ALBURY HEATH & EURO MINING AREAS RECONNAISSANCE & TARGETED FLORA & LEVEL 1 FAUNA ASSESSMENT

PREPARED FOR: WESTGOLD RESOURCES LIMITED

Spectrum ECOLOGY

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Spectrum ECOLOGY

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EXECUTIVE SUMMARY

Westgold has recently acquired the lease for the Albury Heath Mining Area and holds the Euro Mining Area lease, both directly east of their Bluebird Mine. These mining areas are located 15 km south of Meekatharra and 640 km north-north-west of Perth, in the Murchison region of Western Australia.

Spectrum Ecology was commissioned to undertake a reconnaissance flora & vegetation and level 1 fauna assessment of the Albury Heath mining area (598 ha), Euro mining area (758 ha), and 22 km of associated Haul Roads (456 ha). The Survey Area totals 1,745 ha and excludes the overlap of the Haul Road into the Survey Areas. In addition to the Survey Area, Westgold requested a 5 km buffer be mapped for fauna habitats, the Study Area (34,387 ha). Based on the results of the reconnaissance assessment, a targeted flora assessment was undertaken for significant flora, in particular the Priority 1 species *Heliotropium mitchellii.*

The reconnaissance flora and level 1 fauna survey was conducted from the 9 to 12 of June by Senior Botanist Carmel Winton and Senior Zoologist Jesse Forbes-Harper. A total of 15 flora relevés and 23 fauna sites were sampled over the Survey Area. The targeted flora assessment was conducted from the 14 to 18 September by Senior Botanist, Carmel Winton and Botanist, Susan Murrey.

Thirty significant flora taxa were identified during the flora desktop assessment. None of these were previously recorded within the Survey Area and six were assigned a High likelihood of occurrence: *Eremophila retropila* (P1), *Calytrix verruculosa* (P3), *Ptilotus lazaridis* (P3), *Ptilotus luteolus* (P3), *Acacia speckii* (P4), and *Grevillea inconspicua* (P4).

There were no Threatened flora taxa recorded, or considered likely to occur, within the Survey or Study Areas. Three significant flora taxa were recorded within the Survey Area during the reconnaissance assessment: *Heliotropium mitchellii* (Priority 1), *Acacia speckii* (Priority 4), and *Grevillea inconspicua* (Priority 4). Three Priority flora were recorded within the Survey Area during the targeted assessment; *Heliotropium mitchellii* (Priority 1), *Calytrix verruculosa* (Priority 3) and *Grevillea inconspicua* (Priority 4).

The significant flora recorded during the assessment or assigned a High likelihood of occurrence during the desktop assessment, and considered to have high significance at a local and/or regional scale at the Survey Area prior to the targeted assessment and include: *Eremophila retropila* (P1) - High regional significance and *Heliotropium mitchellii* (P1) - High local and regional significance. Species Distribution Modelling (SDM) of these two taxa was conducted prior to the targeted survey to refine likelihood of occurrence and aid with survey direction. The targeted flora assessment primarily focussed on *Heliotropium mitchellii,* but all known significant flora taxa were included.

Five weed species were recorded within the Survey Area: **Bidens bipinnata*, **Cenchrus setiger*, **Malvastrum americanum*, **Ricinus communis*, and **Rumex vesicarius*. Weeds were recorded mostly as scattered clumps of plants in drainage areas or disturbed areas.

No Threatened Ecological Communities (TECs) were recorded or considered likely to occur within the Survey Area. Six PECs were returned from the database searches with the Trillbar and Yagahong Land Systems (both Priority 3) and assigned a High likelihood of occurrence. No vegetation types at the Survey Area resemble any known PEC communities.

Six vegetation types were mapped within the Survey Area of which two were considered to have high local and regional significance at the Survey Area:

- F3 *Tecticornia* sp. sparse samphire shrubland over *Aristida contorta*, *Diplachne fusca* subsp. *muelleri* sparse tussock grassland; recorded at two small locations of clay, on the Haul Road. *Tecticornia* communities are often considered significant, and
- F4: *Acacia aptaneura* tall isolated shrubs over *Micromyrtus sulphurea*, *Grevillea inconspicua* (Priority 4) low sparse shrubland over *Aristida contorta* sparse tussock grassland; recorded at one location of a small shale/rocky rise, on the Haul Road. This community was refuge for three significant flora: *Heliotropium mitchellii* (P1), *Grevillea inconspicua* (P3), and *Acacia speckii* (P4).

Four fauna habitat types were mapped at the Study Area: open plain, Mulga woodland, rock outcrop and cleared/developed. The desktop assessment identified the potential presence of 21 conservation significant fauna species, including one mammal, 16 birds, one reptile and three invertebrates. The fauna habitats recorded in the Survey Area form suitable habitat for five conservation significant vertebrate fauna species; Long-tailed Dunnart (*Sminthopsis longicaudata*), Grey Falcon (*Falco hypoleucos*), Fork-tailed Swift (*Apus pacificus*), Peregrine Falcon (*Falco peregrinus*) and West Coast Mulga Slider/ Meekatharra Slider (*Lerista eupoda*).

It is possible a population of Long-tailed Dunnart (*Sminthopsis longicaudata*) exists in the wider Study Area, but there is only a small area of potential foraging habitat within the proposed disturbance envelope of the Survey Area.

Mulga woodland habitat forms suitable habitat for the Meekatharra Slider (*Lerista eupoda*), particularly when leaf litter accumulates on loamy soils. This habitat type is common in the surrounding region and occurs only in small pockets within the Survey Area along drainage areas.

The remaining three conservation significant fauna species (Grey Falcon, Fork-tailed Swift, and Peregrine Falcon) are wide ranging bird species that are expected to only utilise the Survey Area occasionally to forage. No suitable nesting habitat was recorded within the Survey Area.

1. INTRODUCTION

1.1. Project Background

Westgold has recently acquired the lease for Albury Heath Mining Area and holds the Euro Mining Area lease, both directly east of their Bluebird Mine. These mining areas are located 15 km south of Meekatharra and 640 km north-north-west of Perth, in the Murchison region of Western Australia.

Spectrum Ecology was commissioned to undertake a reconnaissance flora & vegetation and level 1 fauna assessment of the Albury Heath mining area (Albury; 598 ha), Euro mining area (758 ha), and 22 km of associated Haul Roads (456 ha), the Survey Area (totalling 1,745 ha). In addition to the Survey Area, Westgold has requested a 5 km buffer be mapped for fauna habitats, the Study Area (34,387 ha; Map 1.1).

The objectives of a reconnaissance flora & vegetation, and level 1 fauna assessment are:

- To verify the information obtained from the desktop study and characterise the flora, vegetation, fauna, and fauna habitats present; and
- To clarify whether the Study Area may potentially support any significant flora, vegetation, fauna, or fauna habitats.

Following the results of the reconnaissance flora assessment a targeted flora assessment was recommended with a primary focus on Priority 1 taxon *Heliotropium mitchellii* which was identified as high local and regional significance prior to the targeted assessment. The targeted survey was designed using Species Distribution Modelling (SDM), where the areas showing high probability for potential habitat were prioritised.

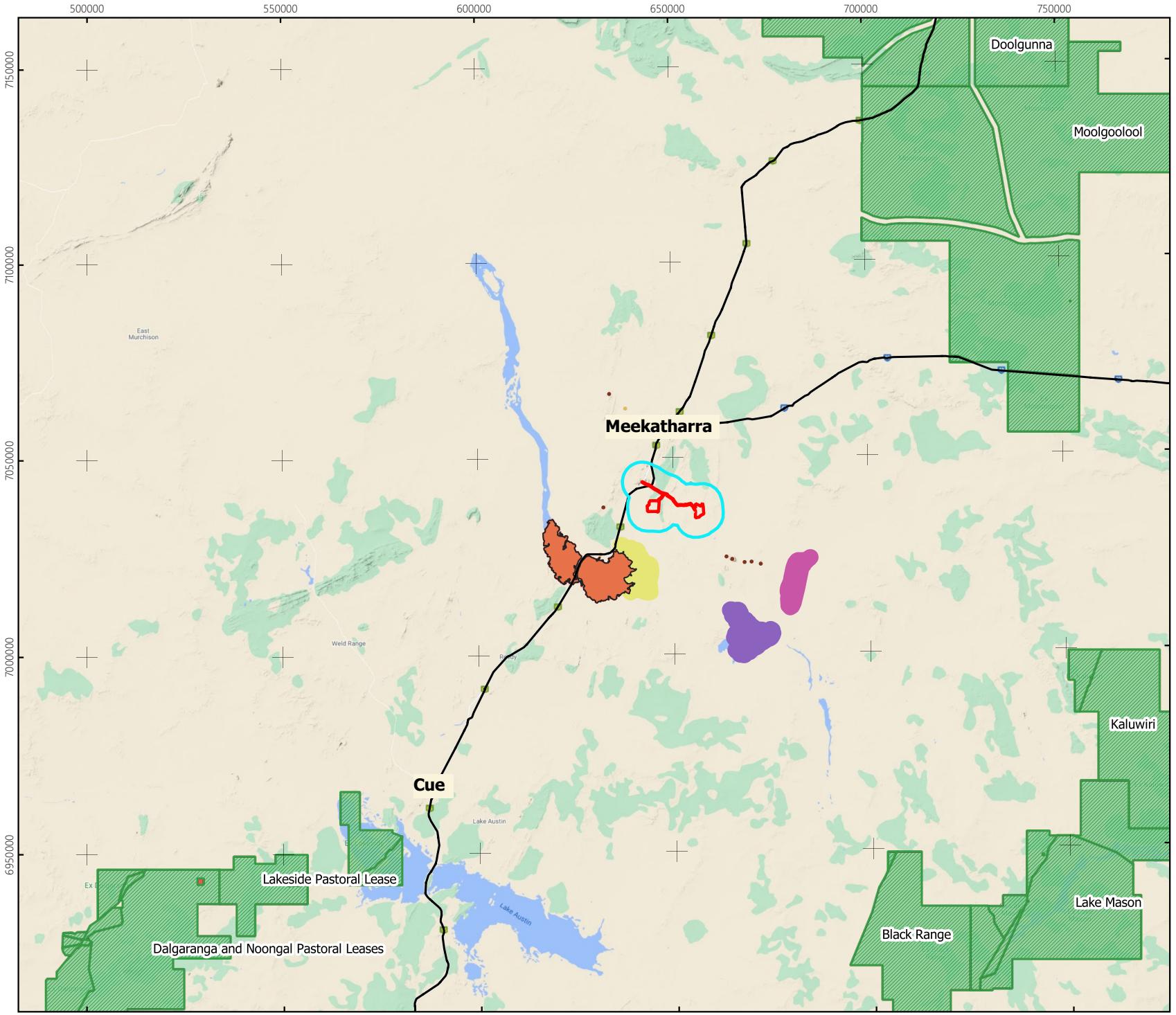
1.2. Legislation & Guidelines

Flora and fauna in Western Australia are protected by various legislation, including:

- *Biodiversity Conservation Act 2016* (BC Act, WA Gov, 2016);
- *Wildlife Conservation Act 1950* (WC Act, (WA Gov, 1950);
- *Environmental Protection Act 1986* (EP Act, (WA Gov, 1986); and
- *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act, (DoEE, 2016b).

The surveys are compliant with reconnaissance flora and vegetation and level 1 fauna survey guidelines, and consistent with relevant biological survey guidelines, including:

- Environmental Protection Authority (EPA) Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment (EIA) (EPA, 2016c);
- EPA Technical Guidance: Terrestrial Fauna Surveys (EPA, 2016d);
- EPA Technical Guidance: Sampling Methods for Terrestrial Vertebrate Fauna (EPA, 2016e).
- EPA Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA, 2002);
- EPA Environmental Factor Guideline: Flora and Vegetation (EPA, 2016b);
- Department of Biodiversity Conservation and Attractions (DBCA) Threatened and Priority Flora Report Form – Field Manual (DBCA, 2017);
- National Vegetation Information System (NVIS) Australian Vegetation Attribute Manual (ESCAVI, 2003);
- EPA Guidance Statement No. 56: Terrestrial Fauna Surveys for EIA in WA (EPA, 2004); and
- EPA & DEC Technical Guide: Terrestrial Vertebrate Fauna Surveys for EIA (EPA and DEC, 2010).



