-faced Heron
	Ardea alba	Great Egret
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill
Accipitridae	*Elanus axillaris*	Black-shouldered Kite
	Lophoictinia isura	Square-tailed Kite
	Haliaeetus albicilla	White-bellied Sea-eagle
	Haliastur sphenurus	Whistling Kite
	Accipiter fasciatus	Brown Goshawk
	Accipiter cirrocephalus	Collared Sparrowhawk

Family	Species	Common Name
	Circus assimilis	Spotted Harrier
	Aquila audax	Wedge-tailed Eagle
	Hieraaetus morphnoides	Little Eagle
Falconidae	*Falco cenchroides*	Nankeen Kestrel
	Falco berigora	Brown Falcon
	Falco longipennis	Australian Hobby
	Falco peregrinus	Peregrine Falcon
Rallidae	*Tribonyx ventralis*	Black-tailed Native-hen
	Fulica atra	Eurasian Coot
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt
	Recurvirostra novaehollandiae	Red-necked Avocet
	Cladorhynchus leucocephalus	Banded Stilt
Charadriidae	*Charadrius ruficapillus*	Red-capped Plover
	Elseyornis melanops	Black-fronted Dotterel
	Erythrogonys cinctus	Red-kneed Dotterel
	Vanellus tricolor	Banded Lapwing
Scolopacidae	*Tringa nebularia*	Common Greenshank
Turnicidae	*Turnix velox*	Little Button-quail
Laridae	*Chlidonias hybridus*	Whiskered Tern
	Chroicocephalus novaehollandiae	Silver Gull
Cacatuidae	*Eolophus roseicapillus*	Galah
	Nymphicus hollandicus	Cockatiel
Psittacidae	*Glossopsitta porphyrocephala*	Purple-crowned Lorikeet
	Polytelis anthopeplus	Regent Parrot
	Platycercus icterotis	Western Rosella
	Barnardius zonarius	Australian Ringneck
	Psephotus varius	Mulga Parrot
	Melopsittacus undulatus	Budgerigar
	Neopsephotus bourkii	Bourke's Parrot
	Neophema splendida	Scarlet-chested Parrot
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-cuckoo

Family	Species	Common Name
	Chalcites osculans	Black-eared Cuckoo
	Cacomantis pallidus	Pallid Cuckoo
Strigidae	*Ninox novaeseelandiae*	Southern Boobook
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra
	Todiramphus pyrrhopygius	Red-backed Kingfisher
Meropidae	*Merops ornatus*	Rainbow Bee-eater
Climacteridae	*Climacteris affinis*	White-browed Treecreeper
	Climacteris rufa	Rufous Treecreeper
Ptilonorhynchidae	*Ptilonorhynchus maculatus*	Spotted Bowerbird
	Ptilonorhynchus guttatus	Western Bowerbird
Maluridae	*Malurus splendens*	Splendid Fairy-wren
	Malurus leucopterus	White-winged Fairy-wren
	Malurus lamberti	Variegated Fairy-wren
	Malurus pulcherrimus	Blue-breasted Fairy-wren
Acanthizidae	*Pyrrholaemus brunneus*	Redthroat
	Smicrornis brevirostris	Weebill
	Gerygone fusca	Western Gerygone
	Acanthiza robustirostris	Slaty-backed Thornbill
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill
	Acanthiza uropygialis	Chestnut-rumped Thornbill
	Acanthiza iredalei	Slender-billed Thornbill
	Acanthiza apicalis	Inland Thornbill
	Aphelocephala leucopsis	Southern Whiteface
Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote
	Pardalotus rubricatus	Red-browed Pardalote
	Pardalotus striatus	Striated Pardalote
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater
	Lichenostomus virescens	Singing Honeyeater
	Lichenostomus leucotis	White-eared Honeyeater
	Lichenostomus ornatus	Yellow-plumed Honeyeater
	Lichenostomus plumulus	Grey-fronted Honeyeater
	Lichenostomus penicillatus	White-plumed Honeyeater
	Purnella albifrons	White-fronted Honeyeater

Family	Species	Common Name
	Manorina flavigula	Yellow-throated Miner
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater
	Anthochaera carunculata	Red Wattlebird
	Conopophila whitei	Grey Honeyeater
	Epthianura tricolor	Crimson Chat
	Epthianura albifrons	White-fronted Chat
	Sugomel niger	Black Honeyeater
	Lichmera indistincta	Brown Honeyeater
	Phylidonyris niger	White-cheeked Honeyeater
	Melithreptus brevirostris	Brown-headed Honeyeater
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler
Psophodidae	*Cinclosoma castanotum*	Chestnut Quail-thrush
	Cinclosoma castaneothorax	Chestnut-breasted Quail-thrush
	Psophodes occidentalis	Chiming Wedgebill
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella
Campephagidae	*Coracina maxima*	Ground Cuckoo-shrike
	Coracina novaehollandiae	Black-faced Cuckoo-shrike
	Lalage sueurii	White-winged Triller
Pachycephalidae	*Pachycephala inornata*	Gilbert's Whistler
	Pachycephala pectoralis	Golden Whistler
	Pachycephala rufiventris	Rufous Whistler
	Colluricincla harmonica	Grey Shrike-thrush
	Oreoica gutturalis	Crested Bellbird
Artamidae	*Artamus personatus*	Masked Woodswallow
	Artamus superciliosus	White-browed Woodswallow
	Artamus cinereus	Black-faced Woodswallow
	Artamus cyanopterus	Dusky Woodswallow
	Artamus minor	Little Woodswallow
	Cracticus torquatus	Grey Butcherbird
	Cracticus nigrogularis	Pied Butcherbird
	Cracticus tibicen	Australian Magpie
	Strepera versicolor	Grey Currawong

Family	Species	Common Name
Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail
	Rhipidura leucophrys	Willie Wagtail
Corvidae	*Corvus coronoides*	Australian Raven
	Corvus bennetti	Little Crow
	Corvus orru	Torresian Crow
Monarchidae	*Grallina cyanoleuca*	Magpie-lark
Petroicidae	*Microeca fascinans*	Jacky Winter
	Petroica goodenovii	Red-capped Robin
	Melanodryas cucullata	Hooded Robin
	Drymodes brunneopygia	Southern Scrub-robin
Megaluridae	*Cincloramphus mathewsi*	Rufous Songlark
	Cincloramphus cruralis	Brown Songlark
Timaliidae	*Zosterops lateralis*	Silvereye
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow
	Hirundo rustica	Barn Swallow
	Hirundo neoxena	Welcome Swallow
	Petrochelidon ariel	Fairy Martin
	Hirundo nigricans	Tree Martin
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird
Estrildidae	*Taeniopygia guttata*	Zebra Finch
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit

Table 6. Amphibian species recorded in areas adjacent to the project area

Family	Species	Common Name
Hylidae	*Cyclorana maini*	Sheep Frog
	Cyclorana platycephala	Water-holding Frog
	Litoria cyclorhyncha	Spotted-thighed Frog
	Litoria moorei	Motorbike Frog
Limnodynastidae	*Neobatrachus kunapalari*	Kunapalari Frog
	Neobatrachus sudelli	Sudell's Frog
	Neobatrachus sutor	Shoemaker Frog
	Neobatrachus wilsmorei	Goldfields Bullfrog
	Platyplectrum spenceri	Spencer's Burrowing Frog
Myobatrachidae	*Crinia georgiana*	Quacking Frog
	Pseudophryne occidentalis	Orange-crowned Toadlet

Table 7. Mammal species recorded in areas adjacent to the project area

Family	Species	Common Name
Bovidae	*Bos taurus*	Cow
	Capra hircus	Goat
	Ovis aries	Sheep
Camelidae	*Camelus dromedarius*	Dromedary
Suidae	*Sus scrofa*	Pig
Canidae	*Canis familiaris*	Dog
	Canis lupus	Dingo
	Vulpes vulpes	Red Fox
Felidae	*Felis catus*	House Cat
Emballonuridae	*Taphozous hilli*	Hill's Sheath-tail Bat
Molossidae	*Austronomus australis*	White-striped Free-tail Bat
	Mormopterus planiceps	Southern Free-tail Bat
	Mormopterus species 4	South-western Free-tail Bat
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat
	Chalinolobus morio	Chocolate Wattled Bat
	Nyctophilus geoffroyi	Lesser Long-eared Bat
	Nyctophilus gouldi	Gould's Long-eared Bat
	Nyctophilus major	Greater Long-eared Bat
	Scotorepens balstoni	Inland Broad-nosed Bat
	Vespadelus baverstocki	Inland Forest Bat
	Vespadelus regulus	Southern Forest Bat
Dasyuridae	*Antechinomys laniger*	Kultarr

Family	Species	Common Name
	Ningaui ridei	Wongai Ningaui
	Ningaui yvonneae	Mallee Ningaui
	Pseudantechinus woolleyae	Woolley's False Antechinus
	Sminthopsis crassicaudata	Fat-tailed Dunnart
	Sminthopsis dolichura	Little Long-tailed Dunnart
	Sminthopsis gilberti	Gilbert's Dunnart
	Sminthopsis hirtipes	Hairy-footed Dunnart
	Sminthopsis longicaudata	Long-tailed Dunnart
	Sminthopsis macroura	Stripe-faced Dunnart
	Sminthopsis ooldea	Ooldea Dunnart
Myrmecobiidae	*Myrmecobius fasciatus*	Numbat
Burramyidae	*Cercartetus concinnus*	Southwestern Pygmy Possum
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo
	Osphranter robustus	Euro
	Osphranter rufus	Red Kangaroo
Phalangeridae	*Trichosurus vulpecula*	Common Brushtail Possum
Potoroidae	*Bettongia lesueur*	Burrowing Bettong
Leporidae	*Oryctolagus cuniculus*	European Rabbit
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna
	Macrotis lagotis	Bilby
Equidae	*Equus asinus*	Donkey
	Equus caballus	Domestic Horse
Muridae	*Mus musculus*	House Mouse
	Notomys alexis	Spinifex Hopping Mouse
	Notomys mitchellii	Mitchell's Hopping Mouse
	Pseudomys albocinereus	Ash-grey Mouse
	Pseudomys bolami	Bolam's Mouse
	Pseudomys hermannsburgensis	Sandy Inland Mouse

Table 8. Reptile species recorded in areas adjacent to the project area

Family	Species	Common Name
Agamidae	*Ctenophorus caudicinctus*	Ring-tailed Dragon
	Ctenophorus cristatus	Crested Dragon
	Ctenophorus fordi	Mallee Dragon
	Ctenophorus inermis	Military Dragon
	Ctenophorus isolepis	Crested Dragon
	Ctenophorus maculatus	Spotted Dragon
	Ctenophorus nuchalis	Central Netted Dragon
	Ctenophorus ornatus	Ornate Crevice Dragon
	Ctenophorus pictus	Painted Dragon
	Ctenophorus reticulatus	Western Netted Dragon
	Ctenophorus salinarum	Saltpan Dragon
	Ctenophorus scutulatus	Lozenge-marked Dragon
	Diporiphora amphiboluroides	Mulga Dragon
	Moloch horridus	Thorny Devil
	Pogona minor	Dwarf Bearded Dragon
	Tympanocryptis cephalus	Pebble Dragon
Boidae	*Antaresia stimsoni*	Stimson's Python
	Morelia spilota	Carpet Python
Carphodactylidae	*Nephrurus laevissimus*	Smooth Knob-tail
	Nephrurus vertebralis	Midline Knob-tail
	Nephrurus wheeleri	Banded Knob-tail
	Underwoodisaurus milii	Barking Gecko
Diplodactylidae	*Amalosia reticulata*	Reticulated Velvet Gecko
	Diplodactylus conspicillatus	Fat-tailed Diplodactylus
	Diplodactylus granariensis	Wheat-belt Stone Gecko
	Diplodactylus pulcher	Fine-faced Gecko
	Hesperoedura reticulata	Reticulated Velvet Gecko
	Lucasium damaeum	Beaded Gecko
	Lucasium maini	Main's Ground Gecko
	Lucasium squarrosum	Mottled Ground Gecko

Family	Species	Common Name
	Strophurus assimilis	Goldfields Spiny-tailed Gecko
	Strophurus ciliaris	Spiny-tailed Gecko
	Strophurus elderi	Jewelled Gecko
	Strophurus intermedius	Southern Spiny-tailed Gecko
	Strophurus strophurus	Western Spiny-tailed Gecko
	Strophurus wellingtonae	Western Shield Spiny-tailed Gecko
Elapidae	*Acanthophis pyrrhus*	Desert Death Adder
	Brachyurophis fasciolata	Narrow-banded Burrowing Snake
	Brachyurophis semifasciata	Half-girdled Snake
	Demansia psammophis	Yellow-faced Whipsnake
	Elapognathus coronatus	Crowned Snake
	Furina ornata	Orange-naped Snake
	Neelaps bimaculatus	Black-naped Burrowing Snake
	Parasuta gouldii	Gould's Snake
	Parasuta monachus	Monk Snake
	Pseudechis australis	Mulga Snake
	Pseudechis butleri	Spotted Mulga Snake
	Pseudonaja mengdeni	Gwardar
	Pseudonaja modesta	Ringed Brown Snake
	Simoselaps bertholdi	Jan's Banded Snake
	Suta fasciata	Rosen's Snake
	Suta suta	Curl Snake
Gekkonidae	*Christinus marmoratus*	Marbled Gecko
	Gehyra punctata	Spotted Dtella
	Gehyra purpurascens	Purplish Dtella
	Gehyra variegata	Tree Dtella
	Gehyra xenopus	Crocodile-faced Dtella
	Heteronotia binoei	Bynoe's Prickly Gecko
	Rhynchoedura ornata	Western Beaked Gecko
Pygopodidae	*Aprasia picturata*	Black-headed Worm-lizard
	Delma australis	Marble-faced Delma
	Delma butleri	Unbanded Delma
	Delma fraseri	Fraser's Delma
	Delma nasuta	Sharp-snouted Delma
	Lialis burtonis	Burton's Snake-lizard
	Pygopus lepidopodus	Common Scaly-foot
	Pygopus nigriceps	Western Hooded Scaly-foot
Scincidae	*Cryptoblepharus buchananii*	Buchanan's Snake-eyed Skink
	Ctenotus atlas	Southern Mallee Ctenotus
	Ctenotus brooksi	Wedgsnout Ctenotus
	Ctenotus calurus	Blue-tailed Finesnout Ctenotus
	Ctenotus greeri	Spotted-necked Ctenotus
	Ctenotus hanloni	Nimbel Ctenotus
	Ctenotus helenae	Clay-soil Ctenotus
	Ctenotus leae	Ornage-tailed Finesnout Ctenotus
	Ctenotus leonhardii	Leonhardi's Ctenotus
	Ctenotus pantherinus	Leopard Skink
	Ctenotus quattuordecimlineatus	Fourteen-lined Ctenotus
	Ctenotus schomburgkii	Schomburgk's Ctenotus
	Ctenotus severus	Stern Ctenotus
	Ctenotus uber	Spotted Ctenotus
	Ctenotus xenopleura	Wide-striped Ctenotus
	Cyclodomorphus branchialis	Common Slender Bluetongue
	Cyclodomorphus melanops	Spinifex Slender Bluetongue
	Egernia depressa	Pygmy Spiny-tailed Skink
	Egernia formosa	Goldfields Crevice-skink
	Egernia napoleonis	South-western Crevice-skink
	Eremiascincus richardsonii	Broad-banded Sand Swimmer
	Hemiergis initialis	South-western Earless Skink
	Lerista desertorum	Central Desert Robust Slider
	Lerista distinguenda	South-western Orange-tailed Slider
	Lerista kingi	King's Slider

Family	Species	Common Name
	Lerista lineopunctulata	Dotted-line Robust Slider
	Lerista macropisthopus	Unpatterned Robust Slider
	Lerista picturata	Southern Robust Slider
	Lerista timida	Timid Slider
	Liopholis inornata	Desert Skink
	Liopholis striata	Nocturnal Desert Skink
	Menetia greyii	Common Dwarf Skink
	Morethia adelaidensis	Saltbush Morethia Skink
	Morethia butleri	Woodland Morethia Skink
	Tiliqua multifasciata	Centralian Blue-tongued Lizard
	Tiliqua occipitalis	Western Blue-tongued Lizard
	Tiliqua rugosa	Bobtail
Typhlopidae	*Anilios australis*	Austral Blind Snake
	Anilios bicolor	Dark-spined Blind Snake
	Anilios bituberculatus	Prong-snouted Blind Snake
	Anilios hamatus	Pale-headed Blind Snake
	Anilios waitii	Waite's Blind Snake
Varanidae	*Varanus caudolineatus*	Stripe-tailed Monitor
	Varanus eremius	Pygmy Desert Monitor
	Varanus giganteus	Perentie
	Varanus gouldii	Gould's Goanna
	Varanus panoptes	Yellow-spotted Monitor
	Varanus tristis	Black-headed Monitor

4.3 SPECIES OF CONSERVATION SIGNIFICANCE

Fauna species of conservation significance are protected by the Commonwealth *EPBC Act 1999*, and this list includes species covered by international treaties such as the Japan-Australia Migratory Bird Agreement (JAMBA) and China-Australia Migratory Bird Agreement (CAMBA) and the Western Australia (WA) *BC Act 2016*. The WA BC *Act 2016* provides for publishing the *Wildlife Conservation (Specially Protected Fauna) Notice* that lists species under multiple categories. In addition, the DBCA maintains a list of fauna that require monitoring under four priorities based on the current knowledge of their distribution, abundance, and threatening processes. The *EPBC Act 1999* and *BC Act 2016* imply legislative requirements for managing anthropogenic impacts to minimise the effects of disturbances on species and their habitats. Priority species have no statutory protection other than the DBCA wishes to monitor potential impacts on these species. Environmental consultants and proponents of developments are encouraged to avoid and minimise impacts on these species. Definitions of the significant fauna under the WA *BC Act* are provided in Appendix C.

Shorebirds, waders and marine migratory species have been excluded from this assessment as there is no suitable habitat for these species in or near the project area.

The Southern Whiteface is the only threatened species of fauna potentially present in the project area, one specially protected species may infrequently be present, and there is a low possibility that two migratory species of birds identified under the *EPBC Act 1999* potentially occur in the project area or surrounds. The following is an assessment of the likelihood of each of the species listed in Table 9 being found in the project area.

Table 9. Potential species of conservation significance found around the project area

Species	DBCA Schedule / Priority	Status under Commonwealth EPBC Act	Comment
Night Parrot *Pezoporus occidentalis*	Critically Endangered	Endangered	Highly unlikely to be in the project area due to a lack of suitable habitat. The potential for impacting on this species is very low.
Sandhill Dunnart *Sminthopsis psammophila*	Endangered	Endangered	Highly unlikely to be in the project area due to a lack of suitable habitat. The potential for impacting on this species is very low.
Malleefowl *Leipoa ocellata*	Vulnerable	Vulnerable	Unlikely to be in the project area due to a lack of suitable habitat and an abundance of feral fauna. The potential for impacting on this species is low.
Chuditch *Dasyurus geoffroii*	Vulnerable	Vulnerable	Highly unlikely to be in the project area due to a lack of suitable habitat. The potential for impacting this species is, therefore, low.
Grey Falcon *Falco hypoleucos*	Vulnerable	Vulnerable	It may be seen very infrequently in the region, however, development is unlikely to impact this species.
Princess Parrot *Polytelis alexandrae*	Priority 4	Vulnerable	It may be seen very infrequently in the region, however, development is unlikely to impact this species.
Southern Whiteface *Aphelocephala leucopsis*		Vulnerable	It is likely to be present in the project area. As it is a mobile species, the project's potential impact on this species is low.
Oriental Plover *Charadrius veredus*	Migratory	Migratory	Highly unlikely to be in the project area due to a lack of suitable habitat. The potential for impacting this species is, therefore, low.
Fork-tailed Swift *Apus pacificus*	Migratory	Migratory	It may be seen very infrequently in the region, however, development is unlikely to impact this species.
Grey Wagtail *Motacilla cinerea*	Migratory	Migratory	Highly unlikely to be seen in the project area, so the potential for impact on this species is low.
Yellow Wagtail *Motacilla flava*	Migratory	Migratory	Highly unlikely to be seen in the project area, so the potential for impact on this species is low.
Peregrine Falcon *Falco peregrinus*	Other specially protected		It may be seen very infrequently in the region, however, development is unlikely to impact this species.
Woma python *Aspidites ramsayi*	P1		Highly unlikely to be seen in the project area, so the potential for impact on this species is low.
Mulgara *Dasycercus blythi / cristicauda*	Priority 4	Vulnerable	It is highly unlikely to be in the project area due to a lack of suitable habitat, so the potential for impact on this species is low.
Long-tailed Dunnart *Sminthopsis longicaudata*	P4		Unlikley to be present in the project area due to a lack of suitable habitat.

Night Parrot (*Pezoporus occidentalis*) – Critically endangered under the WA *BC Act 2016* and endangered under the *EPBC Act 1999*

The Night Parrot is a small, arid-adapted, nocturnal, ground-feeding parrot (Johnstone and Storr 1998, Threatened Species Scientific Committee 2016). Its length is 22-25cm with a body mass of approximately 104g (Threatened Species Scientific Committee 2016), although it was suggested that they were semi-nomadic, the Night Parrots in south-western Queensland appear to be sedentary (Murphy 2015).

The Night Parrot was probably initially distributed over much semi-arid and arid Australia (Garnett et al. 2011, Threatened Species Scientific Committee 2016). Recordings in north-west and western Queensland in the early 1990-2000s were in a broad cross-section of available habitats (Cupitt and Cupitt 2008, Garnett et al. 2011, Boles et al. 2016). There have been recent sightings in the Pilbara in 1980, 2005, and 2017, central WA in 1979, north-eastern South Australia in 1979, western Queensland (including Pullen-Pullen-Mt Windsor-Diamantina population) in 1980, 1990, 1993, 2006 and 2013-17 (Davis and Metcalf 2008, Garnett et al. 2011, Charalambous 2016, Pickrell 2016, AG staff 2017, Palaszxzuk and Miles 2017, Rykers 2017, AG staff 2018), Pilbara in 2017 (Jones 2017), the northern Goldfields (Jackett et al. 2017) and Great Sandy Desert (Lindsay et al. 2024,

Ngururrpa Rangers et al. 2024). Garnett *et al*. (2011) suggested that there were between 50-250 mature individuals in less than 5% of its previous range, but in recent research, there is estimated to be 40-50 birds in one region (Ngururrpa Rangers et al. 2024) so the Australia-wide estimate might be higher.