Legend

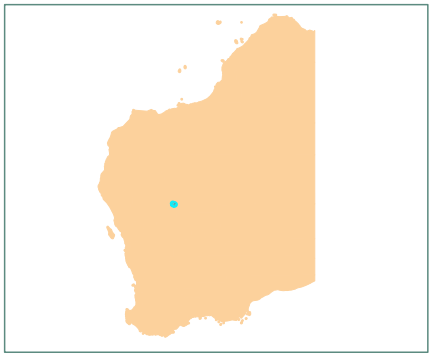
- Study Area
- Survey Area

Significant Lands

- Conservation Estate
- Environmentally Sensitive Areas - DWER 2019
- Directory of Important Wetlands

PECs

- AustinLS
- Hillview Calcrete
- Nowthanna Calcrete
- Polelle Calcrete
- Trillbar LS
- Yagahong LS



N

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Scale 1:1500000 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: AM

Date: 24-11-2020

Location of the Survey & Study Area

Albury Heath & Euro

Map 1.1

Prepared for
Westgold Pty Ltd

1.3. Bioregion & Climate

The Interim Biogeographic Regionalisation for Australia (IBRA) classifies Australia into regions based on dominant landscape, climate, lithology, geology, landform, and vegetation (Thackway and Cresswell, 1995).

The Study Area is situated in the Murchison IBRA region, which is characterised by low hills and mesas with vegetation consisting mainly of low Mulga woodlands. The Murchison is divided into the Eastern and Western Murchison subregions. The majority of the Study Area is located within the Western Murchison subregion with a 1 km section on the eastern side crossing over into the Eastern Murchison subregion (Figure 1.1).

The Western Murchison subregion features low Mulga woodlands, often rich in ephemeral flora species, on outcrops and finely textured Quaternary alluvial and eluvial surfaces of extensive hardpan wash plains, that dominate and characterise the subregion with mantling granitic and greenstone strata within the northern part of the Yilgarn Craton (McKenzie, May and McKenna, 2003). Surfaces associated an expansive occluded drainage system occur throughout the region with hummock grasslands on Quaternary sandplains, saltbush shrublands on calcareous soils, and *Tecticornia* low shrublands on saline alluvia (McKenzie, May and McKenna, 2003). The subregion contains the headwaters of the Murchison and Wooramel Rivers, which drain westwards to the coast.

The Murchison region has an arid climate with bimodal rainfall that usually falls in winter. Spatially averaged median rainfall is 201 mm per year (McKenzie, May and McKenna, 2003)

Figure 1.1: IBRA Classification of the Study Area

1.4. Disturbance History

The Eastern Murchison subregion is mainly used for grazing native pastures (96.2%), with lesser areas of Unallocated Crown Land (UCL), and Crown reserves (2.8%). Conservation lands constitute <0.1% of the subregion, with a significant proportion of conservation estate in the subregion falls outside the International Union for Conservation of Nature (IUCN) I-IV categories. Mining interest in nickel and gold mining in particular are considerable, however most mining leases still come under the pastoral lands act and as such are still required to be stocked (McKenzie, May and McKenna, 2003).

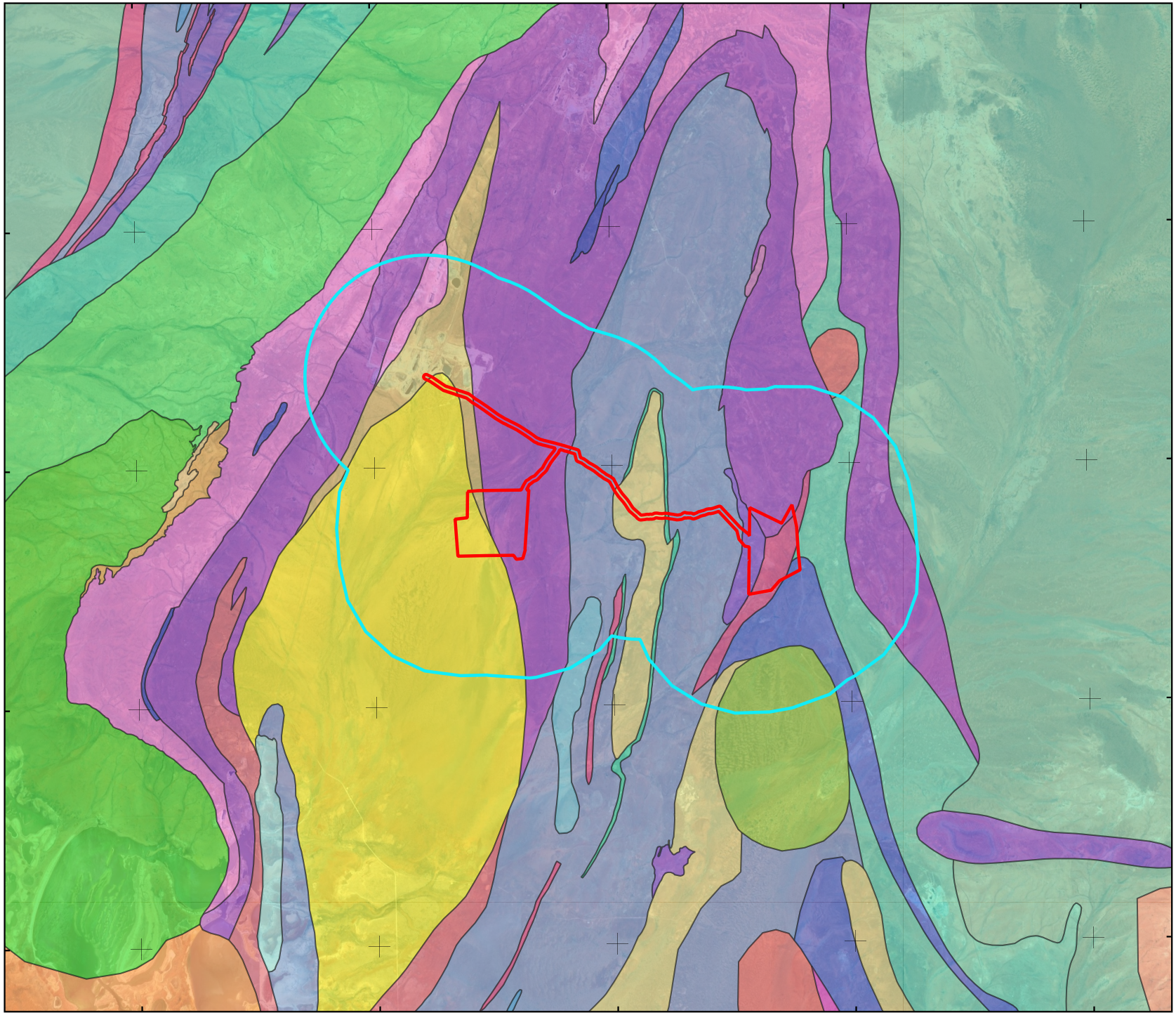
1.5. Geology

The surface geology of Western Australia (WA) has been mapped at a scale of 1:500,000 (DMIR, 2019). Fifteen units in total were mapped within the Study Area, of which 10 were mapped within the Survey Area (Table 1.1, Map 1.2). Thirteen of the 15 geological units present are located exclusively within 250 km of the Survey Area, with the exception of A-g-Y and A-mu-YYO which are very far ranging. Three of these units (A-ANrc-mg, A-PO-fa, and A-POgw-fa) are only recorded within 25 km of the Survey Area. One unit (A-PO-fa) is particularly restricted in WA with only 873 ha in total mapped across the state, but it does not occur in the Survey Area. The next most restricted units are A-POgw-fa and P_-sz-WAC with 6,132 and 5,110 ha mapped across WA, respectively. None of the geological units have over 4% of their total extent within the Survey Area.

Table 1.1: Surface Geology (1:500,000) Surface geology mapped at the Study Area and Survey Area compared with the extent in the state and bioregion. Geology can be indicative of species or vegetation distribution.

Code	Description	Area in Study Area (ha)	Study Area (%)	Area in Survey Area (ha)	Survey Area (%)	Area in WA (ha)	Area in Bioregion (ha)	Survey Area/WA Geology (%)
A-ANla-og	Gabbro; medium to coarse grained; local leucogabbro; metamorphosed.	1,747	5.1	9.5	0.5	11,902	11,902	<0.1
A-AN-mg	Metagranite, undivided; includes deeply weathered rock.	953	2.8	-	-	40,376	40,376	-
A-ANrc-mg	Metagranite, undivided; metamorphosed; includes deeply weathered rock.	6,637	19.3	305.2	17.5	20,641	20,641	1.5
A-g-Y	Granitic rock, undivided; metamorphosed.	4	0.0	-	-	23,777,556	6,800,987	-
A-JU-mgms	Foliated biotite metamonzogranite; minor metagranodiorite, metasyenogranite, and metapegmatite; fine to coarse grained; locally gneissic.	220	0.6	-	-	567,310	567,310	-

Code	Description	Area in Study Area (ha)	Study Area (%)	Area in Survey Area (ha)	Survey Area (%)	Area in WA (ha)	Area in Bioregion (ha)	Survey Area/WA Geology (%)
A-mu-YYO	Metamorphosed ultramafic rock, undivided; typically deeply weathered.	719	2.1	318.1	18.2	105,940	63,104	0.3
A-NO-b	Basaltic volcanic rock; metamorphosed.	1,648	4.8	61.7	3.5	15,778	15,778	0.4
A-NOm-mb	Metabasalt and metakomatiitic basalt.	1,180	3.4	-	-	35,948	35,948	-
A-NOy-cx	Banded iron-formation, jaspilite, chert, and shale with associated mafic rock; metamorphosed.	11,057	32.2	671.4	38.5	56,431	56,431	1.2
A-NOy-xf-cib	Felsic volcaniclastic rocks and banded iron-formation; local quartzite and felsic schist; widely intruded by layered gabbroic to peridotitic sills; metamorphosed.	1,260	3.7	25.7	1.5	123,858	110,223	0.0207
A-PO-fa	Andesitic volcanic rock; minor dacite; metamorphosed.	280	0.8	-	-	873	873	-
A-POg-f	Andesitic to rhyolitic volcanic and volcaniclastic rocks; widely intruded by layered mafic--ultramafic sills; weakly metamorphosed.	268	0.8	2.9	0.2	67,466	67,466	0.0043
A-POgw-fa	Volcaniclastic andesite; metamorphosed.	1,464	4.3	53.1	3.0	6,132	6,132	0.8659
A-POm-xb-f	Basalt and komatiitic basalt; minor felsic volcanic rocks; generally weakly metamorphosed.	6,523	19.0	131.2	7.5	193,966	193,966	0.0676
P_-sz-WAC	Unassigned siliciclastic rocks; sandstone, conglomerate, siltstone, and microbial laminate; commonly silicified and brecciated.	429	1.2	166.7	9.6	5,110	5,110	3.2622



Legend

- Study Area
- Survey Area

Geology

- A-ANla-og
- A-AN-mg
- A-ANrc-mg
- A-g-Y
- A-JU-mgms
- A-mu-YYO
- A-NO-b
- A-NOm-mb
- A-NOy-cx
- A-NOy-xf-cib
- A-PO-fa
- A-POg-f
- A-POgw-fa
- A-POm-xb-f
- P_-sz-WAC

N

0 2 4 6 8 km

Scale 1:250,000 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: AM

Date: 13-07-2020

Surface Geology (1:500,000)

Albury Heath & Euro

Map 1.2

Prepared for
Westgold Pty Ltd

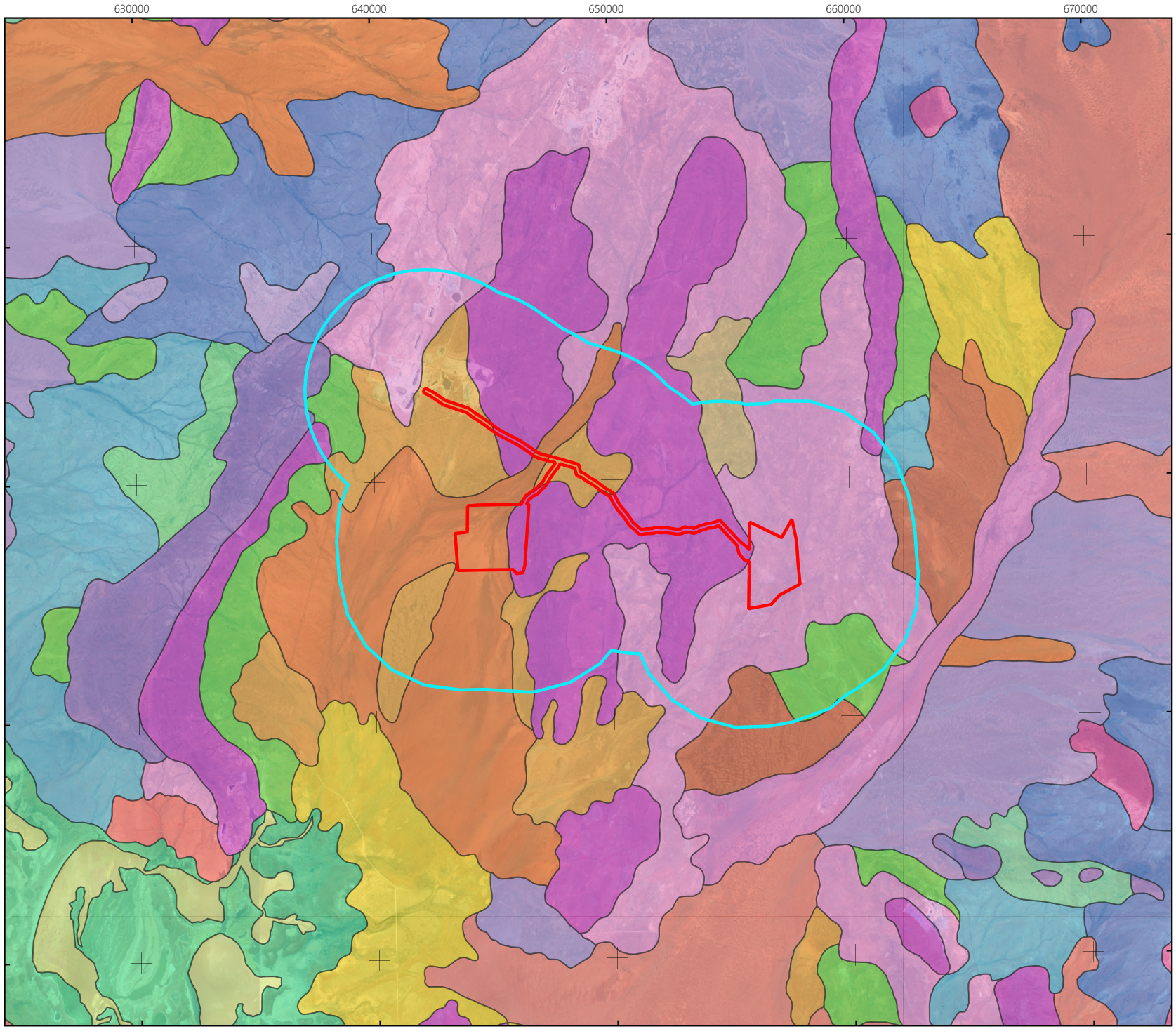
1.6. Land Systems

Ten land systems were mapped in the Study Area and four of these were mapped in the Survey Area (Table 1.2, Map 1.3). Eight of the Study Area land systems are well represented in the wider region, with Trillbar and Yagahong comprising the smallest areas at under 20,000 ha across the state. Yagahong is only known from the Murchison bioregion.

Table 1.2: Land Systems Land Systems mapped at the Study Area and Survey Area compared with the extent in the state and bioregion. Land Systems are mapped for a combination of geology and vegetation and can be indicative of restrictions in species or vegetation distribution.

Land System	Description	Area in Study Area (ha)	Area in Survey Area (ha)	Total Extent in WA (ha)	Total extent in bioregion (ha)	Location & Description of Occurrence
Gabanintha	Greenstone ridges, hills and footslopes supporting sparse acacia and other mainly non-halophytic shrublands.	9,704	442	251,519	165,078	Isolated and scattered across the Murchison and Yalgoo IBRA regions.
Jundee	Hardpan plains with variable gravelly mantles and minor sandy banks supporting weakly groved Mulga shrublands.	4,800	150	662,286	587,189	Scattered but widespread across the Murchison IBRA region with few instances in the Yalgoo and south eastern Gascoyne regions.
Koonmarra	Sandy hardpan plains and broad drainage zones supporting groved Mulga shrublands and wanderrie grasses.	80	-	563,654	537,246	Widespread isolated occurrences over the north western section of the Murchison IBRA region.
Sherwood	Quartz-strewn stony plains and low rises with outcropping granite, gneiss, and schist, supporting scattered Mulga shrublands and other mainly non-saline shrubs.	131	-	1,574,754	1,498,265	Widespread across the majority of the Murchison IBRA region.
Trennaman	Flat hardpan wash plains with mantles of small pebbles and gravels; supporting groved Mulga shrublands and occasional wanderrie grasses.	929	-	81,200	55,354	Small and isolated occurrences across some of the north western Murchison and south western Gascoyne IBRA regions.
Trillbar	Breakaways, kaolinised footslopes and extensive gently sloping plains on granite supporting Mulga shrublands and minor halophytic shrublands.	603	-	19,376	14,142	Very few (<10) isolated occurrences in the Murchison and Gascoyne border and central Murchison IBRA regions.

Land System	Description	Area in Study Area (ha)	Area in Survey Area (ha)	Total Extent in WA (ha)	Total extent in bioregion (ha)	Location & Description of Occurrence
Violet	Gently sloping stony plains with low rises of metamorphic rocks and gilgaied drainage foci; supporting shrublands of snakewood, Mulga, bluebush, and samphire with patches of tussock grassland.	1,891	-	548,625	522,249	Scattered and widespread throughout most of the Murchison and some of the Yalgoo IBRA regions.
Wiluna	Gently undulating gravelly plains on greenstone, laterite, and hardpan, with low stony rises and minor saline plains; supporting groved Mulga and bowgada shrublands and occasionally Chenopod shrublands.	10,525	589	260,027	253,911	Large scattered occurrences across the central Murchison and a few in Yalgoo IBRA subregions.
Yagahong	Low greenstone hills with occasional lateritic breakaways and broad stony slopes, lower saline stony plains, and broad drainage tracts; supporting sparse Mulga and other acacia shrublands with patches of halophytic shrubs.	190	-	16,551	16,551	Small number of medium sized occurrences surrounding the Study Area in the Murchison IBRA region.
Yandil	Hills, ranges and small plateaux on slate and basalt with cobble strewn footslopes supporting stunted Mulga shrublands.	5,535	564	495,976	467,611	Very large and clumped occurrences across most of the northern Murchison IBRA Region.



Legend

Study Area

Survey Area

Land Systems

- Gabanintha Land System
- Jundee Land System
- Koonmarra Land System
- Sherwood Land System
- Trennaman Land System
- Trillbar Land System
- Violet Land System
- Wiluna Land System
- Yagahong Land System
- Yandil Land System

N

0 2 4 6 8 km

Scale 1:250,000 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: AM

Date: 13-07-2020

Land Systems

Albury Heath & Euro

Map 1.3

Prepared for
Westgold Pty Ltd

1.7. Vegetation

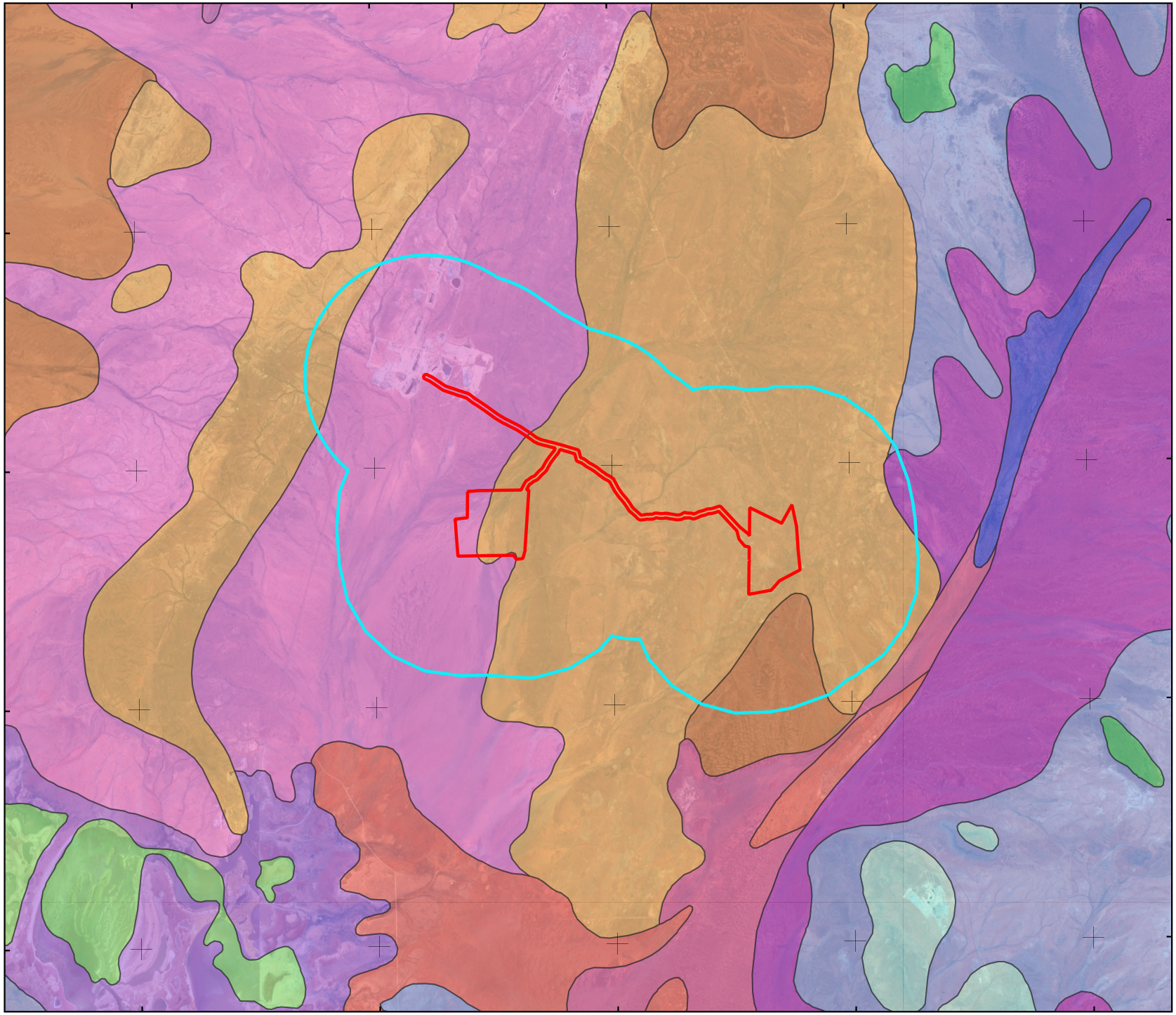
Pre-European vegetation mapping was originally undertaken by Beard at various scales across the state and has since been updated to be consistent with NVIS descriptions at a scale of 1:250,000 (DPIRD, 2019).

Five vegetation sub-associations have been mapped within the Study Area, of which three are mapped within the Survey Area. (Table 1.3, Map 1.4).

State-wide vegetation statistics are available for these units which list pre-European extent, current extent, area in DBCA managed lands etc., and is a useful tool to determine if a vegetation community is rare or otherwise significant (Govt WA, 2019). All of the Beard sub-associations mapped within the Study Area have over 99% of their pre-European extent remaining and none are restricted throughout Western Australia.

Table 1.3: Beard Vegetation Associations Broad vegetation mapped at the Study Area and Survey Area compared with the extent in the state and extent un-cleared from pre-European impacts. Beard vegetation can be indicative of unique vegetation systems or distribution.