Wilson's (1937) summary of observations provided information on the early records of Night Parrots' preferred habitat and breeding sites. Recent information indicates its preferred habitat appears to be in Triodia grasslands, chenopod shrublands, shrubby samphire and floristically diverse habitats dominated by large-seeded species (Threatened Species Scientific Committee 2016, McCarthy 2017, Murphy et al. 2017b). At Pullen Pullen Reserve it nests in large, more or less ring-shaped Triodia, and the nest consists of a tunnel (25-30^{o} and 0^{o} to the ground; 20-33cm long) through an apron of dead spinifex leaves that leads to a chamber under a live hummock, with a shallow depression (3-4cm) excavated into the gravelly/sandy soil (Murphy et al. 2017a). In the northern Goldfields, the nest was again in a spinifex hummock; it was circular, with an excavated depression (~1.5-2.0cm) in sandy substrate (Hamilton et al. 2017, Jackett et al. 2017). The entrance tunnel was 62cm long and was downward sloping (27^{o}), with the entrance 28cm above the ground (Hamilton et al. 2017). It has clutches of two to four sub-elliptical, white eggs with a lustrous appearance (Murphy et al. 2017a). Breeding followed significant rains in March for the observations in Pullen-Pullen Reserve and in April in the northern Goldfields (Hamilton et al. 2017, Murphy et al. 2017a), but it is thought that breeding generally occurs between April and October (Murphy *et al*. 2017a).

Murphy et al. (2017b) placed a GPS tag on Night Parrots and reported that the two birds called at dusk from their diurnal roosts among spinifex hummocks. They then flew to more floristically diverse habitats dominated by large-seeded, prolifically seeding species to feed.

The Department of Biodiversity, Conservation and Attractions (Department of Parks and Wildlife 2017) survey guidelines for Night Parrots indicated that 'at the local (site) level, roosting and nesting sites are in clumps of dense vegetation, primarily old and large spinifex clumps (often >50 years unburnt), especially hummocks that are ring-forming. These may be in expanses or isolated patches but are sometimes associated with other vegetation types, such as dense chenopod shrubs. Spinifex hummocks that are collapsed (i.e., less than 40-50 cm in height) are not likely to provide adequate shelter.' Although there are old rings of spinifex in some areas, none of the spinifex hummocks were above 40cm, suggesting the habitat is unsuitable for this parrot.

As the preferred roosting and nesting sites for Night Parrots are not present in the project area and there is a significant threat to the species in the area (e.g., feral cats), the Night Parrot is unlikely to be present in the project area and will, therefore, not be impacted by any proposed development.

Malleefowl (*Leipoa ocellata*) – Vulnerable under the *BC Act 2018* and *EPBC Act 1999*

Malleefowl are large, ground-dwelling birds that rarely fly unless alarmed or are perching for the night. Historically, Malleefowl have been found in mallee regions of southern Australia from approximately the 26th parallel of latitude southwards. Before vegetation clearing for agriculture, Malleefowl were abundant in the WA Wheatbelt. Vegetation clearing for agriculture also opened adjacent bushland to predators, and in the southwest of WA, Malleefowl often only persist in isolated remnant patches of native vegetation. Sheep and other herbivores (e.g. goats, kangaroos) grazing in remnant vegetation removes or thins the undergrowth, and they also compete with Malleefowl for herbaceous foods and can cause changes to the structure and floristic diversity of foraging habitats (Benshemesh 2007).

Malleefowl and their eggs are vulnerable to predation by foxes, and newly hatched chicks are vulnerable to foxes, cats, and raptors (Priddel and Wheeler 1990, Benshemesh and Burton 1999, Benshemesh 2007, Lewis and Hines 2014). Their abundance in the Goldfields is low and sparsely distributed, favouring those areas that are more densely vegetated. Malleefowl build distinctive nests that comprise a large mound of soil/rock covering a central core of leaf litter. These nest mounds range in diameter but sometimes span more than five metres and may be up to one metre high. Malleefowl are generally monogamous; once breeding commences, they pair for life. The presence of nest mounds indicates the presence of Malleefowl in the area.

Malleefowl have been observed in the bioregion, however, there are no recent records of active breeding mounds in the vicinity of the project area. There are no Malleefowl mounds or tracks in the project area and very little habitat that is suitable for them, so it is highly unlikely that they are in the project area.

Chuditch (*Dasyurus geoffroii*) – Vulnerable under the *BC Act 2016* and *EPBC Act 1999*

The Chuditch is the largest extant carnivorous marsupial in WA. It is usually active from dusk to dawn. Formally known from over 70% of Australia, the Chuditch now has a patchy distribution throughout the Jarrah forest and mixed Karri/Marri/Jarrah forest of south-west WA and other isolated areas. Chuditch are solitary animals for most of their life and den in hollow logs, burrows, culverts, etc. and have also been recorded in tree hollows and rock cavities. Chuditch are opportunistic feeders and forage primarily on the ground at night. Their diet can include other mammals, birds, lizards, and bird and reptile eggs, but the majority is a mixture of large invertebrates (e.g. spiders, scorpions and crickets).

None of the fauna surveys in the adjacent areas have recorded the presence of Chuditch. Much of the habitat in the project area is not suitable, and the abundance of feral predators indicates that it is highly unlikely that they would be present in the project area.

Grey Falcon (*Falco hypoleucos*) – Vulnerable under the *BC Act 2016* and *EPBC Act 1999*.

This is Australia's rarest falcon, and it is mostly found in areas of less than 500mm rainfall south of latitude 26°S in Western Australia (Threatened Species Scientific Committee 2020). It is mostly found in timbered lowland plains, particularly *Acacia* shrublands that are crossed by tree-lined water courses (Threatened Species Scientific Committee 2020). However, this species has been observed in treeless areas and frequents tussock grassland and open woodland (Threatened Species Scientific Committee 2020).

This species was not seen during the site visit, has not been recorded in other fauna surveys in the project or adjacent areas, and if it were present, then would move away once disturbed.

Princess Parrot (*Polytelis alexandrae*) - Vulnerable species under the *EPBC Act 1999* and as a Priority 4 species with DBCA

Very little is known about the Princess Parrot, even the exact extent of its geographical distribution. The species is found mostly in the inland arid areas of Australia, and Western Australia in the Gibson, Little Sandy and Great Victoria Deserts (1998, Pavey et al. 2014). However, they occasionally occurred in lightly wooded areas adjacent to the sandy deserts (Moriarty 1972). It is thought to be nomadic within the central desert regions of Australia, occupying arid shrub lands, particularly those dominated by Mulga, Desert Oak and spinifex. Due to the paucity of information on the species, accurate estimates of its population size are difficult, however, this species is probably threatened by habitat loss due to agricultural practices and changes in fire regimes.

Dr S. Thompson sighted a single specimen of this parrot in a survey near the Wanjarri Nature Reserve in 2006 and Moriarty (1972) also reported it in the same area, so it may occasionally be seen in the general area. However, the proposed vegetation clearing is unlikely to significantly impact this species as it will readily move away to other areas if it is disturbed.

Southern Whiteface (*Aphelocephala leucopsis*) - Vulnerable species under the *EPBC Act 1999*

The Southern Whiteface is a recent addition to the *EPBC Act 1999*. It is a small bush bird found in the arid and semi-arid interior from the WA coast near Hamelin Bay through the Great Victoria Desert into the arid areas of South Australia, Victoria, NSW and Queensland (Johnstone and Storr 2004, Department of Climate Change Energy the Environment and Water 2023).

It is found in open woodlands and shrublands with an understorey of grasses and low shrubs (Department of Climate Change Energy the Environment and Water 2023). It forages on the ground, feeding on insects, spiders and seeds that are mostly found in the leaf litter. (Johnstone and Storr 2004, Department of Climate Change Energy the Environment and Water 2023).

The Southern Whiteface has been recorded in multiple fauna surveys in the region (Plate 23), so it is likely to be present in the project area. In recent years, almost every comprehensive avifauna survey in the region has recorded the presence of Southern Whiteface. It will readily move if disturbed. Given its widespread distribution, abundance in surveys and ability to move if disturbed, it is unlikely to be significantly impacted by vegetation clearing and low impact activities in the project area.

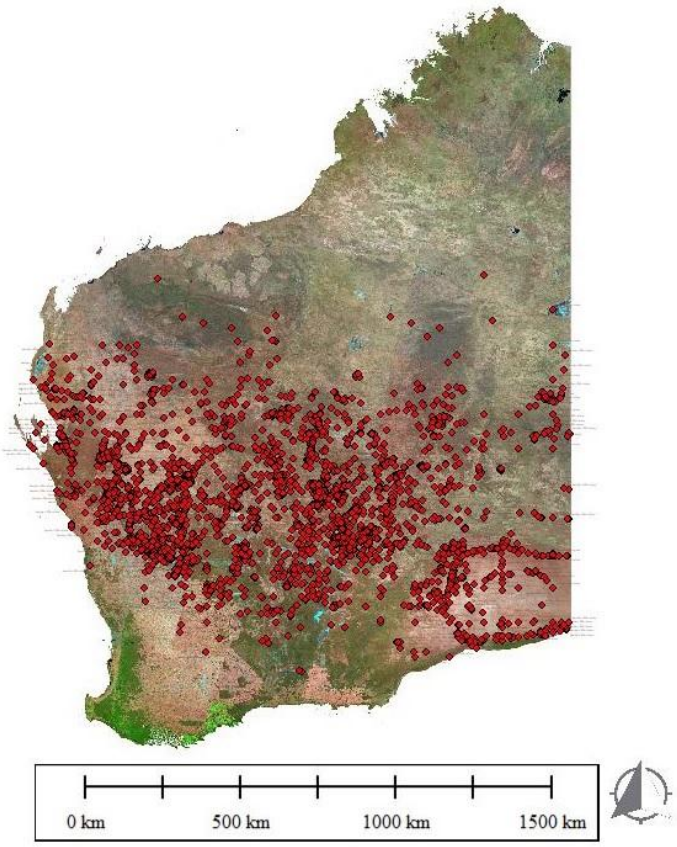

Plate 23. Southern Whiteface records in Terrestrial Ecosystems' fauna survey database near the project area

Oriental Plover (*Charadrius veredus*) - Migratory species under the *EPBC Act 1999* and the WA *BC Act 2018*

A migrant species with patchy distribution in Australia, the Oriental Plover is sparsely distributed across arid and semi-arid Australia but avoids truly desert regions. Its preferred habitat is dry plains. The species is threatened by habitat reduction due to agriculture and changing fire regimes. This plover has not been recorded in the general area in any of the other regional surveys.

Terrestrial Ecosystems assesses that the Oriental Plover is unlikely to be seen in the project area due to a lack of previous records in the general area.

Fork-tailed Swift (*Apus pacificus*) - Migratory species under the *EPBC Act 1999* and the WA *BC Act 2018*

This species breeds in northeast and mid-east Asia and winters in Australia and southern New Guinea. It is a visitor to most parts of Western Australia, beginning to arrive in the Kimberley in late September, in the Pilbara in November, and in the southwest land division in mid-December, and leaving by late April. The Fork-tailed swift is almost exclusively an aerial species, foraging and sleeping on the wing. It is common in the Kimberley, uncommon to moderately common near northwest, west, and southeast coasts, and rare to scarce elsewhere. It rarely comes to the ground, usually only for breeding, so it is unlikely to be significantly impacted by vegetation clearing and low-impact disturbance in the project area. It is rarely seen in the Goldfields and

Midwest (Plate 24). Terrestrial Ecosystems assess that the Fork-tailed Swift may infrequently be seen in the region, however, any proposed vegetation clearing or development is unlikely to significantly impact this species as it is an aerial species and will move away to other areas if it is disturbed.

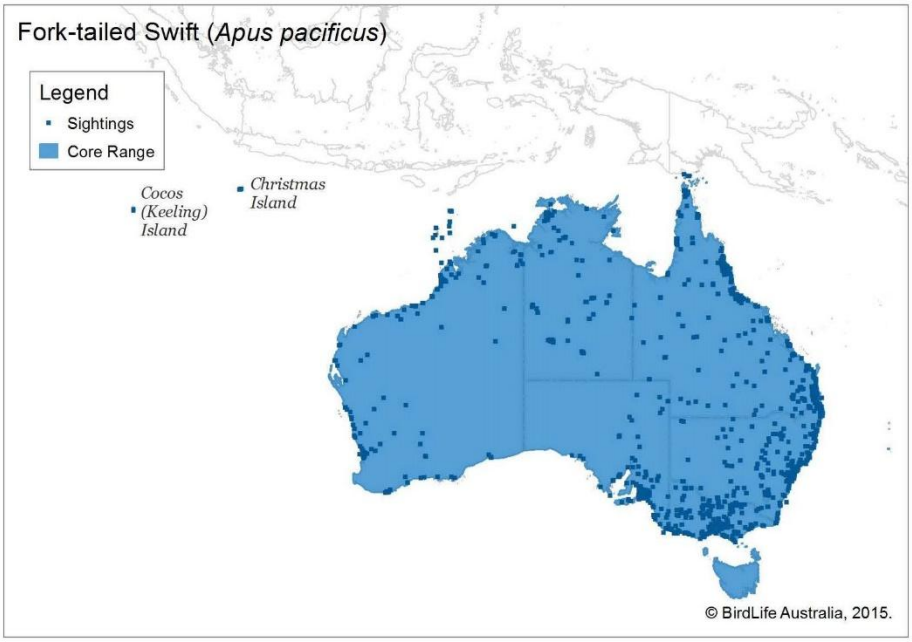

Plate 24. Range and actual reported sightings of the Fork-tailed Swift

(taken from http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds)

Grey Wagtail (*Motacilla cinerea*) - Migratory under the *EPBC Act 1999* and *BC Act 2016*

The Grey Wagtail is a small, yellow-breasted bird with a grey back and head. Johnstone and Storr (2004) reported this migratory species as breeding in the Palearctic from western Europe and northwest Africa to eastern Asia and wintering in Africa, southeast Asia, Indonesia, the Philippines, New Guinea, and Australia. Its preferred habitat in Australia is banks and rocks in fast-running fresh water, including rivers, streams, and creeks, where it feeds on insects.

The Atlas of Living Australia records two sightings on the south coast of Western Australia (Plate 25) and none around the project area. It is highly unlikely to be seen in the project area due to a lack of records and suitable habitat.

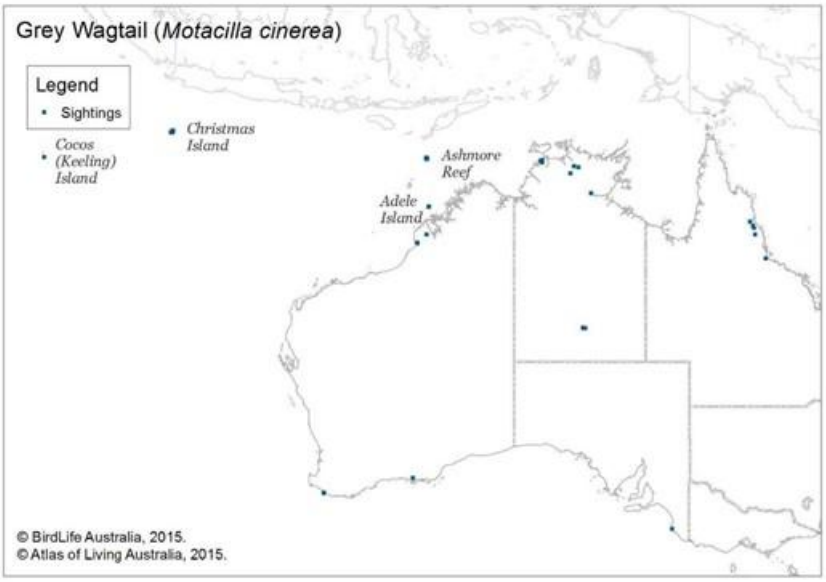

Plate 25. Reported sightings of the Grey Wagtail

(taken from http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds)

Yellow Wagtail (*Motacilla flava*) - Migratory under the *EPBC Act 1999* and *BC Act 2016*

The Yellow Wagtail is found in the millions in the northern hemisphere and the Atlas of Living Australia has multiple records of this bird in Australia in the coastal areas. There are no records for this species in inland Western Australia near the project area (Plate 26), so it is highly unlikely to be significantly impacted by vegetation clearing and development in the project area.

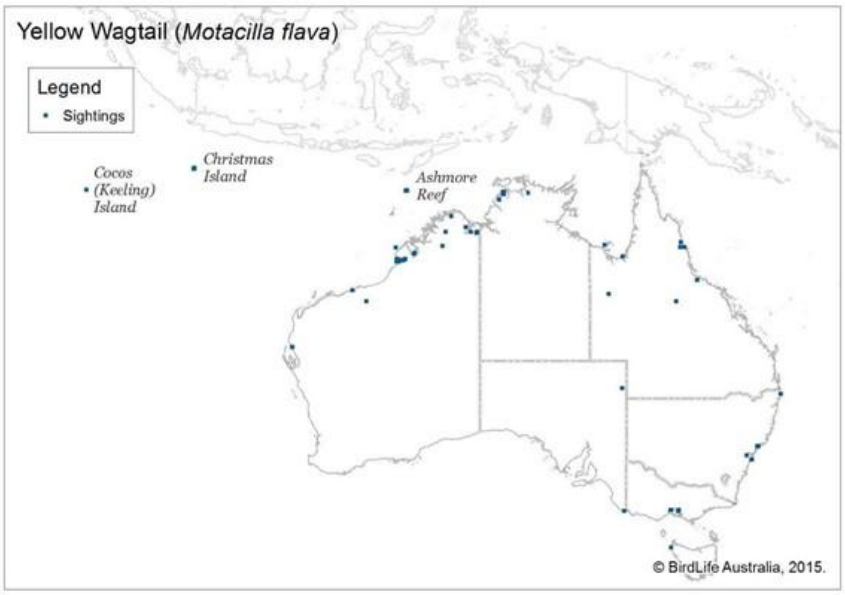

Plate 26. Reported sightings of the Yellow Wagtail

(taken from http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds)

Peregrine Falcon (*Falco peregrinus*) - Otherwise specially protected under the *BC Act 2016*

The Peregrine Falcon is uncommon, although widespread throughout much of Australia excluding the extremely dry areas, and has a wide and patchy distribution. It shows habitat preference for areas near cliffs along coastlines, rivers, and ranges and within woodlands along watercourses and around lakes. Nesting sites include ledges along cliffs, granite outcrops and quarries, hollow trees near wetlands, and old nests of other large bird species. There is no evidence to suggest any change in status in the last 50 years.

The Peregrine Falcon has been seen in the Wanjarri Nature Reserve (Moriarty 1972), at Honeymoon Well (Ninox Wildlife Consulting 1994), at Murrin Murrin (Ninox Wildlife Consulting 1998), at Cawse (Hart Simpson and Associates 2000) and at Mileura (Tingay and Tingay 1977), so they could infrequently be seen in the general area.

Terrestrial Ecosystems assessment is that the Peregrine Falcon may infrequently be seen in the project area. However, the proposed developments are unlikely to significantly impact this species as it will move away to other areas if it is disturbed.

Woma Python (*Aspidites ramsayi*) – Priority 1 species with DBCA

The Woma Python was once found in a crescent shaped geographic distribution from Shark Bay to Kitchener, but it is distribution has been reduced to an area on the western Australian coast near Shark Bay, in the eastern section around Kitchener and a small population on the sand plain near Mt Dimer/Mt Walton, with individuals being occasionally recorded in the sand plain of the northern Goldfields.

Woma Pythons have typically been recorded in sand plain habitats, as they have a habit of burrowing into the ground and using other animal burrows as retreat sites. There are no recent records of Woma Pythons around Menzies and given the highly disturbed nature of the project area, it is improbable that they are present in the project area.

Brush-tailed Mulgara (*Dasycercus blythi / cristicauda*) - Vulnerable species under the *EPBC Act 1999* and Priority 4 with the DBCA

Woolley (2005) recognises two species of 'Mulgara'; *Dasycercus blythi* and *D. cristicauda*. *Dasycercus blythi* has a non-crested tail, two upper premolars, and six nipples; *D. cristicauda* has a crested tail, three upper premolars and eight nipples. Both species potentially have overlapping distributions in arid Australia, but it is thought that *D. cristicauda* does not currently exist in Western Australia, although there are old records indicating its presence. Woolley (2005) suggested the common names for these two species be Brush-tailed Mulgara for *D. blythi* and Crest-tailed Mulgara for *D. cristicauda*. These two species can be sympatric in places, but probably utilise different parts of the habitat on a local scale when they are recorded in the same area. There is insufficient data to separate the spatial ecology, burrows, and reproductive biology of these two species. Information that follows is based on what is known for 'Mulgara' without distinguishing between the species.

The reported distribution of Mulgara includes much of the inland spinifex covered sandy desert and spinifex vegetated areas in the Pilbara and northern goldfields. Within these areas their distribution is patchy, and it is most frequently confined to mature spinifex dominated habitats (Gibson and Cole 1992, Masters 2003, Masters et al. 2003, Thompson and Thompson 2008). In some areas, their relative abundance is positively associated with rainfall in the previous 12 to 24 months (Gibson and Cole 1992, Masters 1998, Dickman et al. 2001, Letnic and Dickman 2005), and the recent burning of the spinifex does not seem to be sufficient to shift Mulgara out of an area (Thompson and Thompson 2007). Mulgara are generally sedentary in contrast with some other small dasyurids and have high site fidelity and a low propensity for dispersal once a home range has been established (Masters 1998, Dickman et al. 2001).

Fauna habitats in the project area are not suitable for Mulgara. It is, therefore, highly unlikely to be found in the project area.

Long-tailed Dunnart (*Sminthopsis longicaudata*) – Priority 4 species with DBCA

Burbidge et al. (2008) summarised the Long-tailed Dunnart distribution as widely scattered in arid zone where it inhabits rugged rocky areas. They went on to suggest that its striated foot-pads, long tail and behaviour in captivity indicated that it was an active and capable climber. Specimens have been recorded in several rocky ranges in the Gibson Desert, West MacDonnell National Park, Murchison, Carnarvon Basin and the Pilbara. All previous capture sites for Long-tailed Dunnarts are within rugged rocky landscapes that support a low open woodland or shrubland of Acacias (especially mulga) with an understorey of spinifex hummocks, and (occasionally) also perennial grasses and cassias.

Long-tailed Dunnarts have been caught at Mt Ida, Bottle Creek, Granny Smith (Terrestrial Ecosystems 2011), Murrin Murrin, Mt Mason (DBCA threatened species database search) and Mt Forrest (Harewood 2014)The low rocky ridges in the project area are small and isolated, so it is unlikely that they support Long-tailed Dunnarts.

5. DISCUSSION

5.1 ADEQUACY OF THE FAUNA SURVEY DATA FOR FAUNA HABITATS REPRESENTED IN THE PROJECT AREA

The EPA's (2020) Technical Guidance on terrestrial fauna surveys indicated that the type of survey should be determined based on:

- level of existing regional knowledge;
- type and comprehensiveness of recent local surveys;
- degree of existing disturbance or fragmentation at the regional scale;
- extent, distribution and significance of habitats;
- significance of species likely to be present;
- sensitivity of the environment to the proposed activities; and
- scale and nature of impact.