#	NVIS Level VI Vegetation Description	Area in Study Area (ha)	% of Study Area	Area in Survey Area (ha)	% of Survey Area	Pre-European WA (ha)	Current Extent WA (ha)	% Remaining	% of Current Extent in DBCA Land
18.0	*Acacia aneura* low woodland	10	<0.1	-	-	5,615,290	5,596,662	99.7	0.8
18.2 (mosaic)	*Acacia aneura* low woodland, over *Eremophila fraseri, Eremophila foliosissima* tall open shrubland *Acacia aneura* low woodland, over *Eremophila spathulata, Eremophila sp. aff. compacta* tall open shrubland *Acacia aneura* low woodland, over *Acacia granitica, Eremophila forrestii* tall open shrubland	12,668	36.8	357	20.4	1,901,789	1,897,254	99.8	0.0
29.0	*Acacia aneura* mid isolated shrubs	1,468	4.3	-	-	3,530,296	3,529,425	100.0	<0.1
29.1	*Acacia aneura* low open woodland, over *Eremophila fraseri, Senna* sp. mid sparse shrubland, over *Maireana pyramidata, Maireana georgei, Maireana triptera* low open shrubland	236	0.7	-	-	779,382	779,188	100.0	0.0
39.1	*Acacia aneura, Acacia quadrimarginea, Acacia ramulosa var. linophylla* tall open shrubland, over *Ptilotus obovatus* low open shrubland	20,005	58.2	1,389	79.5	411,827	410,748	99.7	0.0



Legend

- Study Area
- Survey Area

Beard Vegetation

- 18.0
- 18.2
- 29.0
- 29.1
- 39.1

N

0 2 4 6 8 km

Scale 1:250,000 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: AM

Date: 13-07-2020

Beard Vegetation Associations

Albury Heath & Euro

Prepared for
Westgold Pty Ltd

Map
1.4

1.8. Significant Lands

1.8.1. Conservation Estate & Environmentally Sensitive Areas

The Western Australian conservation estate includes land and waters vested in the Conservation and Parks Commission under the Conservation and Land Management Act (1984). The conservation estate is generally managed by the Parks and Wildlife Service of DBCA to protect Western Australia's biodiversity, and includes National Parks, Nature Reserves, Conservation Reserves and other areas managed primarily for biodiversity conservation (DoEE, 2016a).

No conservation estate occurs within or in the vicinity of the Survey Area. The closest known conservation estate to the Survey Area is ex-Lakeside (107 km south-west), and the ex-Moolgoolool Pastoral Leases (112 km north-east).

1.8.2. Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESA) that are associated with flora and vegetation are areas that are defined by the Department of Water and Environmental Regulation (2019) as:

- A defined wetland and the area within 50 m of a wetland;
- The area covered by vegetation within 50 m of Threatened flora, to the extent to which the vegetation is continuous with the vegetation in which the Threatened flora is located;
- The area covered by a TEC;
- A Bush Forever site;
- Areas covered by the Gnangara Mound Crown Land Policy and Western Swamp Tortoise Policy; and
- Areas covered by lakes, wetlands, and fringing vegetation of the Swan Coastal Plain Lakes Policy, including South West Agricultural Zone Wetlands Policy and Swan and Canning Rivers Policy.

There is one ESA located approximately 15 km south-west of the Survey Area, Lake Annean (also known as Lake Nannine).

1.8.3. Australian Wetlands Database

The Australian Wetlands Database includes nationally significant wetlands (as listed in the directory of important wetlands), wetlands listed under the Ramsar convention, wetlands that are representative, rare or unique, or wetlands that are considered of international importance (DoEE, 2019).

Lake Annean is also listed in the directory of important wetlands as a nationally significant wetland.

2. METHODS

2.1. Project Team & Licences

Spectrum Ecology staff involved with this assessment are listed in Table 2.1, along with their role, years of experience and relevant licences.

Table 2.1: Project Team & Licences

Staff	Role	Experience	Licences
Carmel Winton	Senior Botanist – reconnaissance & targeted team lead & reporting	6 years	FB62000134
Jesse Forbes-Harper	Senior Zoologist – level 1 field survey & reporting	5 years	BA27000267
Aleksa Marinovic	Botanist – reconnaissance flora reporting	1 years	-
Susan Murrey	Botanist – targeted field survey & reporting	2 years	FB62000101-1b
Melissa Hay	Principal Botanist – reporting	14 years	-
Tim Hammer	Senior Botanist/Taxonomist – plant identification	5 years	FB62000124

2.2. Field Survey Timing

2.2.1. Reconnaissance Flora & Level 1 Fauna Assessment

The reconnaissance field survey was conducted from 9 to 12 June by Senior Botanist, Carmel Winton and Senior Zoologist, Jesse Forbes-Harper (eight person days).

Rainfall preceding a field survey influences the number and type of flora and fauna species recorded during the study. To characterise the prevailing conditions of the survey, monthly rainfall data was sourced from the nearest Bureau of Meteorology (BOM) station (Meekatharra Airport BOM station #007045), for the 12 months prior to the survey (June 2019 to May 2020) and compared to the median rainfall (1944-2020) (BOM, 2020). This is displayed in Figure 2.1.

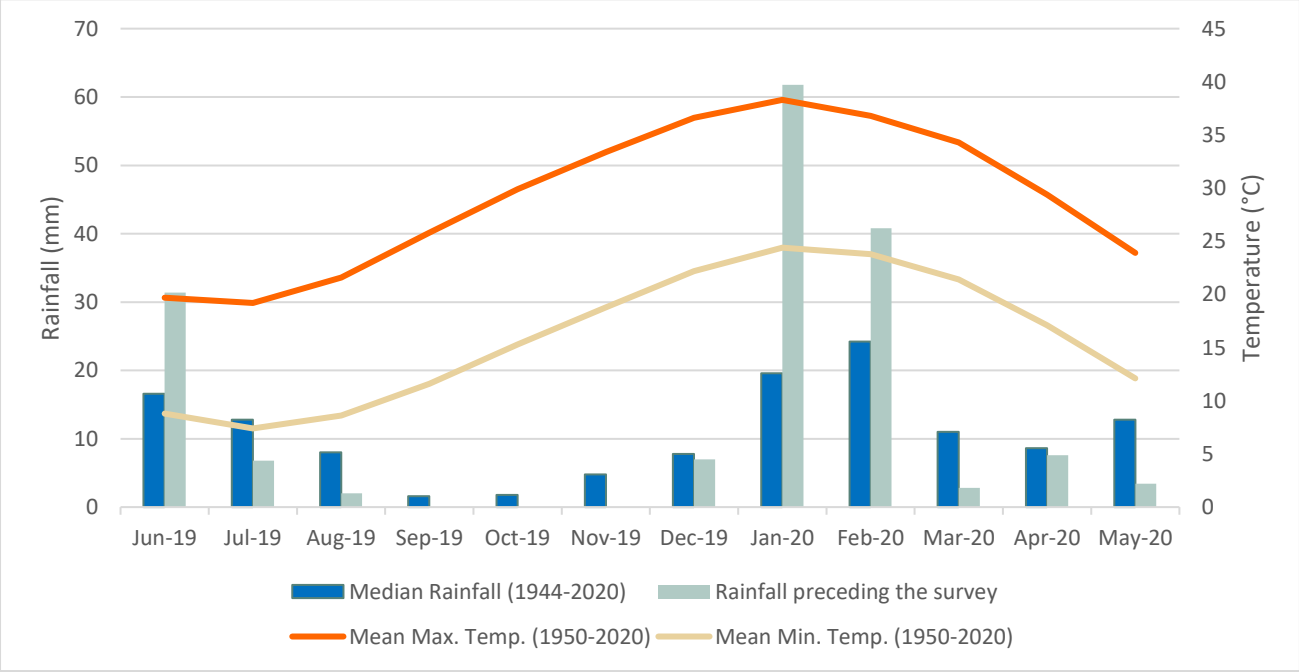


Figure 2.1: Rainfall 12 Months Preceding the Reconnaissance/Level 1 Assessment at Meekatharra Airport

The following rainfall was recorded at Meekatharra:

- In the 12 months preceding the reconnaissance field survey (June 2019 to May 2020), 163.6 mm of rainfall was recorded, which is 33.6 mm more than the sum of the long-term median of 130 mm;
- The wet season prior to the reconnaissance survey (January 2020 - March 2020), made up more than 64% of rainfall recorded in the 12 months prior to the field survey, with 105.4 mm of rainfall. This is 50.6mm higher than the sum of the long-term median for the same three months (54.8 mm)

The Murchison Bioregion is considered part of the Eremaean Botanical province and recommendations are to conduct biological surveys 6-8 weeks after the wet season from March to June (EPA, 2016c, EPA, 2016d). The reconnaissance field survey was conducted in accordance with EPA recommended timing, with sufficient rainfall activity prior to the survey (BOM, 2020).

2.2.2. Targeted Flora Assessment

The targeted flora survey was conducted from 14 to 18 September 2020. The ideal timing for undertaking a flora survey in the Murchison IBRA region is six to eight weeks following summer rainfall (March to June) (EPA, 2016c). The field survey therefore occurred following sub-optimal conditions for plant growth and flowering times for the region, however as the assessment was a targeted survey, appropriate survey timing is associated with being able to detect and identify the target species. Available identification information for each target species is summarised in Table 2.2, including flowering times and examples of persistent distinguishing vegetative characters used. All significant flora searched for during the targeted field survey were perennial and able to be identified during the survey timing.

Table 2.2: Target Species Phenology & Distinguishing Characters

Status	Species	Longevity	Lifeform	Flowering Time	Important Distinguishing Vegetative Characters	Detectability in Survey
P1	*Eremophila retropila*	Perennial	Shrub	August to September	Type of hairs on the branches	Yes
P1	*Heliotropium mitchellii*	Perennial	Shrub	May to June	Hair types on the leaves, branchlets and fruits	Yes
P3	*Calytrix verruculosa*	Perennial	Shrub	August to October	Distinctive stem, leaf, and foliar bud characters	Yes
P3	*Ptilotus lazaridis*	Perennial	Shrub	July to October	Uniquely rigid shrub with divaricately branching stems	Yes
P3	*Ptilotus luteolus*	Perennial	Shrub	No data available	Leaf shape and size, as well as type and colour of indumentum on leaves and stems	Yes
P4	*Acacia speckii*	Perennial	Shrub	No data available	Phyllode size, shape, and venation	Yes
P4	*Grevillea inconspicua*	Perennial	Shrub	June to August	Leaf shape, size, colour and degree of deflexion	Yes

2.2.3. Targeted Flora Survey Plan

A Survey Plan was submitted to Flora Administrative Officer, Jessica Donaldson at the DBCA Species and Communities Branch for comment on the 27 August 2020, three weeks prior to mobilisation. Correspondence communicating acceptance of the survey timing and approach was received by Cheyne Mann on 16 September 2020.

2.3. Significant Flora, Vegetation & Fauna Definitions

Significant flora can include (EPA, 2016b):

- Being identified as Threatened: Critically Endangered, Endangered, or Vulnerable (state listed BC Act and/or nationally listed EPBC Act);
- Being identified as Priority Flora species: Priority 1 to 4, provided in Appendix A (DBCA, 2019);
- Locally endemic or association with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems);
- New species or anomalous features that indicate a potential new species;
- Representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- Unusual species, including restricted subspecies, varieties or naturally occurring hybrids; or
- Relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

Significant vegetation can include (EPA, 2016b):

- Threatened Ecological Community (TEC): Critically Endangered, Endangered or Vulnerable (state listed BC Act and/or nationally listed EPBC Act);
- Priority Ecological Community (PEC): Priority 1 to 5 (DBCA, 2020);
- Restricted distribution;
- Degree of historical impact from threatening processes;
- A role as a refuge; or
- Providing an important function required to maintain ecological integrity of a significant ecosystem.

Significant fauna can include (EPA, 2016a):

- Being identified as a Threatened or Priority species;
- Species with restricted distribution;
- Degree of historical impact from threatening processes; or
- Providing an important function required to maintain the ecological integrity of a significant ecosystem.

2.4. Introduced Flora & Declared Plant Categories

The Department of Primary Industries and Regional Development (DPIRD) keeps a database of organisms that are declared pests in Western Australia. This database is regulated under the Biosecurity and Agricultural Management (WA Gov, 2007). The legal status and control requirements for these environmentally significant weeds are provided in Appendix A.