Fauna assessments of the most value are the ones undertaken by Thompson (2004), Cowan and How (2004), Dell and How (1988), and Ninox Wildlife Consulting (1998). Taken together they provide a comprehensive list of the vertebrate fauna species potentially found in the project area.

Much of the project area has been disturbed by previous mining and anthropogenic activity, with the consequence that a generic, Detailed, and Targeted survey of the project area is unlikely to provide additional information that would alter an assessment by government regulators and is therefore not required.

The EPA's (2020) *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment* are not specific about when a Detailed or Targeted vertebrate fauna survey is required. Rather, it has indicated that the level of survey effort should be determined after consideration of the criteria in Table 10.

Table 10. Criteria for determining survey requirements

Criteria	Response
Level of existing regional knowledge	Surveys have been conducted in the region, and similar habitat types are common regionally. The local vertebrate fauna species are well known; additional trapping efforts are unlikely to add new fauna species to the existing knowledge.
Type and comprehensiveness of recent local surveys	Multiple surveys are available for the bioregion. They provide contextual information concerning the project area and compile a species list.
Degree of existing disturbance or fragmentation at the regional scale	The project area is fragmented and degraded
Extent, distribution, and significance of habitats	The available fauna habitats are not unique and are widely represented in the bioregion.
Significance of species likely to be present	The Southern Whiteface (Vulnerable) will likely be in the project area and region, however, Long-tailed Dunnarts (Priority 4) are unlikely to be present.
Sensitivity of the environment to the proposed activities	There was no evidence to suggest that the project area has a unique fauna habitat that is environmentally sensitive from a vertebrate fauna perspective.
Scale and nature of impact.	The project's scale is small relative to the availability of similar fauna habitats in adjacent areas, and it is unlikely to have a large impact on fauna in the bioregion.

5.1.1 Amphibians

Frogs are normally only detected immediately after rainfall or around semi-permanent pools. There was no evidence of long-standing drainage channels that have been filled with water in the project area, a habitat that would support arid-adapted frogs. *Cyclorana maini*, *C. occidentalis*, *Pseudophryne occidentalis, Neobatrachus kunapalari* and *Neobatrachus wilsmorei,* and *Litoria rubella* could be recorded near the project area. The *Cyclorana* sp. and *Neobatrachus* sp. burrow into the ground and aestivate between rainfall events. *Pseudophryne occidentalis* and *L. rubella* find shelter under rocks and in crevices during the dry periods and enter temporary ponds to breed after major rainfall events. All species have a wide-spread distribution and are abundant. Development of the project area is likely to result in a loss of individuals within the disturbed area; however, it is unlikely to impact these species when assessed in a regional context significantly.

5.1.2 Reptiles

Typically, between 25 and 35 species of reptiles are caught in open Mulga woodlands or shrublands (Thompson et al. 2003, Cowan and How 2004, ATA Environmental 2007, Coffey Environments 2008, Terrestrial Ecosystems 2010) in this part of the goldfields. However, the area is degraded with limited understorey so the abundance of individuals and species is likely to be lower than in more heterogenous areas with more intact fauna habitats. None of the species likely to be in the project area are of conservation significance. There were no characteristics of the reptile assemblage that indicated the fauna habitats present in the project area are of conservation significance or different to that in the neighbouring areas and given that there were large expanses of similar habitat in adjacent areas, development of mining operation is unlikely to have a significant impact on reptiles when assessed in a regional context.

5.1.3 Birds

The number of birds and bird species in the northern Goldfields fluctuates based on seasons and recent rainfall (Craig and Chapman 2003). Semi-arid and arid areas of inland Australia support a diverse range of transient and nomadic species that move through large areas in search of available resources. Heavy rain, followed by flowering and seeding of many plant species, is often sufficient to draw many nomadic species to the general area. These species move on to other areas once the resource is depleted or better resources are available in adjacent areas.

The project area will likely support a similar assemblage to the adjacent areas. The Southern Whiteface (listed as vulnerable under the *EPBC Act*) could be in the project area. Other birds of conservation significance potentially found in the region include the Peregrine Falcon and the Princess Parrot. The Princess Parrot is nomadic and moves around the arid interior for water and resources. It has infrequently been recorded in the region and will readily move if disturbed. The Peregrine Falcon will normally have a very large home range in the Goldfields, and clearing a small section of habitat, particularly when a similar habitat exists in the adjacent areas, is unlikely to impact this species significantly. All birds will readily shift to other areas when there is a disturbance.

Terrestrial Ecosystems views the proposed additional vegetation clearing for the redevelopment of a mine and associated infrastructure as unlikely to significantly impact the bioregion's avian fauna.

5.1.4 Mammals

The diversity of small terrestrial mammals potentially caught in the project area would be low due to the sparsely vegetated habitat, which has few small shrubs and feral and pest fauna.

Although records of Burrowing Bettongs (*Bettongia lesueur*) and Bilbies (*Macrotis lagotis*) are shown in the Atlas of Living Australia and the Western Australian Museum records, they are no longer present in this area, having been predated by foxes, cats and wild dogs many years ago. The project area contains a few low rocky ridges, but they are not considered suitable habitats for the Priority 4 Long-tailed Dunnart as the areas are small and isolated.

5.2 BIODIVERSITY VALUE

An ecological assessment of a site should consider its biodiversity value at the genetic, species, and ecosystem levels and its ecological functional value at the ecosystem level. Inadequate data exist to assess the ecological value at the genetic level.

Fauna habitat types represented in the project area are abundant and in similar conditions in adjacent areas. Therefore, the fauna assemblage that is present in the project area will also be present and abundant in the adjacent areas. The available fauna survey data (Appendix B) provides a good indication of the potential vertebrate fauna in the project area.

From a fauna perspective, the project area has been grazed, resulting in degradation of the fauna habitats. The feral cat is present, and this species will, over many years, have significantly impacted the native vertebrate fauna. The habitat types identified in the project area are also abundant in adjacent areas, so the vertebrate fauna in the project area will be present in adjacent areas. There will be localised impacts from vegetation clearing, however, these will not be significant in a regional context.

5.2.1 Ecological functional value at the ecosystem level

Vertebrate species potentially in the project area are wide-ranging and have been recorded in various other fauna surveys in the bioregion (Appendix B). Because of the prior disturbance and anthropogenic activity, there is likely to be a relatively low abundance of reptiles and mammals in the project area. A substantial section of the project area has been mined and explored, and the disturbance that results from that mining and exploration is evident at multiple locations.

5.2.2 Maintenance of threatened ecological communities

No threatened ecological communities were identified in or near the project area.

5.2.3 Condition of fauna habitat

There are multiple areas of historical mining activity, including large pits, waste dumps, the remains of built infrastructure and tracks that crisscross much of the project area. Over a long period, introduced predators are likely to have been one of the most significant impacts on the vertebrate fauna in the project area. The uncleared fauna habitat of the project area is like that in the many square kilometres of adjacent habitat; therefore, clearing of the vegetation is unlikely to significantly impact the vertebrate fauna when considered in a bioregional context.

5.2.4 Ecological linkages

The project area does not provide an important ecological linkage or terrestrial fauna movement corridor.

5.2.5 Size and scale of the proposed disturbance

The assessed project area is approximately 1645ha, although the proposed disturbance area will be smaller. The project area represents a small proportion of similar fauna habitats in the bioregion.

5.2.6 Abundance and distribution of similar habitat in the adjacent areas

The fauna assemblage in the project area is like that in the many square kilometres of similar habitat in adjacent areas and the bioregion, so the loss of vegetation and the local vertebrates is unlikely to have a significant impact. However, there is a slowly growing cumulative impact when cattle grazing, mining and exploration activity are considered in the bioregion.

5.2.7 Potential impacts on ecosystem function

Clearing native vegetation will likely result in the loss of small vertebrate fauna that cannot move away during the clearing process. The few larger animals, such as kangaroos, large goannas, and snakes, and most of the birds will move into adjacent areas once the clearing commences. There will be a small loss of native fauna due to vehicle strikes on access tracks, but this impact will be very low. Shifting animals into adjacent areas may increase the pressure on resources in those areas, and there may be some disruption to the ecosystems for a short period until a balance is restored.

The impacts associated with clearing vegetation in the project area on the vertebrate fauna in a local, landscape, and bioregional context are likely to be low as there is a very small amount of clearing, and there are vast tracts of similar habitat in adjacent areas.

6. POTENTIAL IMPACTS

6.1 POTENTIAL IMPACTS ON FAUNA

Clearing vegetation will potentially affect vertebrate fauna in numerous ways, including death/injury of fauna during clearing, grading, impacts on vehicles, and loss of habitat.

Although there are anticipated short term impacts on fauna, they are not considered to significantly impact fauna habitat and assemblages in a bioregional context in the long term. The overall impact on fauna species and species of conservation significance will be minimal, provided the recommended management procedures are implemented and adhered to.

The project area contains a few low rocky ridges, but these are generally isolated and, therefore, unlikely to support a population of Long-tailed Dunnarts. No other species of conservation significance will likely be impacted by vegetation clearing and development.

6.2 DIRECT IMPACTS

6.2.1 Animal deaths during the clearing process and displacement of fauna

Clearing vegetation and activities associated with the mining development will result in the loss of small fauna that retreat to burrows, such as reptiles and mammals. Nocturnal species are unlikely to be active when most of the land clearing is taking place. This will inevitably result in these individuals being killed or injured in their burrows or as they attempt to escape. Larger terrestrial animals and avian species will most often move to adjacent areas. These species will be required to establish new activity areas and home ranges, which could result in the temporary displacement of resident species, however, this loss of fauna is unlikely to have a significant impact when considered in a bioregional context.

Clearing large areas increases fauna habitat edges. Small mammals can respond both positively and negatively to edges depending on their ecological traits (Laurance 1991, 1994, Goosem and Marsh 1997, Goosem 2000). Edge and disturbance effects can lead to altered and, most often, higher levels of predation, restricting or increasing fauna movements and altering assemblage structure (Oxley et al. 1974, Paton 1994, Baker et al. 1998, Temple 1998, Luck et al. 1999, Goosem et al. 2001). Goldingay and Whelan (1997) and Clarke and Oldland (2007) reported that edge effects can extend up to 150-200m from the edge for some species, meaning the impact area on vertebrate fauna is likely larger than the cleared footprint.

6.2.2 Reduction or loss of activity areas and closure of burrows

Clearing vegetation and associated mining activities will likely destroy reptile and mammal burrows or foraging habitats that are currently in use or could be used again. Clearing vegetation in areas that form part of an individual's activity area has the potential to force these animals into adjacent areas. These areas may offer fewer resources, placing individuals under survival pressure. It could also cause individuals to move into the territories of other individuals, increasing competition for resources. Forced relocations could increase the possibility of predation.

6.3 INDIRECT IMPACTS

In addition to the obvious impact of vegetation clearing there can be an equally significant or greater impact on the adjacent areas because of 'edge effects'. Edge effects can lead to the disruption of ecological processes such as predation, dispersal, and animal movements and can change assemblage structure. Consequently, the

impact area will always be much larger than the cleared area. Vehicle tracks and areas cleared for mining activity also tend to develop weed infestations that can impact natural fauna habitats.

There are numerous potential threats associated with vegetation clearing and the construction of infrastructure that could impact the vertebrate fauna in the project area. Some of these are discussed below.

6.3.1 Habitat fragmentation

In addition to the direct impacts of vegetation clearing, infrastructure, including tracks, has the potential to fragment habitat. Cleared linear tracks of land are 'unnatural' in much of the habitat. These linear structures partition existing activity areas, isolate sections of established communities and may alter long and medium-term movement patterns around established home ranges, particularly for small mammals and reptiles. A reduction in the population because of this development would be difficult to detect, given our current knowledge of the spatial ecology of most small mammals in the area. The project area contains sparse vegetation and existing vehicle tracks. The impacts of habitat fragmentation due to additional vehicle tracks would, therefore, be quite low.

6.3.2 Introduced fauna and weeds

An increase in human activity is often associated with an increase in the abundance of introduced species, such as the house mouse (*Mus musculus*), fox (*Vulpes vulpes*), cat (*Felis catus*) and wild dogs (*Canis lupus*). This increase may be due to a decline in habitat health, increased road kills, poor waste disposal and easier access to areas via tracks.

House mice, foxes, cats and wild dogs are known to be established in the area. In many situations, they have become a 'naturalised' species in the Australian bush. Increases in fox, dog or cat numbers can harm native fauna because they predate on and compete with native species, severely disrupting the natural balance. Increases in fox, dog or cat numbers can harm native fauna because they predate on and compete with native species, severely disrupting the natural balance. The feral cat is a particularly damaging predator of native fauna, and any increase in their numbers could have a detrimental effect on local native fauna (Kinnear 1993, Bamford 1995, Woinarski et al. 2017, Woinarski et al. 2018, Murphy et al. 2019)Hence, it is important to ensure that feral predator populations, such as cats, are controlled.

Infrastructure that supports feral species, such as rubbish disposal sites and bins, should be managed to minimise increases in these populations.

Introduced plant species can successfully and rapidly invade areas of cleared native vegetation or otherwise disturbed by humans. Introduced plant species may replace native species that provide shelter or foraging areas for native fauna. Major changes to vegetation structure will alter the fauna habitat and consequently may influence fauna species composition. Preparing and implementing a weed management plan will reduce their threat to native fauna species.

6.3.3 Road fauna deaths

Increased road fauna deaths are likely to occur when new roads and tracks are constructed or upgraded, affecting kangaroos, nocturnal birds, and ground-dwelling large carnivorous predators. Species such as goannas and raptors are attracted to carrion on road verges, and therefore, there is an increased propensity for these species to be killed by vehicles. Given the small size of the project area and the likely low level of additional vehicle movements, the impact of road fauna deaths is likely to be low once the area becomes operational.

6.3.4 Fire

Increased human activity is often associated with an altered fire regime, which can lead to the degradation of natural ecosystems. Fire has been identified as one of the threatening processes for some species of conservation significance as many small mammal and bird species rely on long, unburnt vegetation.

Due to the sparse vegetation, fires are unlikely to threaten native fauna species near the project area significantly.

6.3.5 Anthropogenic activity

Unnatural noises, vibrations, artificial light sources, and vehicle and human movement in an area may be sufficient to force individuals or fauna species to move from adjacent areas or alter their activity periods. This disturbance will likely occur during the vegetation clearing and when mining activity commences. The overall impact is likely confined to a relatively small area and is unlikely to be significant.

6.3.6 Dust

Dust generated from shifting topsoil and spoil and vehicle traffic can degrade surrounding vegetation, reducing its ability to absorb sunlight and influencing photosynthetic rates. Degradation of these areas may potentially render the habitat unsuitable for fauna. Dust suppression and management programs are essential to minimising impacts on fauna in areas adjacent to the mine. An effective dust management and monitoring program is required.

7. VERTEBRATE FAUNA RISK ASSESSMENT

7.1 RISK ASSESSMENT

Fauna surveys to support Environmental Impact Assessments (EIA) are part of the environmental risk assessment undertaken to consider what potential impacts a development might have on the biodiversity of a particular area and region. Potential impacts on fauna from the proposed development are identified and briefly described above. Tables 14, 15, and 16 summarise the risk assessment associated with this project.

Any risk assessment is a product of the likelihood of an impact occurring and the consequences of that impact. Likelihood and consequences are categorised and described below. The assessed risk level (likelihood x consequences) is then calculated as the overall risk for the development. This is followed by an assessment of the acceptability of the risk associated with each of the impacts. Disturbances and vegetation clearing impact the fauna at multiple scales – site, local, landscape, and regional. Each of these is considered in the risk assessment. This assessment should be considered in the context of the summary in Table 13.

Table 11. Fauna impact risk assessment descriptors

Likelihood		
Level	Description	Criteria
A	Rare	The environmental event may occur, or one or more fauna species of conservation significance may be present in exceptional circumstances.
B	Unlikely	The environmental event could occur, or one or more fauna species of conservation significance could be present at some time.
C	Moderate	The environmental event should occur, or one or more fauna species of conservation significance should be present at some time.
D	Likely	The environmental event will probably occur, or one or more fauna species of conservation significance will be present in most circumstances.
E	Almost certain	The environmental event is expected to occur, or one or more fauna species of conservation significance are expected to be present in most circumstances.
Consequences		
Level	Description	Criteria
1	Insignificant	Insignificant impacts on fauna of conservation significance or regional biodiversity, and the loss of individuals will be negligible in the context of the availability of similar fauna or fauna assemblages in the area.
2	Minor	Impact on fauna localised and no significant impact on species of conservation significance in the study area. Loss of species at the local scale.
3	Moderate	An appreciable loss of fauna in a regional context or a limited impact on species of conservation significance in the study area.
4	Major	Significant impact on species of conservation significance or their habitat in the project area and/or regional biodiversity and/or a significant loss in the biodiversity at the landscape scale.
5	Catastrophic	Loss of species at the regional scale and/or a significant loss of species categorised as 'vulnerable' or 'endangered' under the *EPBC Act 1999* at a regional scale.
Acceptability of Risk		
Level of risk	Management Action Required	
Low	No action is required.	
Moderate	Avoid if possible. This will require routine management with internal audits and a review of monitoring results annually.	
High	Externally approved management plan to reduce risks, monitor major risks annually with external audit and review of management plan outcomes annually. May a referral to the Commonwealth under the *EPBC Act 1999*.	
Extreme	Unacceptable, and the project should be redesigned or not proceed.	

Table 12. Levels of acceptable risk

		Likelihood				
		Rare or very low (A)	Unlikely or low (B)	Moderate (C)	Likely (D)	Almost certain (E)
Consequence	Insignificant (1)	Low	Low	Low	Low	Low
	Minor (2)	Low	Low	Low	Moderate	Moderate
	Moderate (3)	Low	Moderate	Moderate	High	High
	Major (4)	Moderate	Moderate	High	High	Extreme
	Catastrophic (5)	Moderate	High	High	Extreme	Extreme

Table 13. Assessed risk of potential impacts on the vertebrate fauna assemblage

			Before management			Management	With management		
			Inherent risk				Residual risk		
Factors	**Potential impacts**		**Likelihood**	**Consequence**	**Significance**		**Likelihood**	**Consequence**	**Significance**
Fauna survey data	Inadequate survey data to adequately assess the risks	Unknown loss of fauna, fauna of conservation significance, and fauna assemblages, and an incomplete fauna assessment.	B	2	Low				
	Inadequacy of comparative data	Limits on the availability of comparative data reduced the capacity to assess the uniqueness of the fauna assemblages in the project area.	B	2	Low				
Clearing vegetation	Loss of fauna habitat – local scale	Loss of terrestrial fauna in the project area.	E	2	Mod	Where possible, reduce the extent of clearing.	E	2	Mod
	Loss of fauna habitat – landscape scale	Loss of some fauna during vegetation clearing.	B	1	Low				
	Loss of fauna habitat – regional scale	Small loss of some fauna from the region.	B	1	Low				
	Loss of a threatened ecological fauna community	Loss of an undetected threatened ecological fauna community.	A	2	Low				
	Habitat fragmentation	Fauna movement is restricted, resulting in fauna death and biodiversity loss.	A	2	Low				
	Loss of a unique terrestrial fauna ecosystem	Loss of an ecosystem containing fauna with high species richness, high abundance, and numerous top-of-the-food-chain predators.	A	2	Low				

			Before management			Management	With management		
Death or loss of conservation significant fauna	Malleefowl (*Leipoa ocellata*)	Death or the reduced viability of Malleefowl.	A	3	Low				
	Southern Whiteface (*Aphelocephala leucopsis*)	Loss of a Southern Whiteface or small population of Southern Whiteface	B	2	Low				
	Peregrine Falcon (*Falco peregrinus*)	Death or the reduced viability of the Peregrine Falcon.	A	2	Low				
	Fork-tailed Swift (*Apus pacificus*)	Death or the reduced viability of Fork-tailed Swift.	A	2	Low				
	Long-tailed Dunnart (*Antechinomys longicaudata*)	Loss of a Long-tailed Dunnart or small population of Long-tailed Dunnart	A	2	Low		C	2	Low
Human impacts	Increase or spread of weeds	Changed vegetation and a resulting loss of fauna habitat.	E	2	Mod	Implementation of a weed management plan.	D	2	Low
	Road kills	Animals being killed as they crossroads by vehicles	E	1	Low	Limiting speeds	E	1	Low
	Increase in feral mammals, specifically wild dogs and feral cats	Increased predation on the native fauna	C	3	Mod	Implementation of a feral animal control program(s)	C	2	Low
	Dust	Increased potential for dust	E	2	Mod	Implementation of a dust management plan.	C	2	Low

7.2 NATIVE VEGETATION CLEARING PRINCIPLES AS THEY PERTAIN TO VERTEBRATE FAUNA

The *Environmental Protection Act (1986)* provides criteria to judge the potential impact of a development on clearing native vegetation on flora and fauna. These criteria have been listed below with a response to indicate how clearing the vegetation in the project area might be judged against these principles as they relate to fauna and fauna assemblages (Table 14). Where possible, native vegetation should not be cleared if any of the following principles are compromised.

Table 14. Assessment of impact on fauna and fauna assemblages using the native vegetation clearing principles

Principle	Response
It comprises a high level of biological diversity.	Clearing vegetation will not comprise a high level of biodiversity. The project area will likely support a small population of Southern Whiteface, a small bush bird listed as Vulnerable under the *EPBC Act*. This bird is widespread in this part of the Goldfields and will move if disturbed.
It comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.	Clearing the vegetation will not result in the loss of significant habitats for indigenous fauna, as there is an abundance of similar habitats in the region.
It includes, or is necessary for the continued existence or, rare flora.	N/A
It comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.	The area does not contain a threatened ecological fauna community.
It is significant as a remnant of native vegetation in an area that has been extensively cleared.	The area is not a remnant.
It is growing in, or in association with, an environment associated with a watercourses or wetland.	The area does not contain a wetland.
The clearing of the vegetation is likely to cause appreciable land degradation.	N/A
The clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	Clearing vegetation is unlikely to impact the environmental values of the bioregion.
The clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	N/A
The vegetation clearing is likely to cause, or exacerbate the incidence of flooding.	N/A

7.3 CRITERIA FOR ASSESSING POTENTIAL IMPACTS ON VULNERABLE SPECIES

The significance of potential impacts of vegetation clearing in the project area is assessed per the criteria in the Commonwealth Government's significant impact assessment criteria (Department of the Environment 2013) in Table 15.

Table 15. Criteria for assessing the potential impacts on Southern Whiteface
(taken from: Department of the Environment 2013)

Vulnerable Species	Southern Whiteface
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
• lead to a long-term decrease in the size of an important population of a species	No
• reduce the area of occupancy of an important population	No
• fragment an existing important population into two or more populations	No
• adversely affect habitat critical to the survival of a species	No
• disrupt the breeding cycle of an important population	No
• modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No
• result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	No
• introduce disease that may cause the species to decline, or	No
• interfere substantially with the recovery of the species.	No
• modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No

An important population is defined (Department of the Environment 2013) as:

- key source populations either for breeding or dispersal;
- populations that are necessary for maintaining genetic diversity; and/or
- populations that are near the limit of the species range.