2.5. Nomenclature

2.5.1. Flora

Flora nomenclature used in this report is consistent with the DBCA Census of Western Australian Plants database, provided through Florabase (WAH, 2020). All species are current at the time of report preparation.

2.5.2. Fauna

Nomenclature for mammals, birds, reptiles, and amphibians followed the Western Australian Museum Checklist of the Vertebrates of Western Australia (October 2019). Fauna species identifications were

completed based on information provided in references listed in Table 2.3. Nomenclature for SRE invertebrates is based on data provided by WA Museum and relevant experts.

Table 2.3: References Used for Identification of Fauna Species

Fauna	Survey Technique
Mammals	Churchill (2009), Menkhorst and Knight (2001), Van Dyck and Strahan (2008)
Birds	Menkhorst et. al. (2019)
Reptiles & Amphibians	Wilson and Swan(2017), Cogger (2014), Tyler and Doughty (2009)

2.6. Desktop Assessment

2.6.1. Biological Database Searches

A desktop review of all relevant and available biological data sources was undertaken prior to the field survey to assess the flora, vegetation, and fauna likely to occur in the Study Area (Table 2.4)

Table 2.4: Database Searches

Data Source	Custodian	Details
Commonwealth Protected Matter Search Tool (PMST)	Department of the Environment and Energy (DoEE)	Buffer: 40 km Centre Point: -26.78611, 118.48694
NatureMap	Department of Parks and Wildlife (DPaW) / Western Australian Museum (WAM)	Buffer: 40 km Centre Point: 118°29'13''E, 26°47'10''S
DBCA Threatened & Priority Flora Databases (TPFL / WA Herbarium)	DBCA	Buffer: 60 km Reference: 30-0520FL
DBCA Communities Database	DBCA	Buffer: 20 km Reference: n/a
DBCA Threatened Fauna Database	DBCA	Buffer: 60 km Reference: 2020/000669 #6346
Invertebrate Fauna Databases	WAM	Arachnida & Myriapoda/ Mollusca/ Crustacea: 19/05/2020 Buffer: 40 km
Index of Biodiversity Surveys and Assessments (IBSA) Database	Department of Water and Environmental Regulation (DWER)	Buffer: 50 km

2.6.2. Previously Conducted Biological Assessments

Previously conducted biological assessments within 70 km of the assessment are listed in Table 2.5.

Table 2.5: Previously Conducted Assessments within 70 km of the Study Area.

Source	Survey Type	Author
Nannine Reconnaissance Flora & Vegetation & Level 1 Fauna Assessment	Reconnaissance & Level 1	Spectrum Ecology (2020) for Westgold Resources Ltd
Gabanintha Vanadium Project Reconnaissance Flora & Vegetation Survey	Reconnaissance	Biologic Environmental Survey (2018b) for Technology Metals Australia Ltd.
Gabanintha Vanadium Project Targeted Vertebrate Fauna & SRE Assessment	Level 1 & Targeted	Biologic Environmental Survey (2018a) for Technology Metals Australia Ltd.
Jack Hills Expansion Project Vertebrate Fauna Assessment	Level 2, 2 Phase	*ecologia* Environment (2009a) for Crosslands Resources Ltd
Jack Hills Mine Expansion – SRE Invertebrate Report	Level 2	*ecologia* Environment (2009b) for Crosslands Resources Ltd
Weld Range Vertebrate Fauna Assessment	Level 2, 4 Phase	*ecologia* Environment (2009d) for SMC Pty Ltd
Weld Range Iron Ore Project SRE Assessment	Level 2	*ecologia* Environment (2009c) for SMC Pty Ltd

Source	Survey Type	Author
A Vertebrate Fauna Survey of the Jack Hills Project Area	Level 2, 2 Phase	MBS Environmental (2005) for Murchison Metals Ltd

2.6.3. Likelihood of Occurrence Assessment

The following information was collated for each significant flora/fauna taxon or vegetation community identified during the desktop assessment:

- Conservation status (EPBC Act, WC Act, DBCA listing);
- Description of species and flowering period (flora only);
- Description of habitat requirements and presence within the Survey (flora) and Study (fauna) Areas;
- Source of record (DBCA, previous report etc.); and
- Distance of record to the Project.

A likelihood of occurrence assessment was conducted using the criteria listed in Table 2.6. This included assessing the distance of the record from the project (historical database records considered not accurate were excluded if required), presence of appropriate habitats within the project (using land systems, geology, vegetation mapping, and/or aerial imagery), and the age of the record (fauna only).

Table 2.6: Likelihood of Occurrence Assessment Criteria for conservation significant flora and fauna identified in the database searches within 70 km of the Study Area.

Likelihood	Flora & Vegetation	Fauna
Recorded	Species or vegetation community accurately recorded within the Survey Area during the literature review (includes TEC/PEC buffers that intersect).	Species recorded within the Study Area within the previous ten years.
High	Species or vegetation community recorded near the Survey Area, and suitable habitat does, or is likely, to occur.	Species recorded within or near the Study Area within the previous 20 years. Suitable habitat occurs in the Study Area.
Medium	Species or vegetation community recorded outside the Survey Area but within 20 km and suitable habitat may occur.	Species recorded within or in proximity to the Study Area more than 20 years ago. Species recorded outside the Study Area but within 40 km. Suitable habitat occurs in the Study Area.
Low	Species or vegetation community rarely or not recorded within 40 km of the Survey Area and suitable habitat does not likely occur within the Survey Area.	Species rarely or not recorded within 40 km of the Study Area. Suitable habitat does not occur within or in proximity to the Study Area.
Very Low	n/a	Species not recorded within 40 km despite multiple recent surveys. Suitable habitat does not occur within the Study Area. Species considered locally extinct.

2.6.4. Data for the Index of Biodiversity Surveys for Assessment (IBSA)

The Environmental Protection Authority (EPA) has given instruction that all biological surveys collecting data on biodiversity submit the report and associated raw data to IBSA as an IBSA data package. All survey data have been provided electronically to comply with IBSA data standards.

2.7. Reconnaissance Flora Assessment

2.7.1. Field Methods & Sampling Effort

A reconnaissance flora and vegetation assessment was conducted at the Albury and Euro Survey Area. This was considered appropriate as it is the preliminary investigation into environmental values of the Survey Area. A combination of relevés, traverses and opportunistic sampling is appropriate for reconnaissance surveys as stipulated in the technical guidance (EPA, 2016c) and described in Table 2.7.

Comprehensive relevé data collection information is included in Appendix B. During the reconnaissance survey, 15 relevés were sampled within the Survey Area (data provided in Appendix C). Relevés, traverses, and vehicle tracks are mapped in Map 2.1.

Table 2.7: Flora & Vegetation Survey Technique

Survey Technique	Application and Purpose
Relevés	Relevés are a low intensity survey technique for gathering information for low-intensity flora and vegetation surveys. Information collected at each relevé includes: • Site code, date, location, botanist; • A photograph; • Vegetation condition and disturbances (including fire); • Landform including; slope, soil, rock type, aspect; and • Flora and vegetation information including; dominant cover, structure and species count where necessary
Traverses	A traverse is an unmarked route along which data is collected. Traverses are useful for identifying the boundaries and characteristics of vegetation types, selecting sites for detailed survey, and targeting significant flora or vegetation. Information recorded along a traverse is as for the relevé, with the addition of noting vegetation changes and relationships between vegetation and substrate.
Opportunistic Sampling	Flora species not recorded through other sampling methods was opportunistically sampled as encountered in the Study Area. Opportunistic sampling also included recording locations of significant, introduced (weed) and unknown species.
Targeted Sampling	Areas likely to support significant flora or vegetation were targeted during the survey. Including areas with existing records of significant flora (see Section 2.6.1). Areas were selected based on existing records from database searches, geology, vegetation mapping and known ESAs. Where possible, unusual, and restricted geological features within the Study Area were sampled. When potentially significant flora taxa were encountered during the survey, sufficient information was recorded to complete a Threatened and Priority Flora Report Form (TPRF). SDM was used to survey areas of highest probability for focus Priority 1 species *Heliotropium mitchellii*

2.7.2. Vegetation & Condition Mapping

The data collected from relevés, traverses, as well as general field notes and observations was used to map the vegetation across the Study Area. Vegetation was classified structurally based on the dominant species. The vegetation classification is consistent with NVIS Level V – association vegetation descriptions (referred to as a 'vegetation type' for the local scale in this report). This level of description provides information on the dominant growth form, height and cover for up to three species for each of the upper, mid and ground strata (ESCAVI, 2003).

Vegetation condition was recorded at relevés and where areas of different vegetation condition were observed. The vegetation condition was mapped across the Study Area at the same scale as the vegetation mapping. Vegetation condition ratings follow the scale recommended for the interzone botanical province (EPA, 2016c), summarised in Table 2.8.

Table 2.8: Vegetation & Condition Scale

Vegetation Condition	Disturbance Criteria
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.
Excellent	Vegetation structure intact, disturbance affecting individual species. Damage to trees caused by fire, the presence of non-aggressive wees and occasional vehicle tracks.

Vegetation Condition	Disturbance Criteria
Very Good	Vegetation structure altered with obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback logging and/or grazing.
Good	Vegetation structure significantly altered by obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback, and grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration bit not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback, and grazing.
Completely Degraded	The structure of the vegetation is no longer intact, that the area is completely or almost completely without native species. These areas are often described as "parkland cleared" with the flora comprising weed or crop species with isolated native trees and shrubs.

2.7.3. Specimen Identification & Lodgement

Flora specimens were collected of any suspected or known significant flora and to confirm species recorded during the relevés for vegetation mapping. Specimens were identified using the appropriate taxonomic keys and where required, relevant taxonomic experts at the Western Australian Herbarium.

The *Tecticornia* genus (Samphire taxonomic group) is known for its complexity and propensity for new taxon. At this level of survey, *Tecticornia* species were identified to genus level only unless associated with a PEC/TEC or presumed to be Priority flora.

Specimens were vouchered with the Western Australian Herbarium as per guidance; when they represent new populations of Threatened or Priority flora, new occurrences of TECs or PECs, individuals that have atypical characteristics, or bioregional range extensions. Vouchered specimens for this project are listed in Table 2.9.

Table 2.9: Flora Species Vouchered with the Western Australian Herbarium

Species	Reference	Reason for Lodgement
Heliotropium mitchellii	2016.CF142	Priority 1
Acacia speckii	2016.CF146	Priority 4
Grevillea inconspicua	2016.AR03-2	Priority 4
Grevillea inconspicua	2016.AR03-3	Priority 4
**Ricinus communis*	2016.ER14-2	Introduced species

2.8. Targeted Flora Assessment

2.8.1. Species Distribution Modelling

Prior to the targeted assessment Species Distribution Modelling (SDM) was undertaken for the two significant flora species assigned a high local and/or regional significance: *Heliotropium mitchellii* (P1) and *Eremophila retropila* (P1) to identify areas in the vicinity of the Survey and Study Areas in which they were most likely to occur.

The SDM was generated using the software package Maxent v.3.4.1 (Phillips, Anderson & Schapire, 2006). Maxent model species distributions by utilising machine-learning to predict the probability of species occurrence based on a set of environmental variables in conjunction with known occurrence records (Phillips, Dudík and Schapire, 2004). Environmental variables are listed in Table 2.10 and species occurrence records

were obtained from the DBCA Threatened and Priority Flora and Western Australian Herbarium (WAH) databases.

This SDM extent covered a rectangular area of approximately 110 by 80 km encompassing the known records of two target species and the Survey Area. Results of the SDM were used to direct the survey effort and created efficiency by mobilising first to those areas intersecting the Survey Area and high probability of potential habitat (Section 3.1.3.2).