There are more than 230 records of Southern Whiteface within 100km of the project area, so the number of individuals that are periodically onsite does not constitute an 'important population'. In addition, any Southern Whiteface living in the project area immediately before it is cleared will readily move to surrounding areas. The answer to Criteria 1 is 'No'.

Southern Whiteface records indicate this small bush bird is widespread in the bioregion. Had the Southern Whiteface occupancy area in Western Australia been randomly surveyed instead of survey sites being selected (i.e. mining locations and places where there is vehicle access), then it would have been evident that this bird is geographically widely distributed in Western Australia. No evidence indicates that the number of Southern Whiteface recorded in and around the project area represents an important population. Therefore, the loss of a small quantity of vegetation in the project area will not reduce its area of occupancy or displace an important population. The answer to Criteria 2 is 'No'.

The Southern Whitefaces' geographic distribution includes the entire width of southern Western Australia, extending into South Australia and the Northern Territory. The loss of a very small part of these many thousands of square kilometres of similar habitat, particularly when the bird is mobile, probably has a shifting activity area and will readily move if disturbed, will not fragment an existing population into two or more populations to the extent that it will impact on the species. There is no evidence that the very small number of Southern Whiteface recorded in and around the project area represents an important population.

There is no evidence to suggest that the small population of Southern Whiteface in and near the project area is a key source population, a population necessary to maintain genetic diversity, or is near the limit of its geographic range. The answer to Criteria 3 is 'No'.

Habitat that is critical to the survival of Southern Whiteface is described in the Commonwealth Conservation Advice as:

- relatively undisturbed open woodlands and shrublands with an understorey of grasses or shrubs, or both;
- habitat with low tree densities and an herbaceous understory litter cover which provides an essential foraging habitat; and
- living and dead trees with hollows and crevices which are essential for roosting and nesting.

This critical habitat description is vague and applies to thousands of square kilometres of inland Western Australia in the Midwest, Murchison, Goldfields, and elsewhere. The loss of a very small part of these many thousands of square kilometres of similar habitat, particularly when the bird is mobile, probably has a shifting activity area, and will readily move if disturbed, will not adversely affect habitat critical to the survival of the species to the extent of adversely impacting on the survival of the species. The answer to Criteria 4 is 'No'.

Johnstone and Storr (2004) reported that the Southern Whiteface builds a dome-shaped nest with a side entrance mainly in a hollow branch, a tree trunk, a crevice between branches, a stump, a fence post, or a recumbent log entrance through a knot-hole or crack. Nests are made with grass, bark, rootlets, feathers and wool and lined with feathers, wool, fur and soft plant down (Johnstone and Storr 2004). Such habitats and materials are widely available in the Midwest, Murchison and Goldfields of Western Australia. Based on the geographic records, this small bush bird very obviously breeds in thousands of locations in the semi-arid areas of Western Australia. There is no evidence that the very small number of Southern Whiteface recorded in and around the project area represents an important population. The answer to Criteria 5 is 'No'.

Quality habitat is not defined for the Southern Whiteface, but presumably, it is areas with a high abundance of this species concentrated in a particular area. Even the defined 'habitat critical to its survival' (Department of Climate Change Energy the Environment and Water 2023) is very widely available in the Goldfields, Murchison, and Midwest of Western Australia. Although the Southern Whiteface has been recorded in the project area, there is no evidence to suggest or indicate that it is a 'quality habitat', and it does not differ appreciably from the habitat in the many square kilometres of surrounding habitat in which the Southern Whiteface has been recorded. The answer to Criteria 6 is 'No'.

The proposed action will not result in invasive species harmful to the Southern Whiteface (e.g. cats) becoming established in the species habitat, as these invasive species are already present in the area. Brightstar also proposes to undertake feral cat control programs to keep cat numbers consistent with what was present before the mining areas were operational. The answer to Criteria 7 is 'No'.

There is no suggestion or evidence to indicate that the proposed action will introduce disease into the Southern Whiteface habitats that would adversely significantly impact this small bush bird. The answer to Criteria 8 is 'No'.

There is no recovery plan for Southern Whiteface, and it is highly improbable that the proposed action will significantly and detrimentally impact the overall Southern Whiteface population or the bioregional Southern Whiteface population. The answer to Criteria 9 is 'No'.

Based on an assessment using criteria in the Commonwealth Government's (Department of the Environment 2013) significant impact assessment criteria, the proposed action will not significantly impact this species.

The Department of Climate Change, Energy, the Environment and Water's (2023) conservation advice listed the issues shown in Table 16 as threats to the Southern Whiteface. Against each threat is a comment on whether the proposed action will significantly increase this threat.

Table 16. Threats to Southern Whiteface as described in the Conservation Advice to the Commonwealth Government Minister

Threat	Response
Habitat loss caused by clearing for agriculture	The proposed action at Menzies is not clearing land for agriculture.
Habitat degradation caused by domestic livestock grazing	The cattle on the pastoral stations nearby were present long before the Menzies mining activity was undertaken.
Increased frequency or length of droughts	The Brightstar mining operations have no capacity to influence the frequency or length of droughts in the Goldfields.
Increased likelihood of extreme events (i.e., wildfire, drought and heatwaves)	Brightstar cannot influence the likelihood of extreme events in the Goldfields.

Mitigation

The following two mitigation measures will reduce the potential impact of vegetation clearing and the wind farm on the Southern Whiteface:

- Clearing vegetation outside the breeding season of April to September (Johnstone and Storr 1998), and having a zoologist search each area for Southern Whiteface active nests before vegetation clearing will reduce the probability of disturbing an active Southern Whiteface nest. If an active nest(s) is found, then a 250m buffer is implemented around the nest site until all chicks have fledged; and
- Minimising vegetation clearing by redesigning the infrastructure location to avoid the more densely vegetated areas.

7.4 REFERRAL UNDER THE *EPBC ACT*

The project area will likely support Southern Whiteface (listed as Vulnerable under the *EPBC Act 1999*). However, the proposed vegetation clearing is unlikely to significantly impact this species or any other species of conservation significance. Therefore, a referral under the EPBC Act is not recommended.

8. SUMMARY

Brightstar Resources Ltd proposes to remine historical mines that are currently in care and maintenance. The project area includes the Lady Harriet, Lady Shenton, First Hit, Yunndaga and Selkirk mines on tenements M29/0014, M29/0154, M29/0153, M29/0184 and M29/0088. The Menzies Gold project area assessed was 1,645ha and is immediately west and south-west of the Menzies town site in the northern Goldfields.

Based on a field assessment, the following seven broad fauna habitats are present in the project area:

- Bushy shrubland;
- Casuarina woodland;
- Eucalypt woodland;
- Open grassland;
- Shrubland on a ridge;
- Shrubland; and
- Previously disturbed areas.

Much of the project area is highly disturbed by multiple mining pits, waste dumps, vehicle tracks, and built infrastructure. The vegetation density varies appreciably across the project area with many patches of bare ground.

The fauna habitats in the project area are degraded and similar to adjacent areas, so habitat loss is unlikely to significantly impact the vertebrate fauna in a bioregional context.

The Southern Whiteface (listed as Vulnerable under the *EPBC Act*) has been recorded in other fauna surveys in the adjacent areas, so it will likely be present in the project area. This small bush bird is relatively abundant in this part of the Goldfields and will move if disturbed, so vegetation clearing and further operations in the area are unlikely to impact this species significantly. The project area contains some low rocky ridges, which are small and isolated, so they are unlikely to support the Priority 4 Long-tailed Dunnart.

The impacts associated with clearing the vegetation in the project area in a landscape or bioregional context on the vertebrate fauna are likely low as there are vast tracts of similar habitat in adjacent areas.

9. MANAGEMENT STRATEGIES

The purpose of this section is to identify generic management and mitigation strategies to address the potential impacts of development in the project area. Specific management and mitigation strategies to address potential impacts should be addressed in the recommended Vertebrate Fauna Management Plan.

9.1 RECOMMENDATIONS

All contractors and staff involved in vegetation clearing, development, and ongoing operations should be made aware of the possible presence and issues associated with terrestrial fauna in the area through the induction process.

> **Recommendation 1:** An induction program that includes a component on managing fauna is mandatory for staff working in the project area.
>
> **Recommendation 2:** The induction program should incorporate information on protecting fauna and reporting deaths and sightings of feral fauna or fauna of conservation significance.

The project area is already partially disturbed. Using existing roads and tracks to construct and operate the mine will minimise the need for additional disturbance.

> **Recommendation 3:** Where possible, access routes are aligned to existing roads and tracks or follow the boundaries of broad-scale vegetation associations in the area.

Clearing vegetation in the project area may remove habitat that Southern Whiteface has used and could use in the future. These impacts are unlikely to be significant in a regional context; however, mitigation can further reduce potential impacts.

> **Recommendation 4:** Clearing vegetation is undertaken outside the Southern Whiteface breeding season of April to September, acknowledging that rainfall events can influence the breeding season**.**
>
> **Recommendation 5:** If clearing is to occur in the Southern Whiteface breeding season, a zoologist familiar with the species will search the area for active nests before vegetation clearing is undertaken.
>
> **Recommendation 6:** If an active Southern Whiteface nest(s) is found, a 250m buffer is implemented around the nest site until all chicks have fledged.

A vertebrate management and monitoring plan should be prepared, identifying management actions to mitigate the potential impacts and a monitoring program to assess ongoing operations.

> **Recommendation 7:** A vertebrate management and monitoring plan is prepared, identifying management actions to mitigate the potential impacts and a monitoring program to assess ongoing operations.

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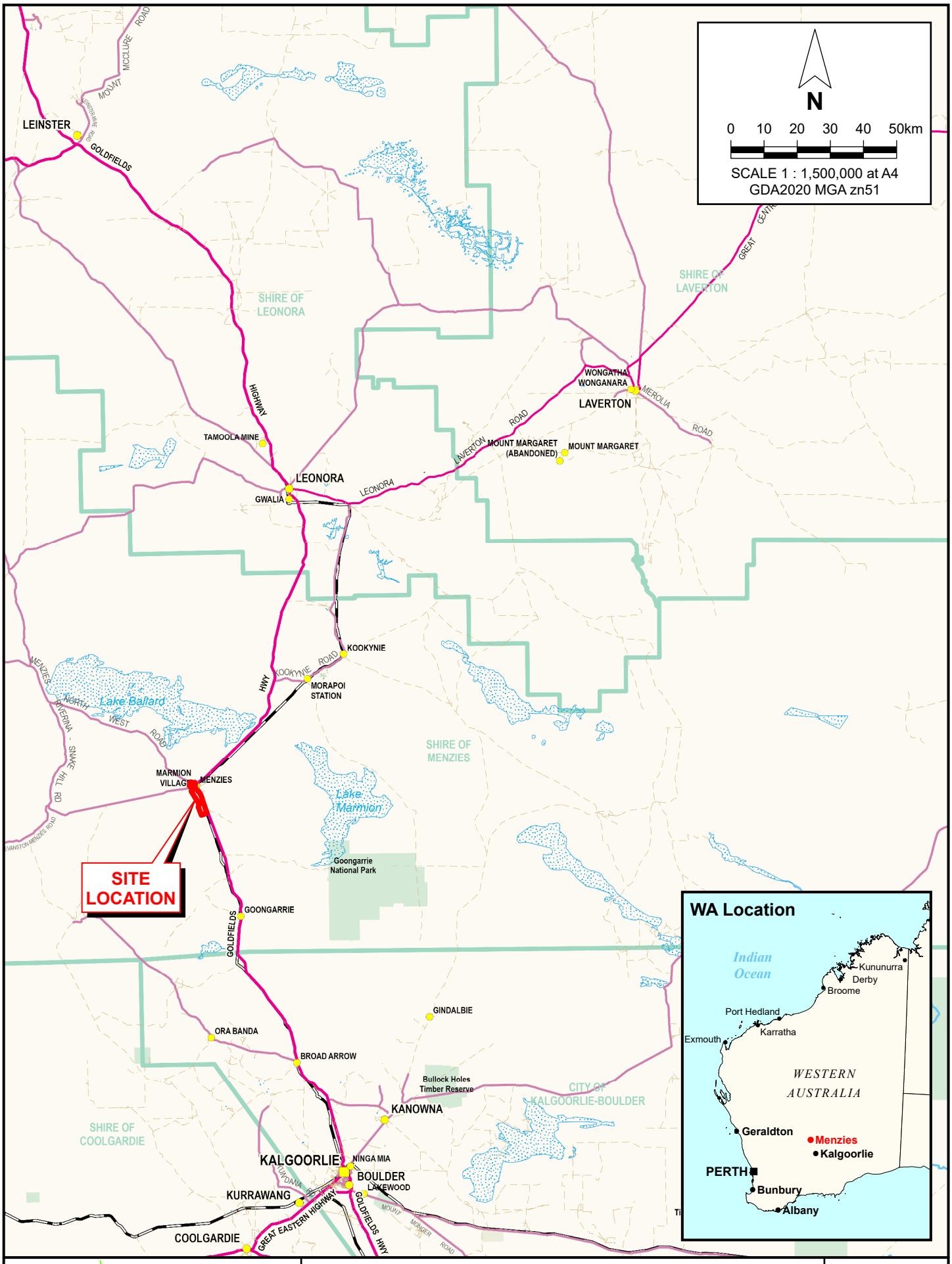
Figures

Basic Vertebrate Fauna Survey and Risk Assessment
Menzies Mining Project



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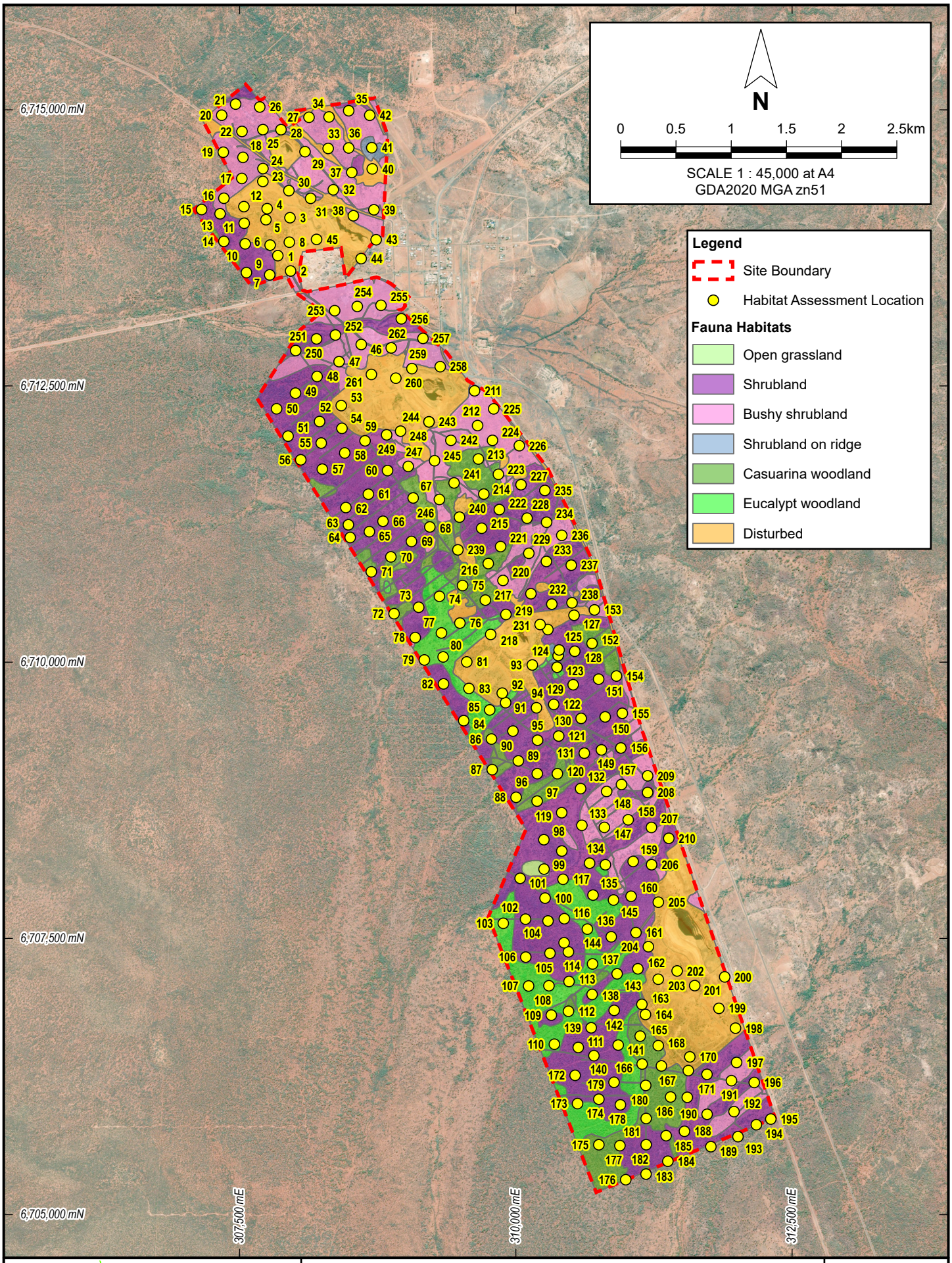
TERRESTRIAL ECOSYSTEMS

Brightstar Resources
BASIC VERTEBRATE FAUNA SURVEY AND RISK ASSESSMENT
MENZIES MINING PROJECT

Figure 1

REGIONAL LOCATION

Drawn: S. Thompson | Date: 7 Jan 2025 | Job: 2024-0214



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TERRESTRIAL ECOSYSTEMS

Drawn: S. Thompson | Date: 7 Jan 2025

Brightstar Resources
BASIC VERTEBRATE FAUNA SURVEY AND RISK ASSESSMENT
MENZIES MINING PROJECT

FAUNA HABITAT TYPES AND HABITAT ASSESSMENT LOCATIONS

Figure 2

Job: 2024-0214

Appendix A. Results of the EPBC Act Protected Matters search

Basic Vertebrate Fauna Survey and Risk Assessment
Menzies Mining Project

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. Please see the caveat for interpretation of information provided here.

Report created: 10-Jan-2025

Summary

Matters of National Environment 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:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	10
Listed Migratory Species:	6

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 https://www.dcceew.gov.au/parks-heritage/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 Lands:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	10
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	3
Regional Forest Agreements:	None
Nationally Important Wetlands:	2
EPBC Act Referrals:	3
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Species			[Resource Information]
Status of Conservation Dependent and Extinct are not MNES under the EPBC Act. Number is the current name ID.			
Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area	In feature area
Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat may occur within area	In buffer area only
MAMMAL			
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
PLANT			
Eleocharis papillosa Dwarf Desert Spike-rush [2519]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Ricinocarpos brevis [82879]	Endangered	Species or species habitat likely to occur within area	In feature area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In buffer area only
Migratory Terrestrial Species			
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [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.

Commonwealth Land Name	State	Buffer Status
Unknown		
Commonwealth Land - [51750]	WA	In feature area

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In buffer area only
Bubulcus ibis as Ardea ibis			
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In buffer area only
Calidris acuminata			
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In buffer area only
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans			
Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area
Thinornis cucullatus as Thinornis rubricollis Hooded Plover, Hooded Dotterel [87735]		Species or species habitat known to occur within area overfly marine area	In buffer area only

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Credo	NRS Addition - Gazettal in Progress	WA	In buffer area only
Goongarrie	National Park	WA	In buffer area only
Unnamed WA46847	Nature Reserve	WA	In buffer area only

Nationally Important Wetlands		[Resource Information]
Wetland Name	State	Buffer Status
Lake Ballard	WA	In buffer area only
Lake Marmion	WA	In buffer area only

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Comet Vale Sand Project	2023/09460		Assessment	In buffer area only
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Ularring Hematite Project, WA	2012/6426	Not Controlled Action	Completed	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data is available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on the contents of this report.

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and 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.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions when time permits.