Table 2.10: Environmental Variables used in SDM

Environmental Variable	Description
Atlas of Australian Soils	Digitalised soil landscapes from Northcote *et al.* (1960-1968)
Beard Vegetation	Natural vegetation presumed to have existed prior to European arrival
Depth of Regolith	Metres of *in situ* and transported material overlying unweathered bedrock (CSIRO)
Digital Elevation Model (1 arc)	Height above sea level (US Geological Survey)
Geology (1:1,000,000)	Surface geology map of Western Australia (CSIRO)
Rangelands	Soil and Landscape mapping for the pastoral area of WA (CSIRO)
Soil Available Water Capacity	Computed plant-available water capacity of the soil at a depth of 0-5 cm (CSIRO)
Soil Bulk Density	Bulk density of the whole soil (including coarse fragments) in mass per unit volume (CSIRO)
Soil Clay (%)	Percentage of clay content of the soil at a depth of 0-5 cm (CSIRO)
Soil Cation Exchange Capacity	Effective cation exchange capacity of the soil at a depth of 0-5 cm (CSIRO)
Soil pH ($CaCl_2$)	pH of 1:5 soil/0.01M calcium chloride extract at a depth of 0-5 cm (CSIRO)
Soil Sand (%)	Percentage of sand content of the soil at a depth of 0-5 cm (CSIRO)
Soil Depth	Depth of soil to 2m (CSIRO)
Slope Relief Classification	Slope relief landform pattern classification based on Speight (2009) (dataset: Speight, 2016)
Soil Total Phosphorus	Percentage of phosphorus content of the soil at a depth of 0-5 cm (CSIRO)
Topographic Position Index	Contextual comparison of elevation with slope position in the landscape

2.8.2. Field Methods & Sampling Effort

The targeted survey was undertaken over eight person days between 14 to 18 September 2020 by Senior Botanist, Carmel Winton and Botanist, Susan Murrey. The survey commenced in the Albury Survey Area (eastern side) and headed west along the Haul Road to the Euro Survey Area. An approximate total of 93 km of targeted traverses were undertaken at the Survey Area and in the near vicinity. The traverse was searched approximately 25 m either side of the line (50 m total). The vegetation of Survey Area was sparse allowing the botanists to easily assess presence of targeted flora at this width.

The results from the SDM were used to direct the survey effort for the species of primary focus; *Heliotropium mitchellii* (P1) and to assess the distribution and likelihood of occurrence of *Eremophila retropila* (P1). During the survey, it appeared that *Heliotropium mitchellii* was associated with the light green colouring in the SDM (Section 3.1.3.2; Map 3.4) and therefore the survey effort was adjusted to target these areas. Some potential habitat of *Heliotropium mitchellii* outside of the Survey Area was ground-truthed however the full extent of the population was not identified in these areas due to time constraints.

Traverses were undertaken at all areas within the Survey Area identified as potential habitat for *Heliotropium mitchellii* by the SDM at 200 m spacings. Where *Heliotropium mitchellii* was recorded within the Survey area, 25-50 m spacing was undertaken to ensure comprehensive counts of individual plants.

Establishing population extent for records of *Heliotropium mitchellii* on the Haul Road required traverses north and south of the Survey Area with spacing between 100 to 200 m. Extent was investigated until there was a 500 m length with no individuals recorded, or more than a kilometre of continuous locations recorded. This spacing and technique may give mapped records an appearance of linear distribution. Survey effort for this assessment is mapped in Map 2.2.

The SDM for *Eremophila retropila* showed over-lap with the potential habitat for *H. mitchellii* in the Haul Road and Albury Survey Area and these areas were walked during the targeted assessment. One section of potential habitat for *Eremophila retropila* in the west through the Euro Survey Area (Map 3.3) had an unusual extent which was likely due to the spatial layers used in the SDM and was considered unlikely to be habitat for *Eremophila retropila*. This area was previously assessed during the reconnaissance assessment but was not traversed in the targeted assessment due to unsuitability and time constraints.

When other significant flora taxa were encountered, they were opportunistically recorded along the traverse but were not specifically targeted.

2.9. Level 1 Fauna Assessment

2.9.1. Sampling Effort

The terrestrial vertebrate fauna survey was consistent with Technical Guidance: Terrestrial Fauna Surveys (EPA, 2016d) and Technical Guidance: Sampling Methods for Terrestrial Vertebrate Fauna (EPA, 2016e). The guidance suggests selective low-intensity sampling of the fauna and fauna habitats to verify the accuracy of the desktop assessment. The approach of a level 1 fauna survey was used to describe and map the vertebrate fauna habitats across the Study Area and complete active searches to describe the vertebrate fauna assemblages, particularly any significant fauna identified as likely to be present.

A total of 23 fauna habitat sites were recorded within the Survey Area (Map 2.1). At each survey site, a variety of survey techniques was used for fauna as outlined in Table 2.11.

Table 2.11: Fauna Survey Techniques

Fauna	Survey Technique
Mammals	Direct sightings and indirect evidence such as tracks, scats and diggings were recorded across the Survey Area.
Birds	Direct sightings and calls, as well as indirect evidence such as feathers, pellets and nests were recorded across the Survey Area. Search effort was focused at dawn and dusk with particular attention to Malleefowl in areas of potential habitat (if present).
Reptiles & Amphibians	Direct sightings and indirect evidence such as calls, tracks, diggings, skins, and latrines were recorded across the Survey Area and targeted searches were undertaken in areas with suitable habitat. Raking of suitable leaf litter, if present, in an effort to detect *Lerista eupoda*.
Invertebrate Fauna	Litter beds and areas between litter beds were surveyed for the leaf arrangement burrow lids characteristic of trapdoor spiders (*Idiosoma* spp.) in the region.

2.9.2. Fauna Habitat Mapping

Fauna habitat mapping identifies areas of vegetation and land features that are distinguishable from other areas. Typically, each fauna habitat supports a characteristic fauna assemblage that is adapted to the features of the fauna habitat. Fauna habitat types are identified and mapped based on the following information:

- General vegetation type (Shepherd, Beeston and Hopkins, 2001);
- Vegetation mapped within the Survey Area;

- Vegetation structure;
- Landforms;
- Geological units;
- Soil substrate;
- Aerial imagery;
- Fauna assemblage; and
- Field observations.

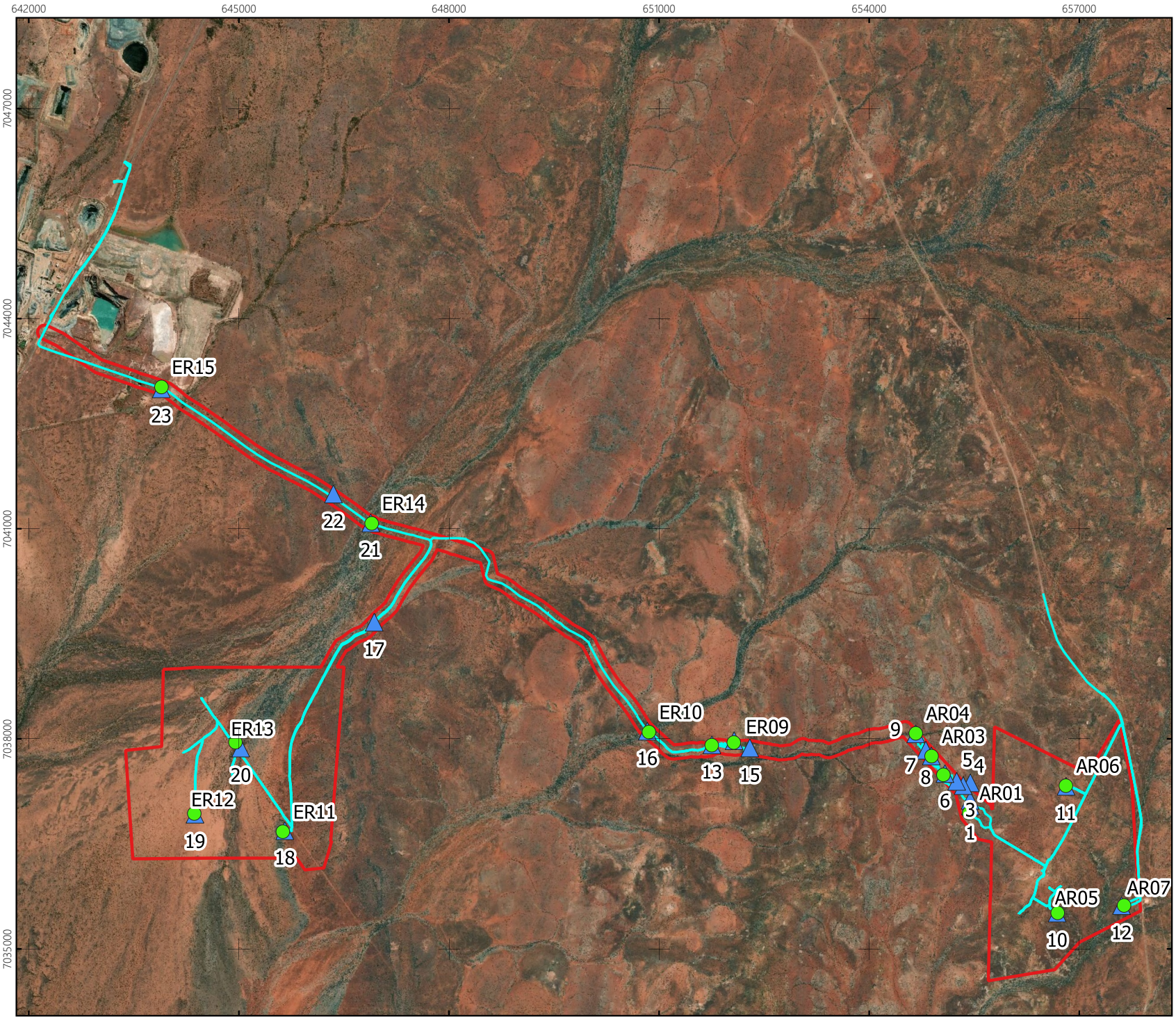
The fauna habitat was recorded at each survey site, opportunistically while traversing the Survey Area on foot, and when travelling between sites.

2.9.3. Conservation Significant Fauna

During the field survey, the preliminary assessment of the likelihood of conservation significant fauna species occurring within the Survey Area was reviewed and amended. The assessment included the following:

- Suitable fauna habitats recorded from the Survey Area;
- Distribution of previously recorded conservation significant species;
- Frequency of occurrence of conservation significant species in the region;
- Temporal distribution of conservation significant species; and
- Accuracy of record locations, date, and source of record (level of reliability).

The likelihood of occurrence of each conservation significant species listed by the database searches was determined based on the criteria outlined in Table 2.6..



Legend

- Survey Area
- Relevé Sites
- Fauna Sites
- Tracks

N

0 1 2 km

Scale 1:75000 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: CJW

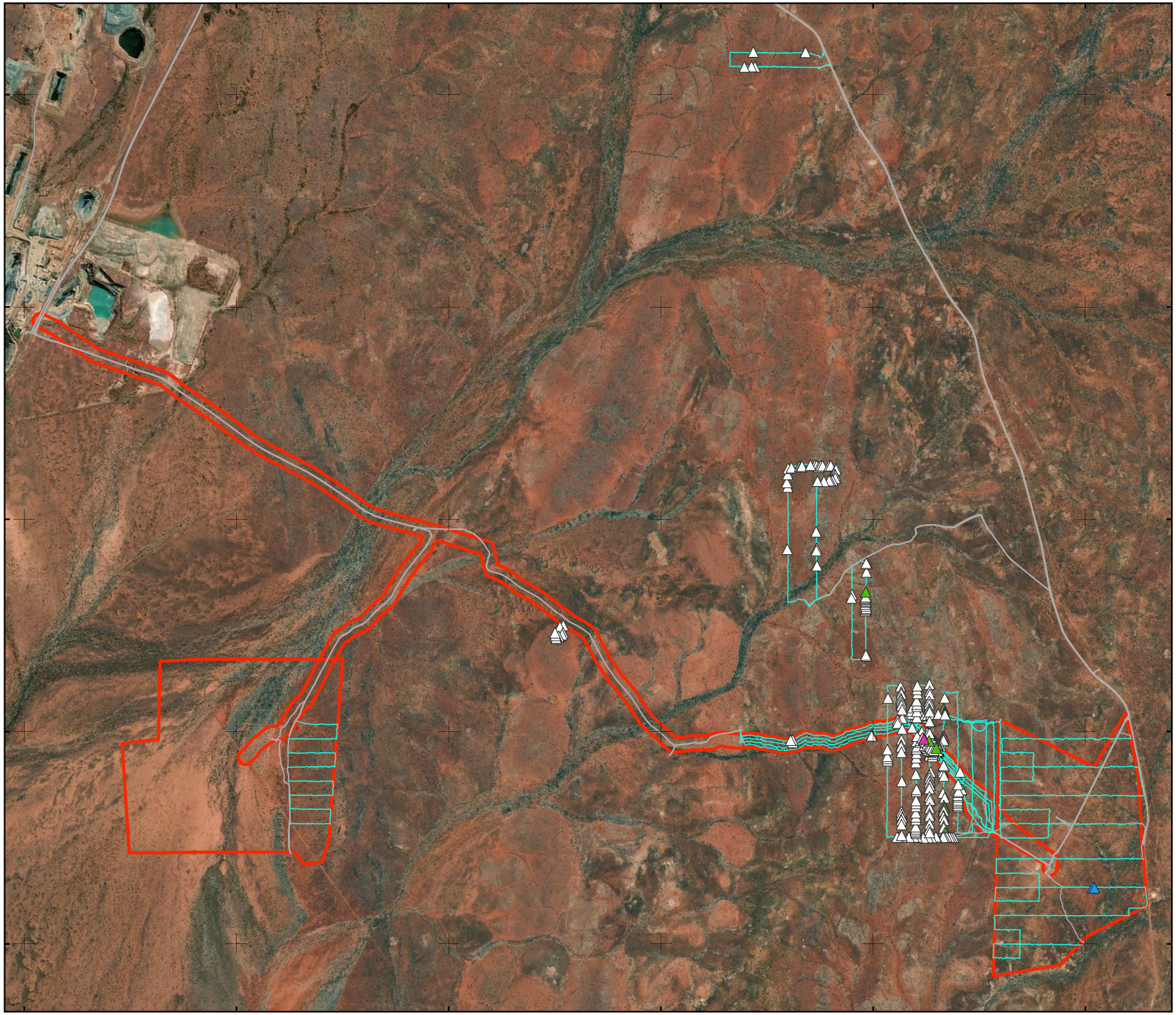
Date: 24-11-2020

Survey Effort of the Reconnaissance Flora & Level 1 Fauna Assessment

Albury Heath & Euro

Prepared for
Westgold Resources Ltd

Map
2.1



Legend

Model Extent

Study Area

Survey Effort

Foot Traverse

Driving Observation

N

0 1 2 km

Scale 1:75000 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: CJW

Date: 24-11-2020

Survey Effort of the Targeted Assessment

Albury Heath & Euro

MAP

Prepared for Westgold

2.2

3. RESULTS

3.1. Flora

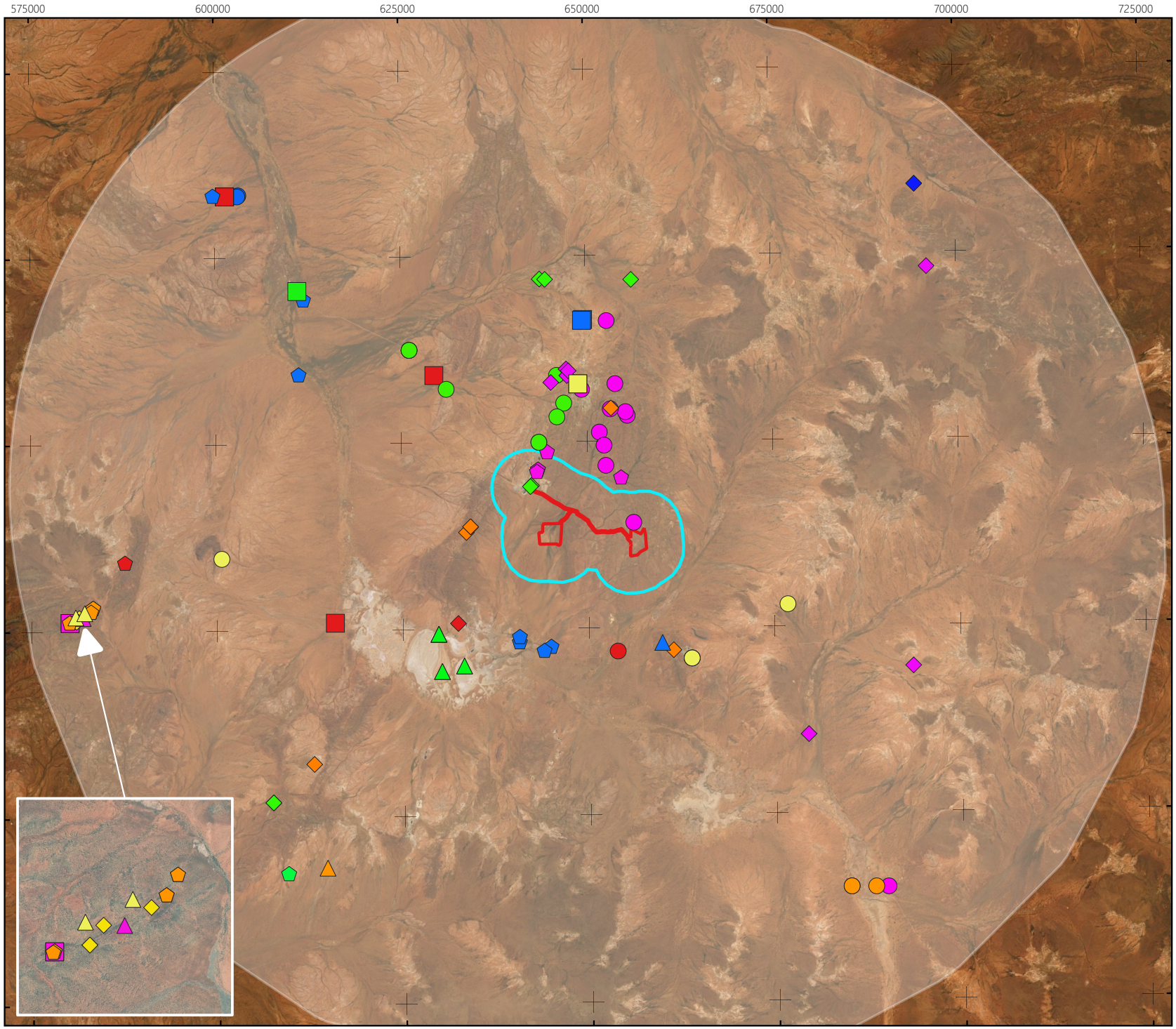
3.1.1. Desktop Assessment

Thirty significant flora taxa were identified during the flora desktop searches of which none were located within the Survey Area and six were assigned a High likelihood of occurrence. The likelihood of each significant flora taxon, habitat, proximity to Survey Area, and general description is listed at Appendix D. Significant flora locations of the database are presented on Map 3.1.

Table 3.1: Significant Flora Results of the Desktop Assessment Significant flora identified within 40 km of the Survey Area classified to likelihood of occurrence, derived from known records, distance to the Survey Area, and habitat.

Likelihood	Status	Taxon
High	Priority 1	*Eremophila retropila*
	Priority 3	*Calytrix verruculosa*^, *Ptilotus lazaridis*, *Ptilotus luteolus*^
	Priority 4	*Acacia speckii*, *Grevillea inconspicua*^
Medium	Priority 1	*Beyeria lapidicola*, *Dicrastylis mitchellii*, *Ptilotus actinocladus*, *Rhodanthe sphaerocephala*
	Priority 3	*Acacia sclerosperma* subsp. *glaucescens*, *Drummondita miniata*, *Eremophila arachnoides* subsp. *arachnoides*, *Eremophila fasciata*, *Hemigenia virescens*, *Hibiscus krichauffianus*, *Homalocalyx echinulatus*, *Menkea draboides*, *Tribulus adelacanthus*
	Priority 4	*Goodenia berringbinensis*
Low	Priority 1	*Lepidium xylodes*, *Stenanthemum mediale*
	Priority 3	*Eragrostis* sp. Erect spikelets (P.K. Latz 2122), *Micromyrtus placoides*, *Petrophile pauciflora*, *Prostanthera petrophila*, *Ptilotus beardii*, *Sida picklesiana*, *Tecticornia cymbiformis*, *Verticordia jamiesonii*

^ = recorded in the wider Study Area



Legend

Survey Area (with 60 km buffer)

Study Area

Flora Species Name

- P3: Acacia sclerosperma subsp. glaucescens
- P4: Acacia speckii
- P1: Beyeria lapidicola
- P3: Calytrix verruculosa
- P1: Dicrastylis mitchellii
- P3: Drummondita miniata
- P3: Eragrostis sp. Erect spikelets
- P3: Eremophila arachnoides subsp. arachnoides
- P3: Eremophila fasciata
- P1: Eremophila retropila
- P4: Goodenia berringbinensis
- P4: Grevillea inconspicua
- P3: Hemigenia virescens
- P3: Hibiscus krichauffianus
- P3: Homalocalyx echinulatus
- P1: Lepidium xylodes
- P3: Menkea draboides
- P3: Micromyrtus placoides
- P3: Petrophile pauciflora
- P3: Prostanthera petrophila
- P1: Ptilotus actinocladus
- P3: Ptilotus beardii
- P3: Ptilotus lazaridis
- P3: Ptilotus luteolus
- P1: Rhodanthe sphaerocephala
- P3: Sida picklesiana
- P1: Stenanthemum mediale
- P3: Tecticornia cymbiformis
- P3: Tribulus adelacanthus
- P3: Verticordia jamiesonii

N

0 5 10 15 20 25 km

Scale 1:800,000 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: JFH

Date: 20-07-2020

Desktop Assessment
Significant Flora
Albury Heath & Euro

Prepared for
Westgold Resources Ltd

Map
3.1

3.1.2. Flora

Eighty-one taxa from 21 families and 47 genera were recorded during the assessment and these are listed in Appendix E. Of these, four were Priority Flora and five were introduced species. Fabaceae was the most species rich family (17 taxa), followed by Poaceae (13 taxa) and Scrophulariaceae (8 taxa). The most species rich genera were; *Acacia* (13 taxa), *Eremophila* (8 taxa), and *Ptilotus* (6 taxa).

3.1.3. Significant Flora

There were no Threatened flora taxa recorded in the Survey Area. Four significant flora taxa were recorded from the Survey Area during the reconnaissance and targeted flora assessment, including one Priority 1, one Priority 3, and two Priority 4 flora:

- Priority 1: *Heliotropium mitchellii*;
- Priority 3: *Calytrix verruculosa*; and
- Priority 4: *Acacia speckii and Grevillea inconspicua*.

The number of locations, number of plants, landform, and photographs for each significant flora species are provided in Table 3.3, and locations are presented in Map 3.2.

3.1.3.1. Targeted Flora Assessment

Three of these significant flora taxa were identified during the targeted assessment; *Heliotropium mitchellii* (Priority 1), *Calytrix verruculosa* (Priority 3), and *Grevillea inconspicua* (Priority 4). Details are included in Table 3.3 and Table 3.3.

Heliotropium mitchellii (Priority 1) was recorded from 273 distinct locations with 5,654 individuals being recorded during the targeted assessment (Table 3.3). The main population intersects the east end of the Haul Road and extends approximately 2 km to the north and more than 1 km to the south. These north-south traverses were spaced to establish extent and it is likely there are individuals of significant flora between these linear records. Sixty-one locations with 1,068 individuals occur within the Survey Area in the east end of the Haul Road. There are no records of *Heliotropium mitchellii* in the Albury and Euro Survey Areas.

The four other significant flora were not recorded from the targeted assessment: *Eremophila retropila* (Priority 1), *Ptilotus lazaridis* (Priority 3), *Ptilotus luteolus* (Priority 3), and *Acacia speckii* (Priority 4) were not recorded during the targeted assessment. *Eremophila retropila* is unlikely to be present in the Survey Area, as ground-truthing within the intersection of the Survey Area and the SDM for this species, did not identify presence.