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded breeding sites; and
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

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
-Department of Land and Resource Management, Northern Territory
-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
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-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 B. Vertebrate fauna recorded in biological surveys in the region

Basic Vertebrate Fauna Survey and Risk Assessment
Menzies Mining Project

B.1 VERTEBRATE FAUNA ASSESSMENTS

		Surveys	A	B										C													D						E	F
Family	Species	Common name		GG26	GG27	GG29	GG28	GS28	GS29	GS26	GS27	GS30	GG30	Spinifex	Salmon Gums	Gimlet South	Davyhurst	Gimlet South	Security	Crossroads	Gimlet South	Wendy Gully	Wendy Gully	Wendy Gully	Floodplains	MME1	MME2	Opportunistic	MME3	MME7	MME6	Goondarrie	Jump Up Dam
Amphibians																																			
Limnodynastidae	*Neobatrachus kunapalari*	Wheatbelt Frog	X											1																					
	Neobatrachus sudelli	Sudell's Frog	X																																
	Neobatrachus sutor	Shoemaker Frog	X											9	3	6	10	30	22	12	7					1	1								
	Neobatrachus wilsmorei	Plonking Frog	X		3	2																													
	Platyplectrum spenceri	Spencer's Burrowing Frog	X																																
Myobatrachidae	*Crinia georgiana*	Quacking Frog	X																																
	Pseudophryne occidentalis	Western Toadlet	X												1	147	1	84		4	158	2													
Pelodryadidae	*Cyclorana maini*	Main's Frog	X																									1							
	Cyclorana occidentalis	Western Water-holding Frog	X																																
	Litoria moorei	Motorbike Frog	X																																
Reptiles																																			
Agamidae	*Ctenophorus cristatus*	Crested Dragon	X				5	1	1					1	1		3	5	1	1			1													
	Ctenophorus fordi	Mallee Dragon	X	22	42	2	15	2	2	6	9																									
	Ctenophorus infans	Ring-tailed Dragon	X																																
	Ctenophorus isolepis	Central Military Dragon																								1									
	Ctenophorus nuchalis	Central Netted Dragon	X																																
	Ctenophorus ornatus	Ornate Crevice Dragon	X																																
	Ctenophorus pictus	Painted Dragon	X																																
	Ctenophorus reticulatus	Western Netted Dragon	X									1	2		3	1	4	13	30	6		1	1	3			1	1	1	3			1	
	Ctenophorus salinarum	Saltpan Dragon	X																																
	Ctenophorus scutulatus	Lozenge-marked Dragon	X		3	7	3		8			3	1				2	2	5				1	13											
	Diporiphora amphiboluroides	Mulga Dragon	X																7																1
	Moloch horridus	Thorny Devil	X		1				1	1	2		1				5					1	1	17											
	Pogona minor	Western Bearded Dragon	X	1	1	1	1		3	1	1		3	13	2	4	11	3	14	21	12	14	4	24	2										
	Tympanocryptis cephalus	Pebble Dragon	X													1		7			2			1											
Carphodactylidae	*Nephrurus laevissimus*	Smooth Knob-tail	X	18	18		2	1	1	12	9																								
	Nephrurus vertebralis	Midline Knob-tail	X																																

		Surveys	A	B										C													D						E	F
Family	Species	Common name		GG26	GG27	GG29	GG28	GS28	GS29	GS26	GS27	GS30	GG30	Spinifex	Salmon Gums	Gimlet South	Davvhurst	Gimlet South	Security	Crossroads	Gimlet South	Wendy Gully	Wendy Gully	Wendy Gully	Floodplains	MME1	MME2	Opportunistic	MME3	MME7	MME6	Goonaarrie	Jump Up Dam
	Nephrurus wheeleri	Banded Knob-tail	X																															
	Underwoodisaurus milii	Barking Gecko	X								9			11	31	231	16	18		2	83	37	33	28	10						2		1
Diplodactylidae	*Amalosia reticulata*	Reticulated Velvet Gecko															1																	
	Diplodactylus conspicillatus	Fat-tailed Gecko	X																															
	Diplodactylus granariensis	Wheatbelt Stone Gecko	X			2	1	5	8	4	8	4		77	18	8	74	71	8	29	22	33	38	76	1										
	Diplodactylus pulcher	Beautiful Gecko	X						1			2	1	53	8	1	86	21	123	80		1	3	46	12						1				
	Lucasium maini	Main's Ground Gecko	X			1	2	2						9	346		9	60	1	9	2		1	1	1										
	Lucasium squarrosum	Mottled Ground Gecko	X																																
	Rhynchoedura ornata	Beaked Gecko	X		2	1	2	2	3	1				4	3		5			41				9											1
	Strophurus assimilis	Goldfields Spiny-tailed Gecko	X							3				44	1	3	1	7			3	14	15	112											
	Strophurus elderi	Jewelled Gecko	X																																
	Strophurus intermedius	Southern Spiny-tailed Gecko																																	
	Strophurus strophurus	Western Spiny-tailed Gecko	X																																
	Strophurus wellingtonae	Western Shield Spiny-tailed Gecko	X																								1								
Elapidae	*Brachyurophis fasciolatus*	Narrow-banded Burrowing Snake									1																								
	Brachyurophis semifasciata	Half-girdled Snake	X							1		1		9	7		6	6	1																1
	Demansia psammophis	Yellow-faced Whipsnake	X				2							1	1		1	4	1					3											
	Elapognathus coronatus	Crowned Snake	X																																
	Furina ornata	Orange-naped Snake	X																																
	Neelaps bimaculatus	Black-naped Burrowing Snake	X																																
	Notechis scutatus	Tiger Snake	X																																
	Suta monachus	Hooded Snake	X				1							2	7		9	4	4	2			1	6				1							
	Pseudechis australis	Mulga Snake	X												1		2		1		1	1													
	Pseudechis butleri	Spotted Mulga Snake	X																								1								
	Pseudonaja mengdeni	Western Brown Snake	X											1									1	1											
	Pseudonaja modesta	Ringed Brown Snake	X		1		3							1			1							1											
	Simoselaps bertholdi	Jan's Banded Snake	X						1						4		8	2		1				2											
	Suta fasciata	Rosen's Snake	X												2			3	1				1												
Gekkonidae	*Christinus marmoratus*	Marbled Gecko	X																																

		Surveys	A	B										C													D						E	F
Family	Species	Common name		GG26	GG27	GG29	GG28	GS28	GS29	GS26	GS27	GS30	GG30	Spinifex	Salmon Gums	Gimlet South	Davvhurst	Gimlet South	Security	Crossroads	Gimlet South	Wendy Gully	Wendy Gully	Wendy Gully	Floodplains	MME1	MME2	Opportunistic	MME3	MME7	MME6	Goonaarrie	Jump Up Dam
	Gehyra punctata	Spotted Dtella	X																																
	Gehyra purpurascens	Purplish Dtella	X				2							1	1		1	1		6															
	Gehyra variegata	Variegated Gehyra	X	1	1		3	4	6		2	3	1	23	14	27	38	37	39	6	18	3	1	12	2	3	9	1	3	2	9		1
	Heteronotia binoei	Bynoe's Gecko	X										2	24	10	21	16	9	25	1	29	42	27	8			3	1					1
Pygopodidae	*Aprasia picturata*	Black-headed Worm-lizard	X																															
	Delma australis	Marble-faced Delma	X											8			4	3						6										
	Delma butleri	Unbanded Delma	X	1			1							4						2				2										
	Delma fraseri	Fraser's Delma												1						1														
	Delma nasuta	Sharp-snouted Delma																																
	Lialis burtonis	Burton's Legless Lizard	X											5										3										
	Pygopus lepidopodus	Common Scaly-foot												2	3		2	2						1										
	Pygopus nigriceps	Western Hooded Scaly-foot	X			1																												
Pythonidae	*Antaresia stimsoni*	Stimson's Python	X																															
Scincidae	*Cryptoblepharus australis*	Inland Snake-eyed Skink	X																															
	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink	X			1	3				1		3		3		10	12	3							2	1							
	Cryptoblepharus plagiocephalus	Peron's Snake-eyed Skink	X																															
	Ctenotus atlas	Southern Mallee Ctenotus	X	4	3	1	4	3	2	2	3			16					1				2	104										
	Ctenotus brooksi	Wedgsnout Ctenotus	X	17						3																								
	Ctenotus brooksi	Wedgsnout Ctenotus	X																															
	Ctenotus leae	Orange-tailed Finesnout Ctenotus	X																															
	Ctenotus leonhardii	Leonhardi's Ctenotus	X																									1						
	Ctenotus pantherinus	Leopard Ctenotus	X																															
	Ctenotus schomburgkii	Barred Wedgesnout Ctenotus	X	4	9	3	5	5	1		1			2										2		1		1						
	Ctenotus severus	Stern Ctenotus	X																															
	Ctenotus uber	Spotted Ctenotus	X			1						1	6	46	6		29	13	44	27		2	1	25										
	Ctenotus xenopleura	Wide-striped Ctenotus	X																															
	Cyclodomorphus melanops	Spinifex Slender Blue-tongue	X			10	2		2			2		24		1	1	2				2	2	24										
	Egernia depressa	Southern Pygmy Spiny-tailed Skink	X											15		3	57	68	27		3										1		1
	Egernia formosa	Goldfields Crevice Skink	X										5	1	4		8		8	1													1

		Surveys	A	B										C												D						E	F
Family	Species	Common name		GG26	GG27	GG29	GG28	GS28	GS29	GS26	GS27	GS30	GG30	Spinifex	Salmon Gums	Gimlet South	Davvhurst	Gimlet South	Security	Crossroads	Gimlet South	Wendy Gully	Wendy Gully	Wendy Gully	Floodplains	MME1	MME2	Opportunistic	MME3	MME7	MME6	Goonaarrie	Jump Up Dam
	Egernia napoleonis	Southwestern Crevice Skink	X																														
	Eremiascincus richardsonii	Broad-banded Sand-swimmer	X											3	6	2	5	4	6	2	1	1		1									
	Hemiergis initialis	South-western Earless Skink	X											12	1		4	5			1												
	Lerista desertorum	Central Desert Robust Slider	X																									1			1		
	Lerista kingi	King's Slider	X																														
	Lerista macropisthopus	Unpatterned Robust Slider	X				1			2																							
	Lerista muelleri	Wood Mulch-slider	X																														
	Lerista picturata	Southern Robust Slider												14	20		18	18		1				20									
	Lerista picturata	Southern Robust Slider	X																														
	Lerista timida	Timid Slider	X																														
	Liopholis inornata	Desert Skink	X	3	2	1		2		2	4				4				2					2									
	Liopholis striata	Nocturnal Desert Skink	X												2				9					1									
	Menetia greyii	Common Dwarf Skink	X	1	2	1	1	1	1		1		1	6	3		19	3	17	4	2			1		4		1					
	Morethia adelaidensis	Saltbush Morethia Skink	X																														
	Morethia butleri	Woodland Morethia Skink	X										2	4	7	3	14	1	4				1				2	1		1	3		
	Saiphos equalis	Three-toed Skink	X																														
	Tiliqua occipitalis	Western Blue-tongued Lizard	X		1						1			5			1		3					4									
	Tiliqua rugosa	Bobtail	X											2			3	1	2	1				1	1								
Typhlopidae	*Anilios australis*	Austral Blind Snake	X						2	1				14	7		8	14		7	1		1	6									
	Anilios bicolor	Dark-spined Blind Snake												1				1						1									
	Anilios bituberculatus	Prong-snouted Blind Snake						1						1			2	2	1		1		1										
	Anilios hamatus	Pale-headed Blind Snake							1					9	10	2	10	24	2	13		1	1	9									
Varanidae	*Varanus caudolineatus*	Stripe-tailed Monitor	X											1	11		11	15	17	9				9			1				1		
	Varanus giganteus	Perentie	X																														
	Varanus gouldii	Gould's Goanna	X			2		1						6	8	1	10	9	2	2	1	2	1		1								
	Varanus panoptes	Yellow-spotted Monitor																										1			1		1
	Varanus tristis	Black-headed Monitor	X									1		3	3		5	1															
Birds																																	
Casuariidae	*Dromaius novaehollandiae*	Emu																								1	1	1			1		1
Anatidae	*Cygnus atratus*	Black Swan																										1					
	Tadorna tadornoides	Australian Shelduck																										1					

		Surveys	A	B										C												D							E	F
Family	Species	Common name		GG26	GG27	GG29	GG28	GS28	GS29	GS26	GS27	GS30	GG30	Spinifex	Salmon Gums	Gimlet South	Davvhurst	Gimlet South	Security	Crossroads	Gimlet South	Wendy Gully	Wendy Gully	Wendy Gully	Floodplains	MME1	MME2	Opportunistic	MME3	MME7	MME6	Goonaarrie	Jump Up Dam
	Anas superciliosa	Pacific Black Duck																								1							
	Anas gracilis	Grey Teal																								1							
	Malacorhynchus membranaceus	Pink-eared Duck																								1							
Megapodiidae	*Leipoa ocellata*	Malleefowl																								1							1
Columbidae	*Phaps chalcoptera*	Common Bronzewing																								1							1
	Ocyphaps lophotes	Crested Pigeon																							2	1				2			1
Cuculidae	*Chrysococcyx basalis*	Horsfield's Bronze-Cuckoo																															1
	Chrysococcyx osculans	Black-eared Cuckoo																															1
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar																															1
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar																															1
Apodidae	*Apus pacificus*	Pacific Swift																															1
Rallidae	*Tribonyx ventralis*	Black-tailed Nativehen																								1							
Recurvirostridae	*Himantopus leucocephalus*	Pied Stilt																								1							
	Recurvirostra novaehollandiae	Red-necked Avocet																								1							
Charadriidae	*Charadrius ruficapillus*	Red-capped Plover																								1							
Charadriidae	*Elseyornis melanops*	Black-fronted Dotterel																								1							
Turnicidae	*Turnix velox*	Little Buttonquail																															1
Otididae	*Ardeotis australis*	Australian Bustard																															1
Ardeidae	*Ardea pacifica*	White-necked Heron																								1							
	Egretta novaehollandiae	White-faced Heron																								1							
Accipitridae	*Haliaeetus albicilla*																								1		1	2		1			
	Hieraaetus morphnoides	Little Eagle																									1							
	Accipiter cirrocephalus	Collared Sparrowhawk																															1
Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo																								1							
Alcedinidae	*Dacelo novaeguineae*	Laughing Kookaburra																														1	
Meropidae	*Merops ornatus*	Rainbow Bee-eater																															1
Falconidae	*Falco longipennis*	Australian Hobby																										1					1
	Falco berigora	Brown Falcon																															1
	Falco peregrinus	Peregrine Falcon																									1						
Cacatuidae	*Eolophus roseicapilla*	Galah																								1							1
	Nymphicus hollandicus	Cockatiel																															1

		Surveys	A	B										C												D						E	F
Family	Species	Common name		GG26	GG27	GG29	GG28	GS28	GS29	GS26	GS27	GS30	GG30	Spinifex	Salmon Gums	Gimlet South	Davvhurst	Gimlet South	Security	Crossroads	Gimlet South	Wendy Gully	Wendy Gully	Wendy Gully	Floodplains	MME1	MME2	Opportunistic	MME3	MME7	MME6	Goonaarrie	Jump Up Dam
Psittacidae	*Neopsephotus bourkii*	Bourke's Parrot																									1						1
	Barnardius zonarius	Australian Ringneck																									1	1		2	3	1	1
	Psephotus varius	Mulga Parrot																										1	1	5	5		1
	Melopsittacus undulatus	Budgerigar																															1
Ptilonorhynchidae	*Chlamydera guttata*	Western Bowerbird	X																														1
Climacteridae	*Climacteris affinis*	White-browed Treecreeper	X																									1		2			1
	Climacteris rufus	Rufous Treecreeper	X																														
Maluridae	*Malurus pulcherrimus*	Blue-breasted Fairywren	X																														
	Malurus splendens	Splendid Fairywren	X																									1		9		1	1
	Malurus leucopterus	White-winged Fairywren	X																							3							1
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater	X																														
	Purnella albifrons	White-fronted Honeyeater	X																							80	100	1	12	10	1		1
	Manorina flavigula	Yellow-throated Miner	X																							10	5	1	7		10	1	1
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater	X																							25	20	1		1	2	1	1
	Anthochaera carunculata	Red Wattlebird	X																													1	1
	Gavicalis virescens	Singing Honeyeater	X																								4	1	2	1	1	1	1
	Ptilotula ornata	Yellow-plumed Honeyeater	X																														
	Epthianura tricolor	Crimson Chat	X																														1
	Epthianura aurifrons	Orange Chat	X																														
	Epthianura albifrons	White-fronted Chat	X																														
	Sugomel nigrum	Black Honeyeater	X																														
	Lichmera indistincta	Brown Honeyeater	X																														1
	Nesoptilotis leucotis	White-eared Honeyeater	X																													1	
	Melithreptus brevirostris	Brown-headed Honeyeater	X																													1	
Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote	X																														
	Pardalotus striatus	Striated Pardalote	X																									1				1	1
Acanthizidae	*Pyrrholaemus brunneus*	Redthroat	X																									1				1	1
	Calamanthus campestris	Rufous Fieldwren																															
	Acanthiza iredalei	Slender-billed Thornbill	X																													1	
	Acanthiza apicalis	Inland Thornbill	X																							2		1		6	2	1	1
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill	X																							5	6	1		4	2		1

		Surveys	A	B										C												D						E	F
Family	Species	Common name		GG26	GG27	GG29	GG28	GS28	GS29	GS26	GS27	GS30	GG30	Spinifex	Salmon Gums	Gimlet South	Davvhurst	Gimlet South	Security	Crossroads	Gimlet South	Wendy Gully	Wendy Gully	Wendy Gully	Floodplains	MME1	MME2	Opportunistic	MME3	MME7	MME6	Goonaarrie	Jump Up Dam
	Acanthiza uropygialis	Chestnut-rumped Thornbill	X																							8	30	1	2	50	15	1	1
	Acanthiza robustirostris	Slaty-backed Thornbill	X																									1		2			
	Smicrornis brevirostris	Weebill	X																									1					1
	Gerygone fusca	Western Gerygone	X																														
	Aphelocephala leucopsis	Southern Whiteface	X																									1		20	6		1
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler	X																									1				1	1
Cinclosomatidae	*Cinclosoma castanotum*	Chestnut Quail-thrush	X																														
	Cinclosoma castaneothorax	Chestnut-breasted Quail-thrush	X																													1	1
Campephagidae	*Coracina maxima*	Ground Cuckooshrike	X																														
	Coracina novaehollandiae	Black-faced Cuckooshrike	X																								2	1				1	1
	Lalage tricolor	White-winged Triller	X																														1
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	X																													1	
Psophodidae	*Psophodes occidentalis*	Chiming Wedgebill	X																														
Oreoicidae	*Oreoica gutturalis*	Crested Bellbird	X																							1	3	1	1	2	1	1	1
Pachycephalidae	*Colluricincla harmonica*	Grey Shrikethrush	X																									1		2	1	1	1
	Pachycephala inornata	Gilbert's Whistler	X																														
	Pachycephala pectoralis	Golden Whistler	X																														
	Pachycephala rufiventris	Rufous Whistler	X																									1		1	1	1	1
Artamidae	*Artamus personatus*	Masked Woodswallow	X																														1
	Artamus superciliosus	White-browed Woodswallow																										1	4		1		
	Artamus cinereus	Black-faced Woodswallow	X																														
	Artamus cyanopterus	Dusky Woodswallow	X																														
	Artamus minor	Little Woodswallow	X																														
	Cracticus torquatus	Grey Butcherbird	X																							1	1	1	1	1	1	1	
	Cracticus nigrogularis	Pied Butcherbird	X																							2	1	1	1			1	1
	Gymnorhina tibicen	Australian Magpie	X																							3		1					1
	Strepera versicolor	Grey Currawong	X																										1			1	1
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail	X																							1		1				1	1
	Rhipidura albiscapa	Grey Fantail	X																											1		1	
Monarchidae	*Grallina cyanoleuca*	Magpie-lark	X																								1	1	2		2		
Corvidae	*Corvus orru*	Torresian Crow	X																								1	1	2		1		

		Surveys	A	B										C													D						E	F
Family	Species	Common name		GG26	GG27	GG29	GG28	GS28	GS29	GS26	GS27	GS30	GG30	Spinifex	Salmon Gums	Gimlet South	Davvhurst	Gimlet South	Security	Crossroads	Gimlet South	Wendy Gully	Wendy Gully	Wendy Gully	Floodplains	MME1	MME2	Opportunistic	MME3	MME7	MME6	Goonaarrie	Jump Up Dam
	Corvus bennetti	Little Crow	X																							2	1		1		1	1
	Corvus coronoides	Australian Raven	X																														
Petroicidae	*Microeca fascinans*	Jacky Winter	X																														
	Petroica goodenovii	Red-capped Robin	X																						1	2	1		6	2	1	1
	Melanodryas cucullata	Hooded Robin	X																								1	3			1	
	Drymodes brunneopygia	Southern Scrub-Robin	X																														
Locustellidae	*Cincloramphus cruralis*	Brown Songlark	X																														
	Cincloramphus mathewsi	Rufous Songlark	X																														
Hirundinidae	*Hirundo rustica*	Barn Swallow																												5			
	Hirundo neoxena	Welcome Swallow	X																														
	Petrochelidon ariel	Fairy Martin	X																														
	Petrochelidon nigricans	Tree Martin	X																														
	Cheramoeca leucosterna	White-backed Swallow	X																								1	2					
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird	X																												1	1
Estrildidae	*Taeniopygia guttata*	Zebra Finch	X																								1					1
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit	X											1		1									4		1	4				1
Mammals																																	
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna	X																							1	1					1
Bovidae	*Bos taurus*	Cow																														1
	Capra hircus	Goat																									1					1
Camelidae	*Camelus dromedarius*	Dromedary	X																														
Suidae	*Sus scrofa*	Pig	X																														
Canidae	*Canis lupus*	Dingo	X																								1						
	Vulpes vulpes	Red Fox																									1					1
Felidae	*Felis catus*	Cat																														1
Molossidae	*Austronomus australis*	White-striped Freetail Bat	X																														
	Mormopterus planiceps	Southern Free-tail Bat	X																														
	Mormopterus sp. 4	South-western Free-tail Bat																															1
Vespertilionidae	*Nyctophilus* sp.	Long-eared Bat Sp.																															1
	Chalinolobus gouldii	Gould's Wattled Bat	X																														1
	Chalinolobus morio	Chocolate Wattled Bat																															1

		Surveys	A	B										C												D						E	F
Family	Species	Common name		GG26	GG27	GG29	GG28	GS28	GS29	GS26	GS27	GS30	GG30	Spinifex	Salmon Gums	Gimlet South	Davvhurst	Gimlet South	Security	Crossroads	Gimlet South	Wendy Gully	Wendy Gully	Wendy Gully	Floodplains	MME1	MME2	Opportunistic	MME3	MME7	MME6	Goonaarrie	Jump Up Dam
	Nyctophilus geoffroyi	Lesser Long-eared Bat	X																														
	Nyctophilus major	Greater Long-eared Bat	X												1																		
	Scotorepens balstoni	Inland Broad-nosed Bat	X																														1
	Vespadelus baverstocki	Inland Forest Bat	X																														
	Vespadelus regulus	Southern Forest Bat	X																														
Dasyuridae	*Ningaui sp.*	Ningaui sp.												35	2		2					2	17										
	Antechinomys laniger	Kultarr	X												1						1												
	Ningaui ridei	Wongai Ningaui	X	1				4	3	5				1									2										
	Ningaui yvonneae	Mallee Ningaui	X											1																			
	Pseudantechinus woolleyae	Woolley's False Antechinus	X																					1									
	Sminthopsis crassicaudata	Fat-tailed Dunnart	X	1					1					2	5	14		2	4	26	32	121	100	24	108	1			1					
	Sminthopsis dolichura	Little Long-tailed Dunnart	X	1	1	1	1		1	2	2	12		63	34	4	47	15	46	11	2	7	4	32	2								
	Sminthopsis gilberti	Gilbert's Dunnart	X																														
	Sminthopsis hirtipes	Hairy-footed Dunnart	X																														
	Sminthopsis longicaudata	Long-tailed Dunnart																															
	Sminthopsis ooldea	Ooldea Dunnart	X																														
Burramyidae	*Cercartetus concinnus*	Southwestern Pygmy Possum	X											23	15	23	37	62	8	17	27	9	6	16									
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo	X																									1					
	Osphranter robustus	Euro	X																									1					1
	Osphranter rufus	Red Kangaroo	X																									1	5				1
Phalangeridae	*Trichosurus vulpecula*	Common Brushtail Possum	X																														
Leporidae	*Oryctolagus cuniculus*	Rabbit																1	1									1					1
Equidae	*Equus asinus*	Donkey																										1					
Muridae	*Mus musculus*	House Mouse	X					1		2	4			26	6	62	19	25	10	18	128	181	88	13	31	1	2		2		2		
	Notomys alexis	Spinifex Hopping Mouse	X	9	3	1	1		2																	7				2			
	Notomys mitchellii	Mitchell's Hopping Mouse	X	1													1				1												
	Pseudomys albocinereus	Ash-grey Mouse	X																			1											
	Pseudomys bolami	Bolam's Mouse	X											9	30	11	49	13	1	8	20			5	4								
	Pseudomys hermannsburgensis	Sandy Inland Mouse	X		2				4	1				8	9	3	9	5		2	5	2	1	5	2						1		
	Pseudomys nanus	Western Chestnut Mouse	X																														

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B.2 VERTEBRATE FAUNA ASSESSMENTS

		Surveys	A															B									C							
Family	Species	Common name	Site 13	Site 3	Site 9	Site 9a	Site 12	Site 21	Site 22	Site 14	Site 15	Site 21a	Site 19	Freshwater	Goongarri	Salt Lake	Site 12a	Site 3	Site 5	Site 7	Site 4	Site 1	Site 6	Site 8	Opportunisti	Site 2	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 9	Site 8
Amphibians																																		
Limnodynastidae	*Neobatrachus kunapalari*	Wheatbelt Frog																																
	Neobatrachus sutor	Shoemaker Frog	3	1	5	10																												
	Neobatrachus wilsmorei	Plonking Frog	1		11		2	2																										
Reptiles																																		
Agamidae	*Ctenophorus cristatus*	Crested Dragon							5																									
	Ctenophorus fordi	Mallee Dragon	43	26				2	16									7	11															
	Ctenophorus reticulatus	Western Netted Dragon			2	1				2	4	4								1														
	Ctenophorus scutulatus	Lozenge-marked Dragon																		15	3						1	3	5	3	1			
	Ctenophorus vadnappa	Red-barred Dragon	3		2	1		7	3		1	2																						
	Diporiphora amphiboluroides	Mulga Dragon																											2					
	Moloch horridus	Thorny Devil	1			1	2				1							1																
	Pogona minor	Western Bearded Dragon																				1	6					1		1				
	Pogona minor	Western Bearded Dragon	1	1	2		4	2	1	1	3	1	2																					
Carphodactylidae	*Nephrurus laevissimus*	Smooth Knob-tail	18	18			1		2										28															
	Underwoodisaurus milii	Barking Gecko																				1		1										
Diplodactylidae	*Amalosia reticulata*	Reticulated Velvet Gecko																1			2	1												
	Diplodactylus granariensis	Wheatbelt Stone Gecko					1	2	1			1						1	1	1	5	4		1										
	Diplodactylus pulcher	Beautiful Gecko									1		1							1		1	4					1			1			
	Lucasium maini	Main's Ground Gecko					3	1	2									6		1	6	1												
	Rhynchoedura ornata	Beaked Gecko	2		1		7	1	2																									
	Strophurus assimilis	Goldfields Spiny-tailed Gecko																5									1							
	Strophurus elderi	Jewelled Gecko																	1															
	Strophurus intermedius	Southern Spiny-tailed Gecko					2																											
Elapidae	*Brachyurophis semifasciata*	Half-girdled Snake																	1		1	1												
	Demansia psammophis	Yellow-faced Whipsnake																1					1	1										
	Demansia psammophis	Yellow-faced Whipsnake							2																									
	Suta monachus	Hooded Snake							1																									
	Pseudonaja mengdeni	Western Brown Snake					1														1													
	Pseudonaja modesta	Ringed Brown Snake	1						3																									

		Surveys	A															B									C							
Family	Species	Common name	Site 13	Site 3	Site 9	Site 9a	Site 12	Site 21	Site 22	Site 14	Site 15	Site 21a	Site 19	Freshwater	Goongarri	Salt Lake	Site 12a	Site 3	Site 5	Site 7	Site 4	Site 1	Site 6	Site 8	Opportunisti	Site 2	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 9	Site 8
	Simoselaps bertholdi	Jan's Banded Snake											1											1										
Gekkonidae	*Gehyra purpurascens*	Purplish Dtella							2													1		2										
	Gehyra variegata	Variegated Gehyra	1	1			2		4		1	2	1																		1			
	Heteronotia binoei	Bynoe's Gecko									2	2																				1		
Pygopodidae	*Delma australis*	Marble-faced Delma																						1										
	Delma nasuta	Sharp-snouted Delma		1					1																									
	Lialis burtonis	Burton's Legless Lizard					1																											
	Pygopus nigriceps	Western Hooded Scaly-foot					1	1																										
Scincidae	*Cryptoblepharus buchananii*	Buchanan's Snake-eyed Skink						1	3		4	1										1		1										
	Ctenotus atlas	Southern Mallee Ctenotus	3	4					1		4							7																
	Ctenotus brooksi	Wedgsnout Ctenotus		24															11															
	Ctenotus calurus	Blue-tailed Finesnout Ctenotus											1																					
	Ctenotus greeri	Spotted-necked Ctenotus											12																					
	Ctenotus helenae	Clay-soil Ctenotus											1																					
	Ctenotus leonhardii	Leonhardi's Ctenotus			5	9																	1				1	8	2	1				
	Ctenotus pantherinus	Leopard Ctenotus											4																					
	Ctenotus quattuordecimlineatus	Fourteen-lined Ctenotus											11																					
	Ctenotus schomburgkii	Barred Wedgesnout Ctenotus	9	4	1			3	5				11					1			1							1	1					
	Ctenotus uber	Spotted Ctenotus						1			6	1								2														
	Cyclodomorphus branchialis	Common Slender Bluetongue					1		2																									
	Egernia depressa	Southern Pygmy Spiny-tailed Skink						2	1		10																				3			
	Egernia formosa	Goldfields Crevice Skink									5																							
	Eremiascincus richardsonii	Broad-banded Sand-swimmer																						1										
	Lerista desertorum	Central Desert Robust Slider											6																					
	Lerista lineopunctulata	Dotted-line Robust Slider																	2				4											
	Lerista macropisthopus	Unpatterned Robust Slider							1																									
	Liopholis inornata	Desert Skink	1	3			1	1			1	1						1	1	2				1										
	Menetia greyii	Common Dwarf Skink	2	1	1			1	2		1										1							1			3			
	Morethia butleri	Woodland Morethia Skink								2	2	2																						
	Tiliqua occipitalis	Western Blue-tongued Lizard	1				1														4													
	Tiliqua rugosa	Bobtail																			3			1										
Typhlopidae	*Anilios hamatus*	Pale-headed Blind Snake																		1														

		Surveys	A															B									C							
Family	Species	Common name	Site 13	Site 3	Site 9	Site 9a	Site 12	Site 21	Site 22	Site 14	Site 15	Site 21a	Site 19	Freshwater	Goongarri	Salt Lake	Site 12a	Site 3	Site 5	Site 7	Site 4	Site 1	Site 6	Site 8	Opportunisti	Site 2	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 9	Site 8
Varanidae	*Varanus caudolineatus*	Stripe-tailed Monitor			1																			1			3	2						
	Varanus gouldii	Gould's Goanna			1	1		2				2						1		2														
	Varanus panoptes	Yellow-spotted Monitor																									1		2	1	2			
	Varanus tristis	Black-headed Monitor										3																						
Birds																																		
Casuariidae	*Dromaius novaehollandiae*	Emu	8	2	1				3		4	1	2	1	1	1									1									
Anatidae	*Cygnus atratus*	Black Swan																							1									
	Tadorna tadornoides	Australian Shelduck												1											1									
	Chenonetta jubata	Australian Wood Duck												1											1									
	Anas superciliosa	Pacific Black Duck												1											1									
	Anas gracilis	Grey Teal												1											1									
	Aythya australis	Hardhead																							1									
Columbidae	*Phaps chalcoptera*	Common Bronzewing							2			1		1	1	1	1								1									
	Ocyphaps lophotes	Crested Pigeon		2	6					1				1	1	1									1									
	Geopelia cuneata	Diamond Dove			1																													
Cuculidae	*Chrysococcyx basalis*	Horsfield's Bronze-Cuckoo	6		1				2		3	2	3		1	1									1		1	2	2	1				
	Chrysococcyx osculans	Black-eared Cuckoo	3	4					6		2		1		1												1				1			
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar							3	3					1										1				1					
Podargidae	*Podargus strigoides*	Tawny Frogmouth							1						1										1									
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar														1																		
Rallidae	*Tribonyx ventralis*	Black-tailed Nativehen												1																				
Recurvirostridae	*Himantopus leucocephalus*	Pied Stilt																							1									
	Cladorhynchus leucocephalus	Banded Stilt														1									1									
	Recurvirostra novaehollandiae	Red-necked Avocet												1											1									
Charadriidae	*Charadrius ruficapillus*	Red-capped Plover												1																				
	Erythrogonys cinctus	Red-kneed Dotterel																							1									
	Elseyornis melanops	Black-fronted Dotterel												1																				
Scolopacidae	*Tringa nebularia*	Common Greenshank																							1									
Turnicidae	*Turnix velox*	Little Buttonquail	13	3											1																			
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull																							1									
Ardeidae	*Ardea pacifica*	White-necked Heron												1											1									
	Egretta novaehollandiae	White-faced Heron												1	1										1									
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill																							1									

		Surveys	A															B									C							
Family	Species	Common name	Site 13	Site 3	Site 9	Site 9a	Site 12	Site 21	Site 22	Site 14	Site 15	Site 21a	Site 19	Freshwater	Goongarri	Salt Lake	Site 12a	Site 3	Site 5	Site 7	Site 4	Site 1	Site 6	Site 8	Opportunisti	Site 2	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 9	Site 8
Ardeidae	*Ardea alba*	Great Egret																							1									
Accipitridae	*Elanus axillaris*	Black-shouldered Kite																							1									
	Lophoictinia isura	Square-tailed Kite																							1									
	Hieraaetus morphnoides	Little Eagle		1					2				3		1										1									
	Aquila audax	Wedge-tailed Eagle								6					1										1									
	Circus assimilis	Spotted Harrier						1							1																			
	Accipiter fasciatus	Brown Goshawk									1		3		1	1									1									
	Accipiter cirrocephalus	Collared Sparrowhawk													1	1									1									
Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo						4		2			1		1												1	2	2	1				
Strigidae	*Ninox boobook*	Southern Boobook													1																			
Alcedinidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher												1	1										1									
Meropidae	*Merops ornatus*	Rainbow Bee-eater	3	1					5				3		1										1									
Falconidae	*Falco cenchroides*	Nankeen Kestrel											3		1										1									
	Falco longipennis	Australian Hobby							1						1										1									
	Falco berigora	Brown Falcon		2					2		2		5		1										1									
	Falco peregrinus	Peregrine Falcon																							1									
Timaliidae	*Zosterops lateralis*	Silvereye																							1									
Cacatuidae	*Eolophus roseicapilla*	Galah							4	44	5	62	5	1	1	1									1			2			2			
	Nymphicus hollandicus	Cockatiel							11			4	3	1	1	1											13	3		21	3			
Psittacidae	*Neopsephotus bourkii*	Bourke's Parrot												1	1	1														5				
	Neophema splendida	Scarlet-chested Parrot									2																							
	Barnardius zonarius	Australian Ringneck			10			3		25	8		16	1	1										1		8	5	8	5	5			
	Psephotus varius	Mulga Parrot	4	4	3			2			4		2		1										1									
	Melopsittacus undulatus	Budgerigar	1	6				38	27	11	1		29	1	1	1											10		20	15				
Ptilonorhynchidae	*Chlamydera guttata*	Western Bowerbird																										1						
Climacteridae	*Climacteris affinis*	White-browed Treecreeper						1				1			1																			
Maluridae	*Malurus pulcherrimus*	Blue-breasted Fairywren	15	9																					1									
	Malurus splendens	Splendid Fairywren	24								34				1										1		15	10	20	14	21			
	Malurus leucopterus	White-winged Fairywren			17									1	1	1									1									
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater	2							2	3				1	1																		
	Purnella albifrons	White-fronted Honeyeater	69	125	16			7	144	3	12	6	4		1	1	4								1									
	Manorina flavigula	Yellow-throated Miner			109			3	74	10			13		1										1				1	7				
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater	18	23	7			6	52	11	30	4	8	1	1	1									1		1	1	5	5	6			

		Surveys	A															B									C							
Family	Species	Common name	Site 13	Site 3	Site 9	Site 9a	Site 12	Site 21	Site 22	Site 14	Site 15	Site 21a	Site 19	Freshwater	Goongarri	Salt Lake	Site 12a	Site 3	Site 5	Site 7	Site 4	Site 1	Site 6	Site 8	Opportunisti	Site 2	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 9	Site 8
	Anthochaera carunculata	Red Wattlebird			1				5				2												1				2	5				
	Gavicalis virescens	Singing Honeyeater	2		4				1	11	2		2	1	1	1									1		1	1	1	2	2			
	Ptilotula ornata	Yellow-plumed Honeyeater							230						1										1									
	Ptilotula plumula	Grey-fronted Honeyeater							12	56			3			1																		
	Conopophila whitei	Grey Honeyeater	2		1							17			1	1																		
	Epthianura tricolor	Crimson Chat								154																		2						
	Epthianura albifrons	White-fronted Chat												1	1										1									
	Sugomel nigrum	Black Honeyeater	7	4							3																							
	Lichmera indistincta	Brown Honeyeater													1										1									
	Nesoptilotis leucotis	White-eared Honeyeater	4																						1									
	Melithreptus brevirostris	Brown-headed Honeyeater							6						1										1									
Pardalotidae	*Pardalotus striatus*	Striated Pardalote		1					2				2		1										1									
Acanthizidae	*Pyrrholaemus brunneus*	Redthroat	16	8				2			4	1			1										1			1			2			
	Calamanthus campestris	Rufous Fieldwren																													1			
	Acanthiza iredalei	Slender-billed Thornbill													1																			
	Acanthiza apicalis	Inland Thornbill	32	38				1	15		18	2	3		1		2								1		19	10	18	11	16			
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill	2		4				1		48		4												1			2						
	Acanthiza uropygialis	Chestnut-rumped Thornbill	23	3	27				46		86	10	88		1	1	2								1									
	Acanthiza robustirostris	Slaty-backed Thornbill											3														5	5	14	8	12			
	Smicrornis brevirostris	Weebill	50	36				2	269			2	98		1										1		2		10	5				
	Aphelocephala leucopsis	Southern Whiteface									153	12	5		1										1									
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler	1								4	3			1										1			3						
Cinclosomatidae	*Cinclosoma castanotum*	Chestnut Quail-thrush							3		1																							
Campephagidae	*Coracina maxima*	Ground Cuckooshrike							6						1																			
	Coracina novaehollandiae	Black-faced Cuckooshrike		11	3				12	4	15		9		1										1				2					
	Lalage tricolor	White-winged Triller	2		2				14		3	6			1	1																		
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	2										6		1																			
Oreoicidae	*Oreoica gutturalis*	Crested Bellbird	11	6	2				15	14	18	2	15		1		1								1		6	8	6	5	5			
Pachycephalidae	*Colluricincla harmonica*	Grey Shrikethrush	6	16					17		5	1	5		1										1		2	2	2	1	3			
	Pachycephala rufiventris	Rufous Whistler		2					32		13	1	8		1	1									1		2		1					
Artamidae	*Artamus personatus*	Masked Woodswallow	1	1					18	2			2		1	1																		
	Artamus cinereus	Black-faced Woodswallow								55		1			1	1									1									
	Cracticus torquatus	Grey Butcherbird	2	2	1				8	2			8		1	1									1									

		Surveys	A															B									C							
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	Cracticus nigrogularis	Pied Butcherbird	3	2	14				5	6	1	2	4		1										1			1	1	2	1			
	Gymnorhina tibicen	Australian Magpie			5				2																1									
	Strepera versicolor	Grey Currawong			4				1		1	1	2		1										1		3	1	5	1	4			
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail			1				5					1	1	1									1									
	Rhipidura albiscapa	Grey Fantail							13						1										1		1							
Monarchidae	*Grallina cyanoleuca*	Magpie-lark												1											1									
Corvidae	*Corvus orru*	Torresian Crow							2																1		3	2	4					
	Corvus bennetti	Little Crow			149				7	29	10		24	1	1										1		1		1	1				
Petroicidae	*Microeca fascinans*	Jacky Winter							28				22		1	1									1									
	Petroica goodenovii	Red-capped Robin	8		4				20	1	106	4	29		1	1									1			4	4	5	3			
	Melanodryas cucullata	Hooded Robin		2					32	2	13	1			1	1																		
Locustellidae	*Cincloramphus cruralis*	Brown Songlark								3					1																			
	Cincloramphus mathewsi	Rufous Songlark										2			1										1									
Hirundinidae	*Hirundo neoxena*	Welcome Swallow	2	1										1	1	1									1									
	Petrochelidon ariel	Fairy Martin		5											1										1									
	Petrochelidon nigricans	Tree Martin		7										1											1									
	Cheramoeca leucosterna	White-backed Swallow												1	1										1									
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird	3	1	4			1	5						1										1									
Estrildidae	*Taeniopygia guttata*	Zebra Finch (Australian)		4					2	12	2		5	1	1										1									
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit			2				4					1	1	1									1									
Mammals																																		
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna									1								1	1						1									
Bovidae	*Capra hircus*	Goat								1			1																					
	Ovis aries	Sheep			1	1		1					1																					
Camelidae	*Camelus dromedarius*	Dromedary							1																									
Canidae	*Canis lupus*	Dingo	1						1																									
	Vulpes vulpes	Red Fox	1	1							1	1	1																					
Felidae	*Felis catus*	Cat		1																														
Molossidae	*Austronomus australis*	White-striped Freetail Bat							1																		1	1	1	1	1			
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat																									1	1	1	1	1			
	Scotorepens balstoni	Inland Broad-nosed Bat																									1	1	1	1				
	Vespadelus finlaysoni	Finlayson's Cave Bat																									1	1	1	1	1			
	Vespadelus regulus	Southern Forest Bat																																

		Surveys	A															B									C							
Family	Species	Common name	Site 13	Site 3	Site 9	Site 9a	Site 12	Site 21	Site 22	Site 14	Site 15	Site 21a	Site 19	Freshwater	Goongarri	Salt Lake	Site 12a	Site 3	Site 5	Site 7	Site 4	Site 1	Site 6	Site 8	Opportunisti	Site 2	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 9	Site 8
Dasyuridae	*Ningaui ridei*	Wongai Ningaui	1	3									5					2																
	Pseudantechinus woolleyae	Woolley's False Antechinus																															1	
	Sminthopsis crassicaudata	Fat-tailed Dunnart		1		1																1	1											
	Sminthopsis dolichura	Little Long-tailed Dunnart	3					1	1				1						2		2	2		2			1	2	3	4	3			
	Sminthopsis longicaudata	Long-tailed Dunnart																											2					
Burramyidae	*Cercartetus concinnus*	Southwestern Pygmy Possum																				1		1										
Macropodidae	*Osphranter robustus*	Euro						1					1																					
	Osphranter rufus	Red Kangaroo								1																								
Leporidae	*Oryctolagus cuniculus*	Rabbit		1																														
Muridae	*Mus musculus*	House Mouse	4	2									3													4	4	2	2	23	10		1	2
	Notomys alexis	Spinifex Hopping Mouse	2	9				2	1		1																5							
	Notomys mitchellii	Mitchell's Hopping Mouse		3				1																										
	Pseudomys bolami	Bolam's Mouse										3						1	3															
	Pseudomys hermannsburgensis	Sandy Inland Mouse	2	1									7					1									3		1	2	1			

A Dell, J and How, R.A. (1988) Vertebrate fauna in The biological survey of the eastern goldfields of Western Australia Part 5: Edjudina - Menzies Study Area, *Records of the Western Australian Museum*, Supplement No. 31, 38-69.

B Hart Simpson and Associates (2000) *Anaconda Nickel Ltd, Cawse Expansion Project, Fauna Survey*, Unpublished report for Anaconda Nickel Ltd, Perth

C Keith Lindbeck and Associates (2012) *Central Yilgarn Iron Project (CYIP) Fauna Assessment*, Unpublished report for Jupiter Mines Ltd, Perth.

Appendix C. Definitions of significant fauna under the WA *Biodiversity Conservation Act 2016* and Priority Species

Basic Vertebrate Fauna Survey and Risk Assessment
Menzies Mining Project

APPENDIX C
DEFINITIONS OF SIGNIFICANT FAUNA UNDER THE WA BIODIVERSITY CONSERVATION ACT 2016

Threatened, Extinct and Specially Protected fauna or flora[1] are species[2] which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such. The *Wildlife Conservation (Specially Protected Fauna) Notice 2018* and the *Wildlife Conservation (Rare Flora) Notice 2018* have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016*. Categories of Threatened, Extinct and Specially Protected fauna and flora are:

T Threatened Species

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR Critically endangered species

Threatened species considered to be "*facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for critically endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for critically endangered flora.

[1] The definition of flora includes algae, fungi and lichens

[2] Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

EN Endangered species

Threatened species considered to be "*facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for endangered flora.

VU Vulnerable species

Threatened species considered to be "*facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for vulnerable fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for vulnerable flora.

Extinct Species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX Extinct species

Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.

EW Extinct in the wild species

Species that "*is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the pwild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially Protected Species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

MI Migratory birds protected under an international agreement

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

CD Species of special conservation interest (conservation dependant fauna)

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

OS Other specially protected species

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

P Priority species

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations

P1 Priority 1: Poorly-known species

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

P2 Priority 2: Poorly-known species

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

P3 Priority 3: Poorly-known species

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

P4 Priority 4: Rare, Near Threatened and other species in need of monitoring

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.

(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.

(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Appendix D.
Rapid habitat assessment

Basic Vertebrate Fauna Survey and Risk Assessment
Menzies Mining Project

Date: 15/11/2021 Habitat Assessment #: 1 Observer: ST

GDA94 51; 307844 mE 6713678 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Disturbed

Date: 15/11/2021 Habitat Assessment #: 2 Observer: ST

GDA94 51; 307959 mE 6713540 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 15/11/2021 Habitat Assessment #: 3 Observer: ST

GDA94 51; 307954 mE 6714022 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Disturbed

Date: 15/11/2021 Habitat Assessment #: 4 Observer: ST

GDA94 51; 307747 mE 6714103 mN Fire History: >5 years Landform: Waste dump

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded

TERRESTRIAL ECOSYSTEMS

Date: 15/11/2021 Habitat Assessment #: 5 Observer: ST

GDA94 51; 307737 mE 6714003 mN Fire History: >5 years Landform: Waste dump

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded

Date: 15/11/2021 Habitat Assessment #: 6 Observer: ST

GDA94 51; 307774 mE 6713774 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 15/11/2021 Habitat Assessment #: 7 Observer: ST

GDA94 51; 307770 mE 6713504 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded

Date: 15/11/2021 Habitat Assessment #: 8 Observer: ST

GDA94 51; 307948 mE 6713800 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 15/11/2021 Habitat Assessment #: 9 Observer: ST

GDA94 51; 307560 mE 6713525 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

Date: 15/11/2021 Habitat Assessment #: 10 Observer: ST

GDA94 51; 307549 mE 6713785 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 15/11/2021 Habitat Assessment #: 11 Observer: ST

GDA94 51; 307540 mE 6713971 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

Date: 15/11/2021 Habitat Assessment #: 12 Observer: ST

GDA94 51; 307537 mE 6714122 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded

TERRESTRIAL ECOSYSTEMS

Date: 15/11/2021 Habitat Assessment #: 13 Observer: ST

GDA94 51; 307321 mE 6714057 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 15/11/2021 Habitat Assessment #: 14 Observer: ST

GDA94 51; 307356 mE 6713807 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 15/11/2021 Habitat Assessment #: 15 Observer: ST

GDA94 51; 307154 mE 6714096 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

Date: 15/11/2021 Habitat Assessment #: 16 Observer: ST

GDA94 51; 307356 mE 6714198 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 15/11/2021 Habitat Assessment #: 17 Observer: ST

GDA94 51; 307518 mE 6714377 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good

Date: 15/11/2021 Habitat Assessment #: 18 Observer: ST

GDA94 51; 307528 mE 6714568 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 15/11/2021 Habitat Assessment #: 19 Observer: ST

GDA94 51; 307350 mE 6714614 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good

Date: 15/11/2021 Habitat Assessment #: 20 Observer: ST

GDA94 51; 307336 mE 6714949 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good

Date: 15/11/2021 Habitat Assessment #: 21 Observer: ST

GDA94 51; 307462 mE 6715050 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good

Date: 15/11/2021 Habitat Assessment #: 22 Observer: ST

GDA94 51; 307520 mE 6714802 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 15/11/2021 Habitat Assessment #: 23 Observer: ST

GDA94 51; 307708 mE 6714350 mN Fire History: >5 years Landform: Waste dump

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded

Date: 15/11/2021 Habitat Assessment #: 24 Observer: ST

GDA94 51; 307709 mE 6714466 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 15/11/2021 Habitat Assessment #: 25 Observer: ST

GDA94 51; 307709 mE 6714819 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Completely degraded

Date: 15/11/2021 Habitat Assessment #: 26 Observer: ST

GDA94 51; 307680 mE 6715024 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 15/11/2021 Habitat Assessment #: 27 Observer: ST

GDA94 51; 308126 mE 6714930 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good

Date: 15/11/2021 Habitat Assessment #: 28 Observer: ST

GDA94 51; 307873 mE 6714818 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 15/11/2021 Habitat Assessment #: 29 Observer: ST

GDA94 51; 308090 mE 6714619 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Disturbed

Date: 15/11/2021 Habitat Assessment #: 30 Observer: ST

GDA94 51; 307944 mE 6714266 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 15/11/2021 Habitat Assessment #: 31 Observer: ST

GDA94 51; 308141 mE 6714197 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Disturbed

Date: 15/11/2021 Habitat Assessment #: 32 Observer: ST

GDA94 51; 308346 mE 6714275 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good

Date: 15/11/2021 Habitat Assessment #: 33 Observer: ST

GDA94 51; 308300 mE 6714648 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good

Date: 15/11/2021 Habitat Assessment #: 34 Observer: ST

GDA94 51; 308307 mE 6714933 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Disturbed

Date: 15/11/2021 Habitat Assessment #: 35 Observer: ST

GDA94 51; 308485 mE 6714990 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good

Date: 15/11/2021 Habitat Assessment #: 36 Observer: ST

GDA94 51; 308485 mE 6714653 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 15/11/2021 Habitat Assessment #: 37 Observer: ST

GDA94 51; 308513 mE 6714432 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded

Date: 15/11/2021 Habitat Assessment #: 38 Observer: ST

GDA94 51; 308528 mE 6714039 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Completely degraded

TERRESTRIAL ECOSYSTEMS

Date: 15/11/2021 Habitat Assessment #: 39 Observer: ST

GDA94 51; 308714 mE 6714093 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Completely degraded

Date: 15/11/2021 Habitat Assessment #: 40 Observer: ST

GDA94 51; 308699 mE 6714464 mN Fire History: >5 years Landform: Creekline

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded

TERRESTRIAL ECOSYSTEMS

Date: 15/11/2021 Habitat Assessment #: 41 Observer: ST

GDA94 51; 308694 mE 6714655 mN Fire History: >5 years Landform: Flat plain

Soil Type: Rock Surface: Clay with pebbles

Habitat Type: Shrubland on a ridge Habitat Quality: Good

Date: 15/11/2021 Habitat Assessment #: 42 Observer: ST

GDA94 51; 308676 mE 6714949 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 15/11/2021 Habitat Assessment #: 43 Observer: ST

GDA94 51; 308734 mE 6713822 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Completely degraded

Date: 15/11/2021 Habitat Assessment #: 44 Observer: ST

GDA94 51; 308598 mE 6713651 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 45 Observer: ST

GDA94 51; 308195 mE 6713825 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded

Date: 16/11/2021 Habitat Assessment #: 46 Observer: ST

GDA94 51; 308599 mE 6712874 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 47 Observer: ST

GDA94 51; 308398 mE 6712719 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 48 Observer: ST

GDA94 51; 308199 mE 6712585 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 49 Observer: ST

GDA94 51; 308004 mE 6712434 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 50 Observer: ST

GDA94 51; 307833 mE 6712292 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 51 Observer: ST

GDA94 51; 307937 mE 6712045 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 52 Observer: ST

GDA94 51; 308222 mE 6712177 mN Fire History: >5 years Landform: Waste dump

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 53 Observer: ST

GDA94 51; 308418 mE 6712321 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded

Date: 16/11/2021 Habitat Assessment #: 54 Observer: ST

GDA94 51; 308424 mE 6712115 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 55 Observer: ST

GDA94 51; 308237 mE 6711982 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 56 Observer: ST

GDA94 51; 308052 mE 6711830 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 57 Observer: ST

GDA94 51; 308247 mE 6711746 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 58 Observer: ST

GDA94 51; 308449 mE 6711893 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 59 Observer: ST

GDA94 51; 308633 mE 6712002 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 60 Observer: ST

GDA94 51; 308837 mE 6711733 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 61 Observer: ST

GDA94 51; 308664 mE 6711519 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 62 Observer: ST

GDA94 51; 308460 mE 6711398 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 63 Observer: ST

GDA94 51; 308483 mE 6711242 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 64 Observer: ST

GDA94 51; 308499 mE 6711127 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 65 Observer: ST

GDA94 51; 308673 mE 6711180 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 66 Observer: ST

GDA94 51; 308796 mE 6711274 mN Fire History: >5 years Landform: Gentle slope

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 67 Observer: ST

GDA94 51; 309069 mE 6711485 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Completely degraded

Date: 16/11/2021 Habitat Assessment #: 68 Observer: ST

GDA94 51; 309220 mE 6711223 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 69 Observer: ST

GDA94 51; 309053 mE 6711091 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 70 Observer: ST

GDA94 51; 308867 mE 6710952 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 71 Observer: ST

GDA94 51; 308690 mE 6710817 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 72 Observer: ST

GDA94 51; 308896 mE 6710438 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 73 Observer: ST

GDA94 51; 309119 mE 6710496 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 74 Observer: ST

GDA94 51; 309307 mE 6710595 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Eucalypt woodland Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 75 Observer: ST

GDA94 51; 309516 mE 6710692 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 76 Observer: ST

GDA94 51; 309492 mE 6710353 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Eucalypt woodland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 77 Observer: ST

GDA94 51; 309325 mE 6710263 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Eucalypt woodland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 78 Observer: ST

GDA94 51; 309088 mE 6710222 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 79 Observer: ST

GDA94 51; 309170 mE 6710019 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Eucalypt woodland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 80 Observer: ST

GDA94 51; 309340 mE 6710046 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Eucalypt woodland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 81 Observer: ST

GDA94 51; 309554 mE 6710001 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded

Date: 16/11/2021 Habitat Assessment #: 82 Observer: ST

GDA94 51; 309344 mE 6709803 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 83 Observer: ST

GDA94 51; 309574 mE 6709761 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Eucalypt woodland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 84 Observer: ST

GDA94 51; 309526 mE 6709470 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 85 Observer: ST

GDA94 51; 309762 mE 6709567 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Eucalypt woodland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 86 Observer: ST

GDA94 51; 309778 mE 6709303 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 87 Observer: ST

GDA94 51; 309784 mE 6709026 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 88 Observer: ST

GDA94 51; 310001 mE 6708776 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 89 Observer: ST

GDA94 51; 310021 mE 6709106 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 90 Observer: ST

GDA94 51; 309972 mE 6709375 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 91 Observer: ST

GDA94 51; 309906 mE 6709632 mN Fire History: >5 years Landform: Waste dump

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Eucalypt woodland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 92 Observer: ST

GDA94 51; 309875 mE 6709718 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 93 Observer: ST

GDA94 51; 310148 mE 6709974 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded

Date: 16/11/2021 Habitat Assessment #: 94 Observer: ST

GDA94 51; 310185 mE 6709586 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 95 Observer: ST

GDA94 51; 310195 mE 6709293 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Completely degraded

Date: 16/11/2021 Habitat Assessment #: 96 Observer: ST

GDA94 51; 310192 mE 6708990 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 97 Observer: ST

GDA94 51; 310191 mE 6708741 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

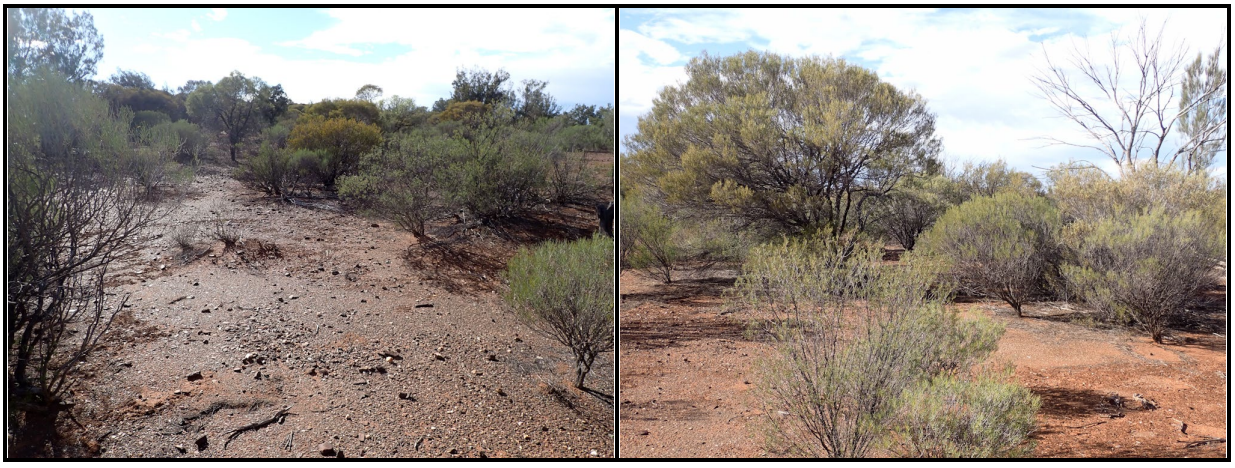
Habitat Type: Casuarina woodland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 98 Observer: ST

GDA94 51; 310252 mE 6708392 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good



TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 99 Observer: ST

GDA94 51; 310254 mE 6708126 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open grassland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 100 Observer: ST

GDA94 51; 310263 mE 6707864 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 101 Observer: ST

GDA94 51; 310037 mE 6708043 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 102 Observer: ST

GDA94 51; 310086 mE 6707673 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 103 Observer: ST

GDA94 51; 309885 mE 6707635 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Eucalypt woodland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 104 Observer: ST

GDA94 51; 310290 mE 6707657 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 105 Observer: ST

GDA94 51; 310307 mE 6707364 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 106 Observer: ST

GDA94 51; 310088 mE 6707329 mN Fire History: >5 years Landform: Flat plain

Soil Type: SST Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 107 Observer: ST

GDA94 51; 310114 mE 6707068 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Eucalypt woodland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 108 Observer: ST

GDA94 51; 310298 mE 6707070 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Eucalypt woodland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 109 Observer: ST

GDA94 51; 310320 mE 6706805 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 110 Observer: ST

GDA94 51; 310347 mE 6706541 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Eucalypt woodland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 111 Observer: ST

GDA94 51; 310563 mE 6706512 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 112 Observer: ST

GDA94 51; 310475 mE 6706839 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 113 Observer: ST

GDA94 51; 310480 mE 6707109 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Eucalypt woodland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 114 Observer: ST

GDA94 51; 310474 mE 6707377 mN Fire History: >5 years Landform: Creekline

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 115 Observer: ST

GDA94 51; 310435 mE 6707460 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 116 Observer: ST

GDA94 51; 310437 mE 6707677 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 117 Observer: ST

GDA94 51; 310425 mE 6708034 mN Fire History: >5 years Landform: Creekline

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 118 Observer: ST

GDA94 51; 310414 mE 6708290 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 119 Observer: ST

GDA94 51; 310413 mE 6708637 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 120 Observer: ST

GDA94 51; 310374 mE 6708990 mN Fire History: >5 years Landform: Flat plain

Soil Type: Pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 121 Observer: ST

GDA94 51; 310386 mE 6709330 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 122 Observer: ST

GDA94 51; 310341 mE 6709616 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 123 Observer: ST

GDA94 51; 310372 mE 6709953 mN Fire History: >5 years Landform: Creekline

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 124 Observer: ST

GDA94 51; 310381 mE 6710058 mN Fire History: >5 years Landform: Creekline

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Shrubland on a ridge Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 125 Observer: ST

GDA94 51; 310390 mE 6710110 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Shrubland on a ridge Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 126 Observer: ST

GDA94 51; 310288 mE 6710294 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 127 Observer: ST

GDA94 51; 310525 mE 6710423 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded

Date: 16/11/2021 Habitat Assessment #: 128 Observer: ST

GDA94 51; 310532 mE 6710098 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 129 Observer: ST

GDA94 51; 310517 mE 6709795 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 130 Observer: ST

GDA94 51; 310589 mE 6709490 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 131 Observer: ST

GDA94 51; 310618 mE 6709176 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 132 Observer: ST

GDA94 51; 310585 mE 6708855 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 133 Observer: ST

GDA94 51; 310596 mE 6708522 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 134 Observer: ST

GDA94 51; 310666 mE 6708180 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 135 Observer: ST

GDA94 51; 310697 mE 6707891 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 136 Observer: ST

GDA94 51; 310646 mE 6707583 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Eucalypt woodland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 137 Observer: ST

GDA94 51; 310693 mE 6707268 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Eucalypt woodland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 138 Observer: ST

GDA94 51; 310689 mE 6706991 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 139 Observer: ST

GDA94 51; 310680 mE 6706690 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 140 Observer: ST

GDA94 51; 310705 mE 6706438 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

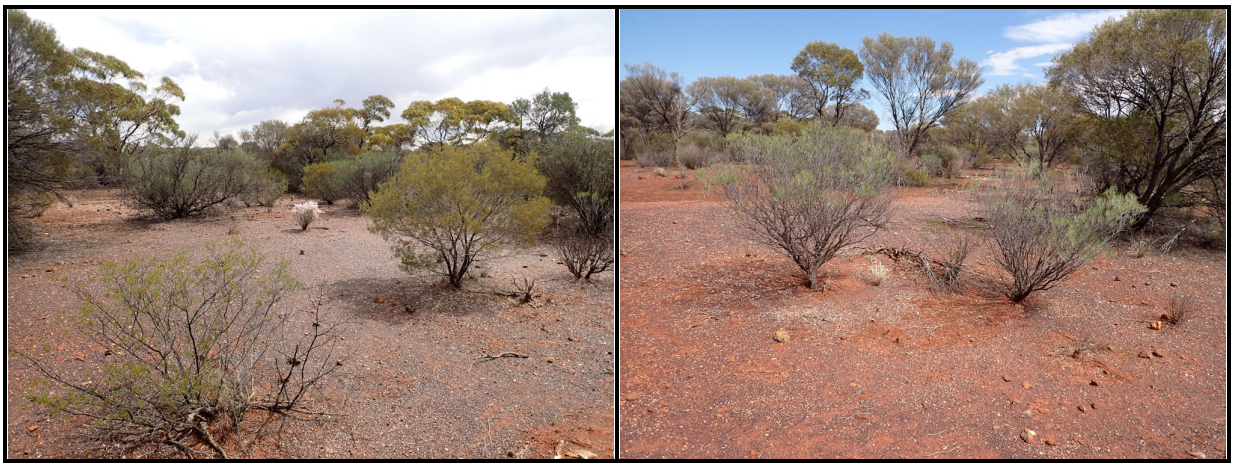
TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 141 Observer: ST

GDA94 51; 310925 mE 6706533 mN Fire History: >5 years Landform: Flat plain

Soil Type: Pebbles Surface: Clay with pebbles

Habitat Type: Eucalypt woodland Habitat Quality: Disturbed



Date: 16/11/2021 Habitat Assessment #: 142 Observer: ST

GDA94 51; 310889 mE 6706847 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 143 Observer: ST

GDA94 51; 310915 mE 6707178 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 144 Observer: ST

GDA94 51; 310862 mE 6707513 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 145 Observer: ST

GDA94 51; 310882 mE 6707846 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 146 Observer: ST

GDA94 51; 310809 mE 6708166 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 147 Observer: ST

GDA94 51; 310800 mE 6708503 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 148 Observer: ST

GDA94 51; 310820 mE 6708829 mN Fire History: >5 years Landform: Flat plain

Soil Type: Pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 149 Observer: ST

GDA94 51; 310773 mE 6709205 mN Fire History: >5 years Landform: Gentle slope

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 150 Observer: ST

GDA94 51; 310807 mE 6709504 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 151 Observer: ST

GDA94 51; 310748 mE 6709845 mN Fire History: >5 years Landform: Gentle slope

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 152 Observer: ST

GDA94 51; 310688 mE 6710169 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 153 Observer: ST

GDA94 51; 310710 mE 6710472 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 154 Observer: ST

GDA94 51; 310909 mE 6709873 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Completely degraded

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 155 Observer: ST

GDA94 51; 310962 mE 6709536 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

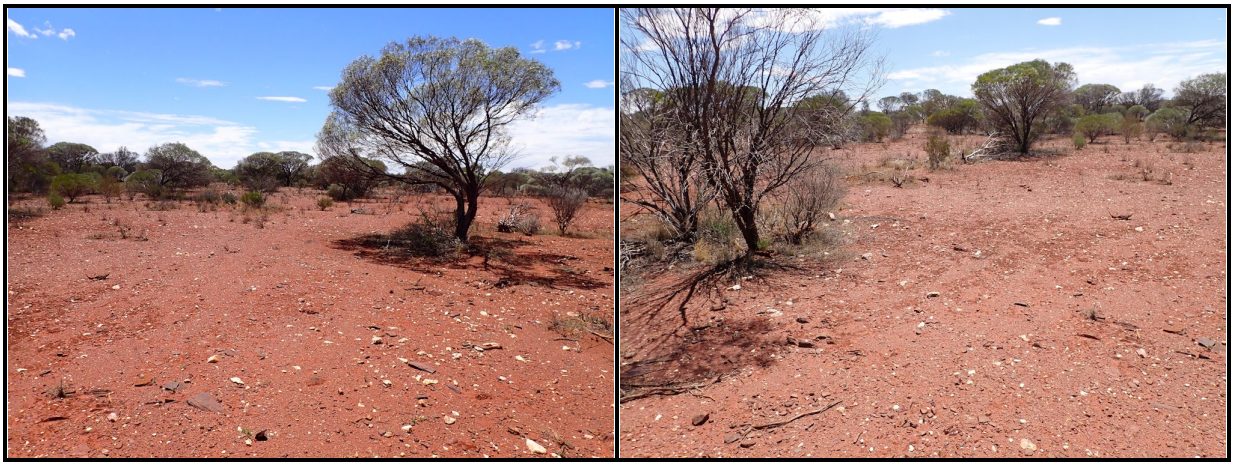
Habitat Type: Open shrubland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 156 Observer: ST

GDA94 51; 310949 mE 6709222 mN Fire History: >5 years Landform: Gentle slope

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Disturbed



TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 157 Observer: ST

GDA94 51; 310955 mE 6708892 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 158 Observer: ST

GDA94 51; 311015 mE 6708572 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 159 Observer: ST

GDA94 51; 311060 mE 6708195 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 160 Observer: ST

GDA94 51; 311041 mE 6707880 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 161 Observer: ST

GDA94 51; 311086 mE 6707552 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 162 Observer: ST

GDA94 51; 311103 mE 6707224 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Completely degraded

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 163 Observer: ST

GDA94 51; 311139 mE 6706902 mN Fire History: >5 years Landform: Waste dump

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Eucalypt woodland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 164 Observer: ST

GDA94 51; 311172 mE 6706810 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 165 Observer: ST

GDA94 51; 311124 mE 6706614 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Completely degraded

Date: 16/11/2021 Habitat Assessment #: 166 Observer: ST

GDA94 51; 311142 mE 6706362 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 167 Observer: ST

GDA94 51; 311316 mE 6706345 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 168 Observer: ST

GDA94 51; 311288 mE 6706528 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 169 Observer: ST

GDA94 51; 311560 mE 6706302 mN Fire History: >5 years Landform: Waste dump

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 170 Observer: ST

GDA94 51; 311573 mE 6706427 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 171 Observer: ST

GDA94 51; 311728 mE 6706268 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Completely degraded

Date: 16/11/2021 Habitat Assessment #: 172 Observer: ST

GDA94 51; 310535 mE 6706259 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Completely degraded

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 173 Observer: ST

GDA94 51; 310557 mE 6706004 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Eucalypt woodland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 174 Observer: ST

GDA94 51; 310749 mE 6706043 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 175 Observer: ST

GDA94 51; 310750 mE 6705631 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 176 Observer: ST

GDA94 51; 310993 mE 6705315 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 177 Observer: ST

GDA94 51; 310940 mE 6705623 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 178 Observer: ST

GDA94 51; 310945 mE 6705992 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 179 Observer: ST

GDA94 51; 310887 mE 6706197 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 180 Observer: ST

GDA94 51; 311174 mE 6706168 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 181 Observer: ST

GDA94 51; 311178 mE 6705869 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 182 Observer: ST

GDA94 51; 311178 mE 6705632 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 183 Observer: ST

GDA94 51; 311177 mE 6705366 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Eucalypt woodland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 184 Observer: ST

GDA94 51; 311374 mE 6705482 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 185 Observer: ST

GDA94 51; 311359 mE 6705713 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 186 Observer: ST

GDA94 51; 311399 mE 6706063 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 187 Observer: ST

GDA94 51; 311550 mE 6706060 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 188 Observer: ST

GDA94 51; 311524 mE 6705753 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 189 Observer: ST

GDA94 51; 311764 mE 6705614 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 190 Observer: ST

GDA94 51; 311730 mE 6705907 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 191 Observer: ST

GDA94 51; 311950 mE 6706211 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 192 Observer: ST

GDA94 51; 311973 mE 6705931 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 193 Observer: ST

GDA94 51; 312009 mE 6705704 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 194 Observer: ST

GDA94 51; 312175 mE 6705813 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

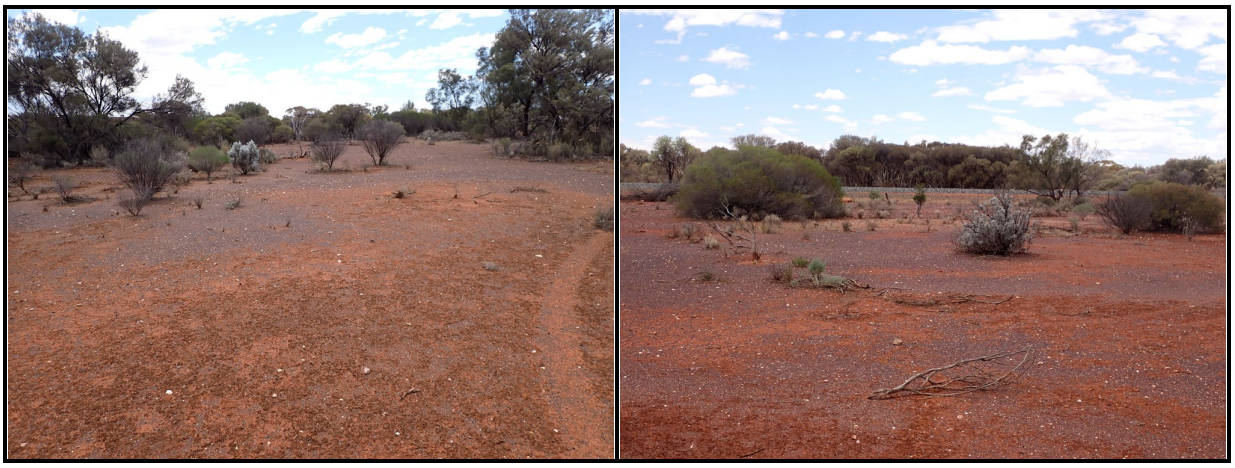
TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 195 Observer: ST

GDA94 51; 312306 mE 6705864 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good



Date: 16/11/2021 Habitat Assessment #: 196 Observer: ST

GDA94 51; 312156 mE 6706195 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 197 Observer: ST

GDA94 51; 311997 mE 6706376 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 198 Observer: ST

GDA94 51; 311986 mE 6706686 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 199 Observer: ST

GDA94 51; 311836 mE 6706866 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 200 Observer: ST

GDA94 51; 311889 mE 6707150 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Disturbed

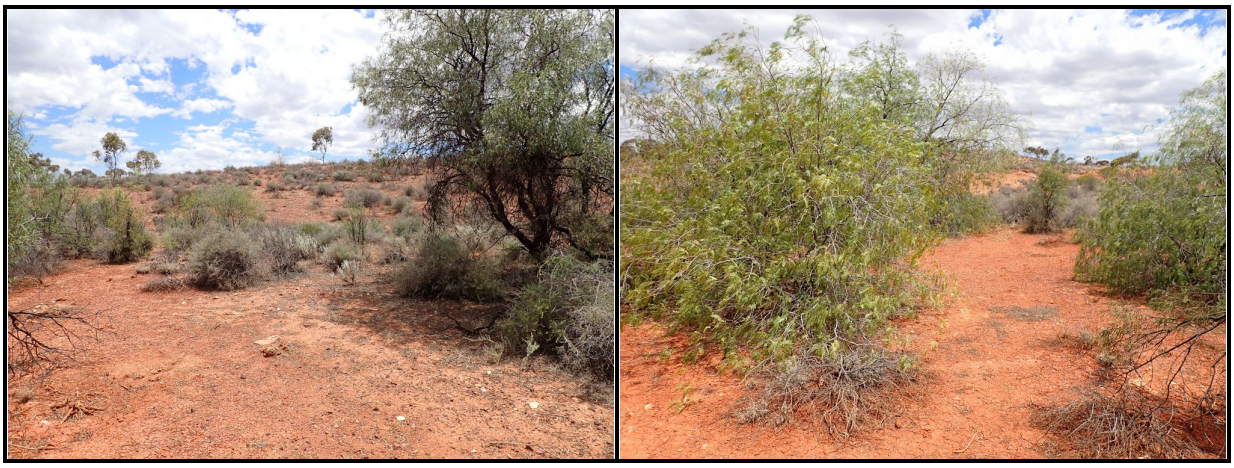
TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 201 Observer: ST

GDA94 51; 311617 mE 6707071 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Disturbed



Date: 16/11/2021 Habitat Assessment #: 202 Observer: ST

GDA94 51; 311458 mE 6707204 mN Fire History: >5 years Landform: Waste dump

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 203 Observer: ST

GDA94 51; 311287 mE 6707129 mN Fire History: >5 years Landform: Waste dump

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded

Date: 16/11/2021 Habitat Assessment #: 204 Observer: ST

GDA94 51; 311198 mE 6707424 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 205 Observer: ST

GDA94 51; 311288 mE 6707827 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 206 Observer: ST

GDA94 51; 311227 mE 6708166 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 207 Observer: ST

GDA94 51; 311225 mE 6708503 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 208 Observer: ST

GDA94 51; 311191 mE 6708819 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 209 Observer: ST

GDA94 51; 311191 mE 6708970 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 210 Observer: ST

GDA94 51; 311383 mE 6708405 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 211 Observer: ST

GDA94 51; 309624 mE 6712455 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

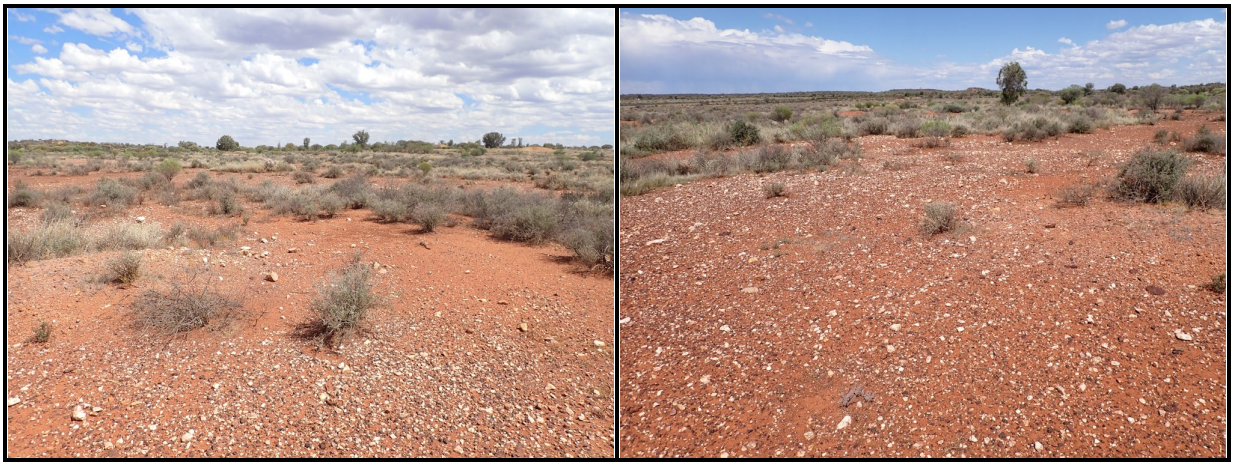
Habitat Type: Bushy shrubland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 212 Observer: ST

GDA94 51; 309652 mE 6712140 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good



TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 213 Observer: ST

GDA94 51; 309659 mE 6711838 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 214 Observer: ST

GDA94 51; 309708 mE 6711521 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 215 Observer: ST

GDA94 51; 309689 mE 6711211 mN Fire History: >5 years Landform: Creekline

Soil Type: Rock Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 216 Observer: ST

GDA94 51; 309749 mE 6710892 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Casuarina woodland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 217 Observer: ST

GDA94 51; 309723 mE 6710561 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

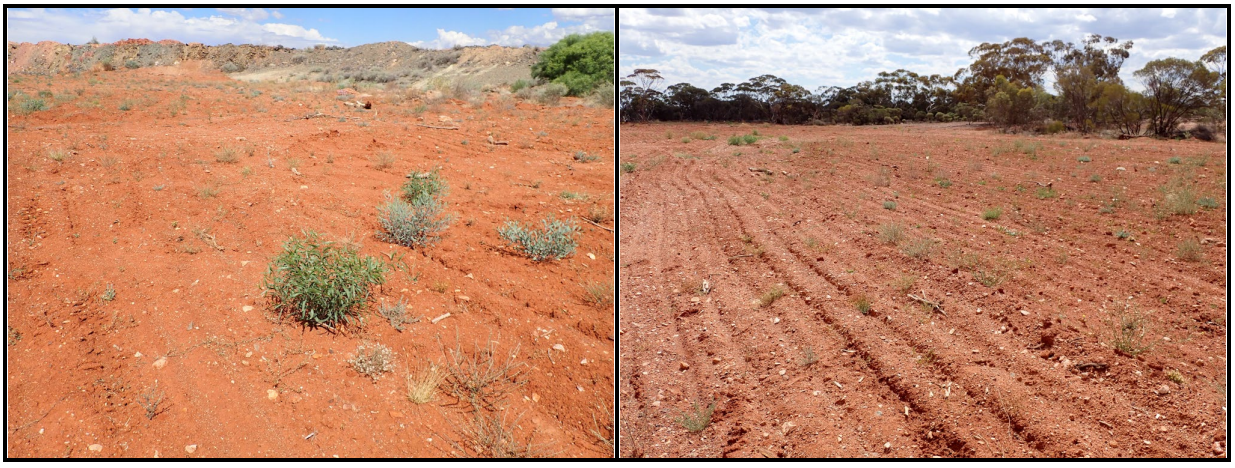
Habitat Type: Casuarina woodland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 218 Observer: ST

GDA94 51; 309770 mE 6710250 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded



TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 219 Observer: ST

GDA94 51; 309909 mE 6710431 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 220 Observer: ST

GDA94 51; 309882 mE 6710739 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 221 Observer: ST

GDA94 51; 309860 mE 6711045 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 222 Observer: ST

GDA94 51; 309849 mE 6711380 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 223 Observer: ST

GDA94 51; 309841 mE 6711699 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

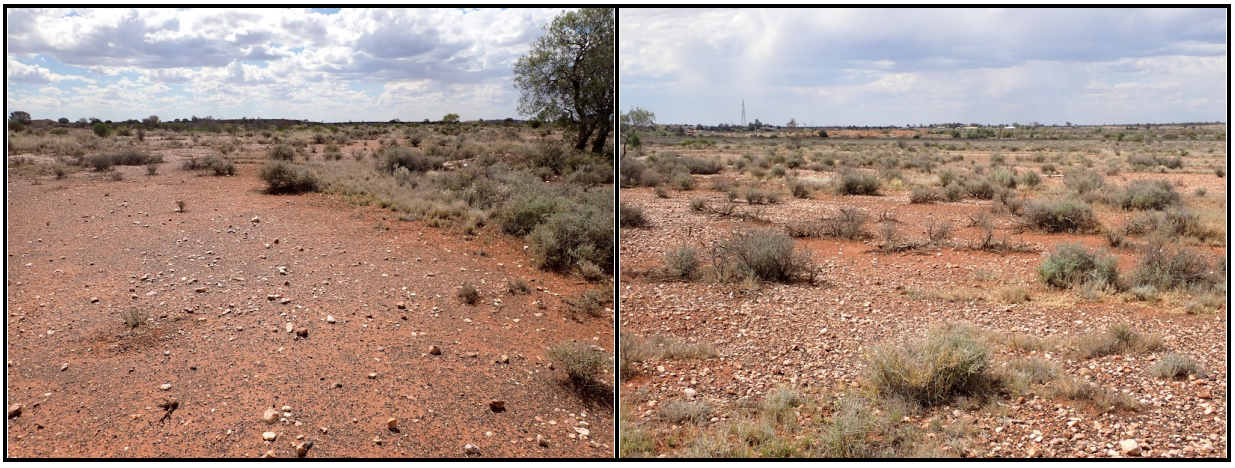
Habitat Type: Casuarina woodland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 224 Observer: ST

GDA94 51; 309787 mE 6712006 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Very good



TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 225 Observer: ST

GDA94 51; 309798 mE 6712292 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 226 Observer: ST

GDA94 51; 310030 mE 6711958 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 227 Observer: ST

GDA94 51; 310045 mE 6711605 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 228 Observer: ST

GDA94 51; 310100 mE 6711302 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 229 Observer: ST

GDA94 51; 310116 mE 6710984 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 230 Observer: ST

GDA94 51; 310135 mE 6710619 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Completely degraded

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 231 Observer: ST

GDA94 51; 310218 mE 6710339 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded

Date: 16/11/2021 Habitat Assessment #: 232 Observer: ST

GDA94 51; 310324 mE 6710524 mN Fire History: >5 years Landform: Gentle slope

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 233 Observer: ST

GDA94 51; 310275 mE 6710910 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 234 Observer: ST

GDA94 51; 310277 mE 6711265 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 235 Observer: ST

GDA94 51; 310261 mE 6711553 mN Fire History: >5 years Landform: Gentle slope

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 236 Observer: ST

GDA94 51; 310414 mE 6711147 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 237 Observer: ST

GDA94 51; 310500 mE 6710876 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 238 Observer: ST

GDA94 51; 310507 mE 6710536 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 239 Observer: ST

GDA94 51; 309474 mE 6711015 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 240 Observer: ST

GDA94 51; 309488 mE 6711312 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

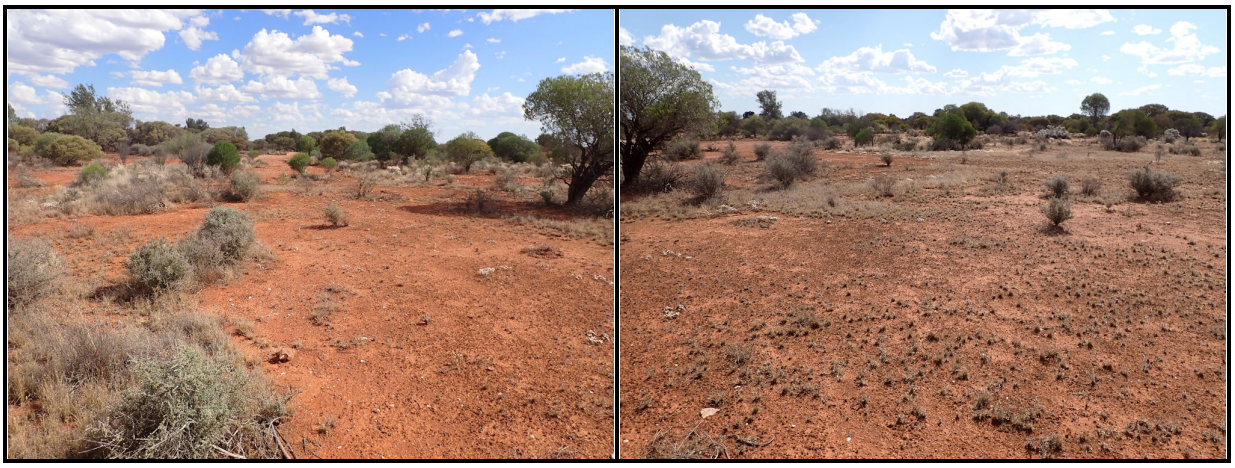
TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 241 Observer: ST

GDA94 51; 309439 mE 6711621 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Disturbed



Date: 16/11/2021 Habitat Assessment #: 242 Observer: ST

GDA94 51; 309410 mE 6712007 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good

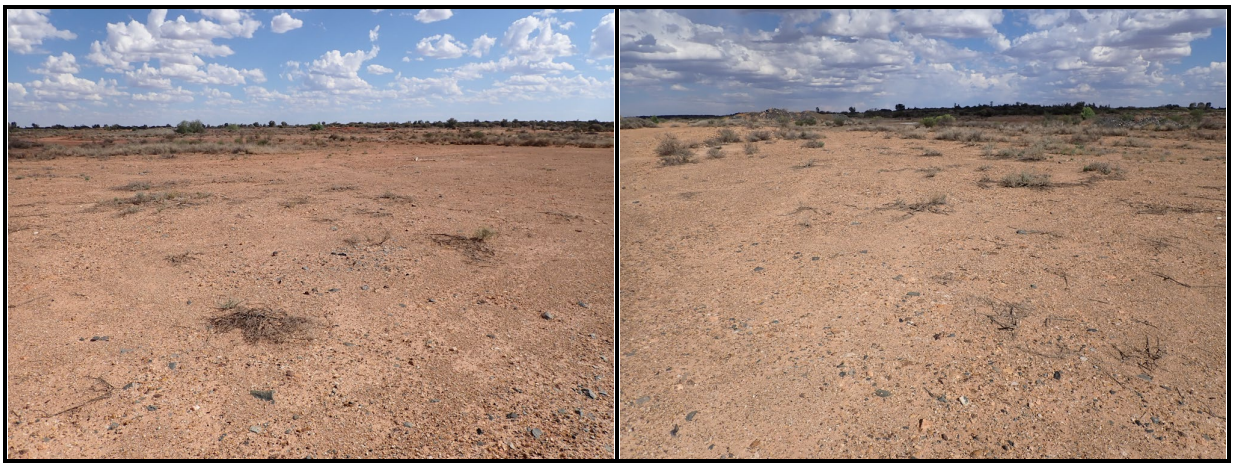
TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 243 Observer: ST

GDA94 51; 309212 mE 6712174 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded



Date: 16/11/2021 Habitat Assessment #: 244 Observer: ST

GDA94 51; 309212 mE 6712174 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 245 Observer: ST

GDA94 51; 309263 mE 6711822 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Completely degraded

Date: 16/11/2021 Habitat Assessment #: 246 Observer: ST

GDA94 51; 309306 mE 6711471 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Completely degraded

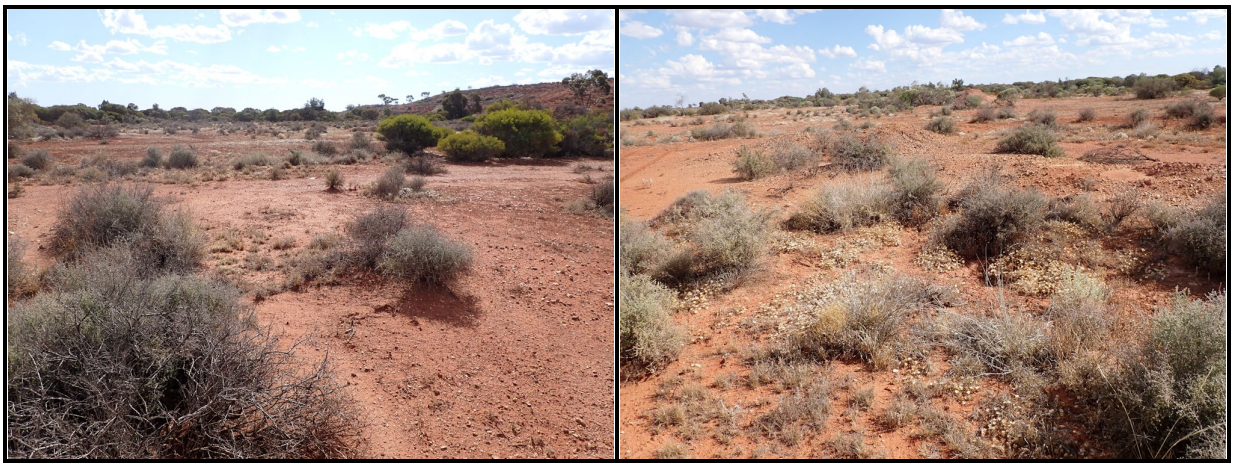
TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 247 Observer: ST

GDA94 51; 309024 mE 6711771 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Completely degraded

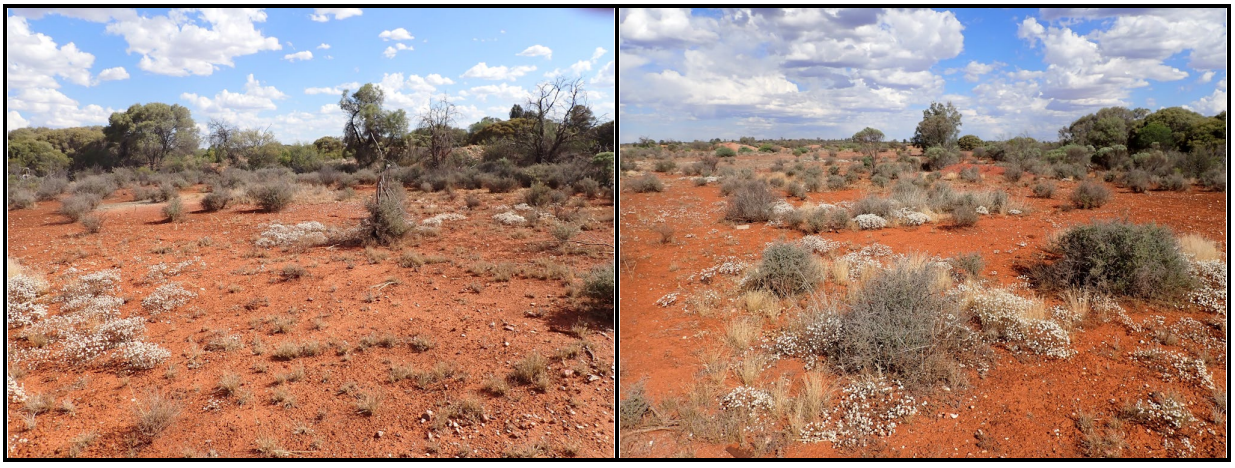


Date: 16/11/2021 Habitat Assessment #: 248 Observer: ST

GDA94 51; 308955 mE 6712090 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Disturbed



TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 249 Observer: ST

GDA94 51; 308829 mE 6712056 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Good

Date: 16/11/2021 Habitat Assessment #: 250 Observer: ST

GDA94 51; 308006 mE 6712820 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 251 Observer: ST

GDA94 51; 308195 mE 6712925 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

Date: 16/11/2021 Habitat Assessment #: 252 Observer: ST

GDA94 51; 308365 mE 6712960 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Very good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 253 Observer: ST

GDA94 51; 308359 mE 6713180 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 254 Observer: ST

GDA94 51; 308563 mE 6713218 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 255 Observer: ST

GDA94 51; 308778 mE 6713229 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 256 Observer: ST

GDA94 51; 308962 mE 6713107 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Open shrubland Habitat Quality: Good

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 257 Observer: ST

GDA94 51; 309158 mE 6712929 mN Fire History: >5 years Landform: Flat plain

Soil Type: Clay Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 258 Observer: ST

GDA94 51; 309314 mE 6712674 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Bushy shrubland Habitat Quality: Disturbed

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 259 Observer: ST

GDA94 51; 309058 mE 6712656 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Disturbed

Date: 16/11/2021 Habitat Assessment #: 260 Observer: ST

GDA94 51; 308912 mE 6712569 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded

TERRESTRIAL ECOSYSTEMS

Date: 16/11/2021 Habitat Assessment #: 261 Observer: ST

GDA94 51; 308691 mE 6712603 mN Fire History: >5 years Landform: Flat plain

Soil Type: Sand with pebbles Surface: Clay with pebbles

Habitat Type: Disturbed Habitat Quality: Completely degraded

TERRESTRIAL ECOSYSTEMS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