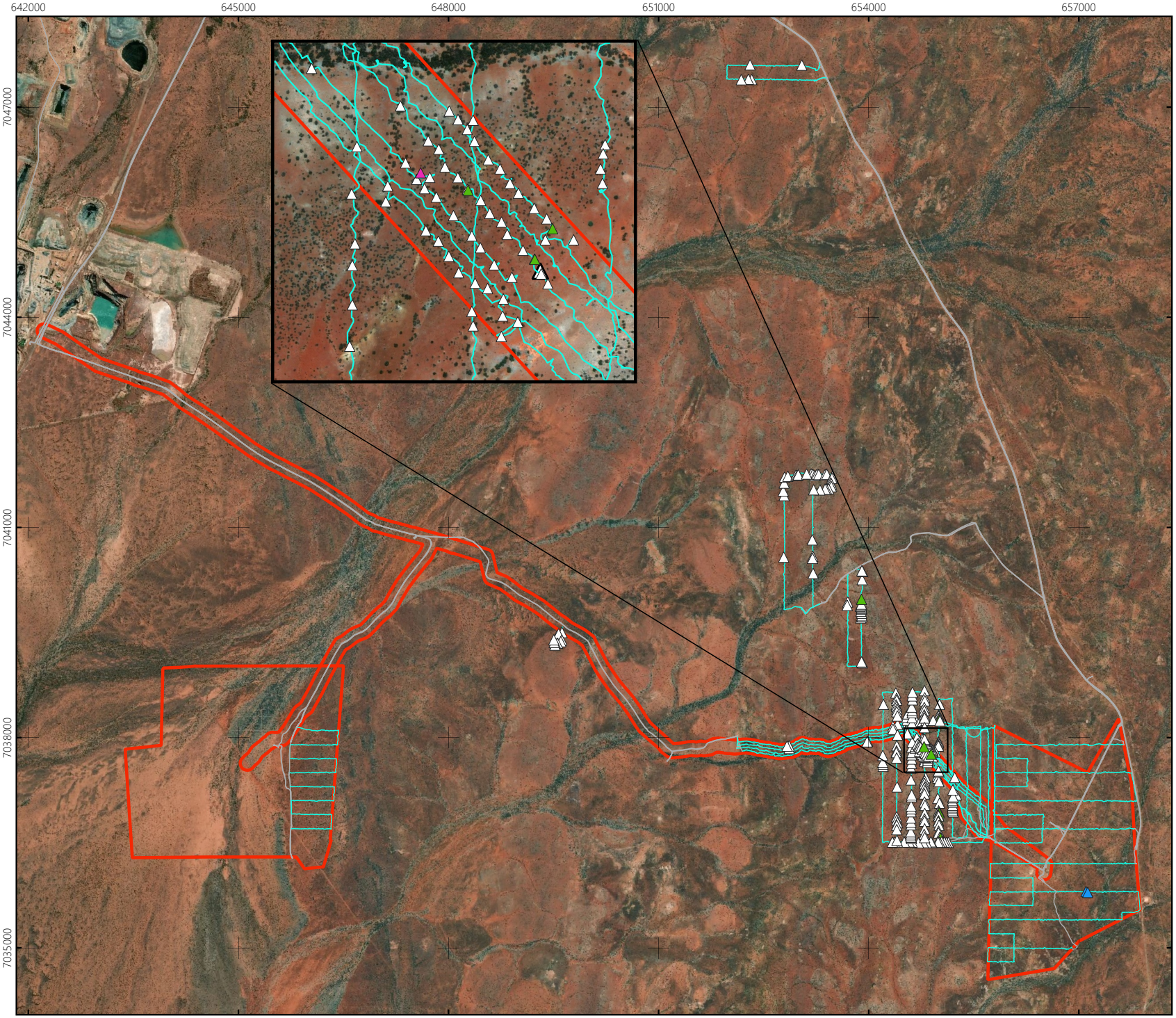
Table 3.2: Targeted Flora Flora of High likelihood to occur in the Survey Area searched for in the targeted assessment.

Status	Taxon	Family	Recorded in the Survey Area
P1	*Eremophila retropila*	SCROPHULARIACEAE	No
P1	*Heliotropium mitchellii*	BORAGINACEAE	Yes
P3	*Calytrix verruculosa*	MYRTACEAE	Yes
P3	*Ptilotus luteolus*	AMARANTHACEAE	No
P3	*Ptilotus lazaridis*	AMARANTHACEAE	No
P4	*Acacia speckii*	FABACEAE	Yes (reconnaissance only)
P4	*Grevillea inconspicua*	PROTEACEAE	Yes

Table 3.3: Significant Flora Recorded from the Survey Area

Species & Description	Vegetation & Landform	Reconnaissance Assessment	Targeted Assessment (Counts)		Image	
			Inside	Outside		
P1: *Heliotropium mitchellii* Low scraggly silver shrub to 0.5 m. Leaves ovate. Flowers 2mm, yellow	F4 – Undulating stony plain; red brown sandy loam; 50-90% medium gravel granite; excellent condition	2 individuals 1 location	1,068 individuals 61 locations	4,586 individuals 212 locations		
P3: *Calytrix verruculosa* Bright green shrub, 0.4-0.75 m high. Fleshy upright leaves. Fl. pink/white	D1 – Drainage line on flats; red brown orange sandy clay; 20-50% medium gravel ironstone or laterite; very good to excellent condition	Not recorded	14 individuals 2 locations	Not recorded		

Species & Description	Vegetation & Landform	Reconnaissance Assessment	Targeted Assessment (Counts)		Image	
			Inside	Outside		
P4: *Grevillea inconspicua* Intricately branched, spreading shrub, 0.6-2 m high. Fl. white/pink-white	F4 – Undulating stony plain; red brown sandy loam; 50-90% medium gravel granite; excellent condition	15 individuals 2 location	4 individuals 4 locations	13 individuals 6 location		
P4: *Acacia speckii* Bushy, rounded shrub or tree, 1.5-3 m high, phyllodes long and linear, pods constricted	F4 – Undulating stony plain; red brown sandy loam; 50-90% medium gravel granite; excellent condition	1 individual 1 location	Not recorded	Not recorded		



Legend

Model Extent

- Study Area

Survey Effort

- Driving Observations
- Foot Traverse

Priority Flora

- Heliotropium mitchellii (P1)
- Grevillea inconspicua (P3)
- Calytrix verruculosa (P4)
- Acacia speckii (P4)

N

0 0.5 1 1.5 2 km

Scale 1:75000 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: CJW

Date: 24-11-2020

Significant Flora Recorded from the Survey Area

Albury Heath & Euro

MAP 3.2

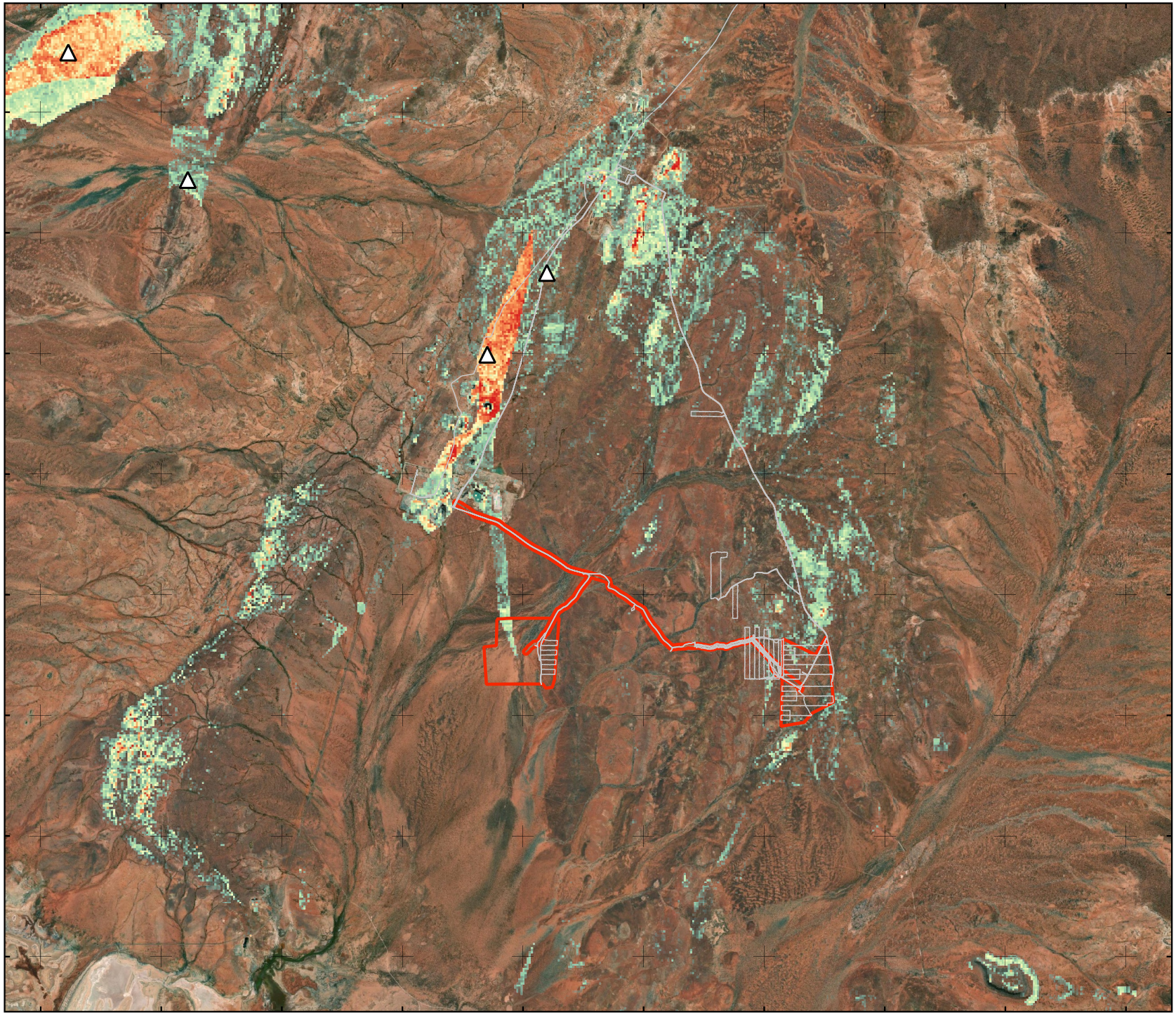
Prepared for Westgold

3.1.3.2. Species Distribution Modelling

Species Distribution Modelling (SDM) conducted prior to the targeted assessment indicated potential habitat for two Priority 1 taxa with high local and regional significance; *Heliotropium mitchellii* and *Eremophila retropila*. The SDM indicated potential habitat for both Priority taxa in the Survey Area.

The SDM analysis indicated that the highest probability of occurrence for *Heliotropium mitchellii* was at the junction of the Haul Road and Albury Heath Survey Area (Map 3.4). Ground-truthing indicated *Heliotropium mitchellii* was primarily associated with areas of greater than 0.4 or 0.5 probability values. The common environmental variable between these points is depth of regolith (DER), referring to the depth in the soil geology from surface to bedrock. This variable was obtained from national datasets with the soil and landscape grid national soil attributes maps (CSIRO, 2020). In the field, the botanists noted these areas had a slight elevation of landscape and basalt surface geology (A-POm-xb-f), from georeferenced geological mapping. Survey effort was adjusted to focus on this probability value and multiple populations of *Heliotropium mitchellii* were located, presenting the SDM data as a very useful field tool.

The SDM for *Eremophila retropila* indicated an approximately 10 x 1 km band, beginning north of Bluebird camp and running parallel and west of the highway area had the highest probability of occurrence (Map 3.3). There are two existing records of *Eremophila retropila* near this location. Areas of lower probability intersected with the Survey Area at the west end of the Haul Road and the northwest of Euro Survey Area. Scattered areas of low probability were north and south of the Albury Survey Area and east side of the Haul Road. The environmental variables contributing the greatest percentage to this modelling was Beard vegetation (30.9%; WA Gov 2020) and Rangeland attributes (27.2%; WA Gov, 2020). These variables are comprised of vegetation composition and surface soil. No locations of *Eremophila retropila* were recorded from the Survey Area during either survey.



Legend

- Known records: Eremophila retropila
- Traverse
- Study Area

Probability of occurrence

- 0
- 0.1
- 0.2
- 0.3
- 0.4
- 0.5
- 0.6
- 0.7
- 0.8
- 0.9
- 1

N

0 1 2 3 4 km

Scale 1:220000 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: CJW

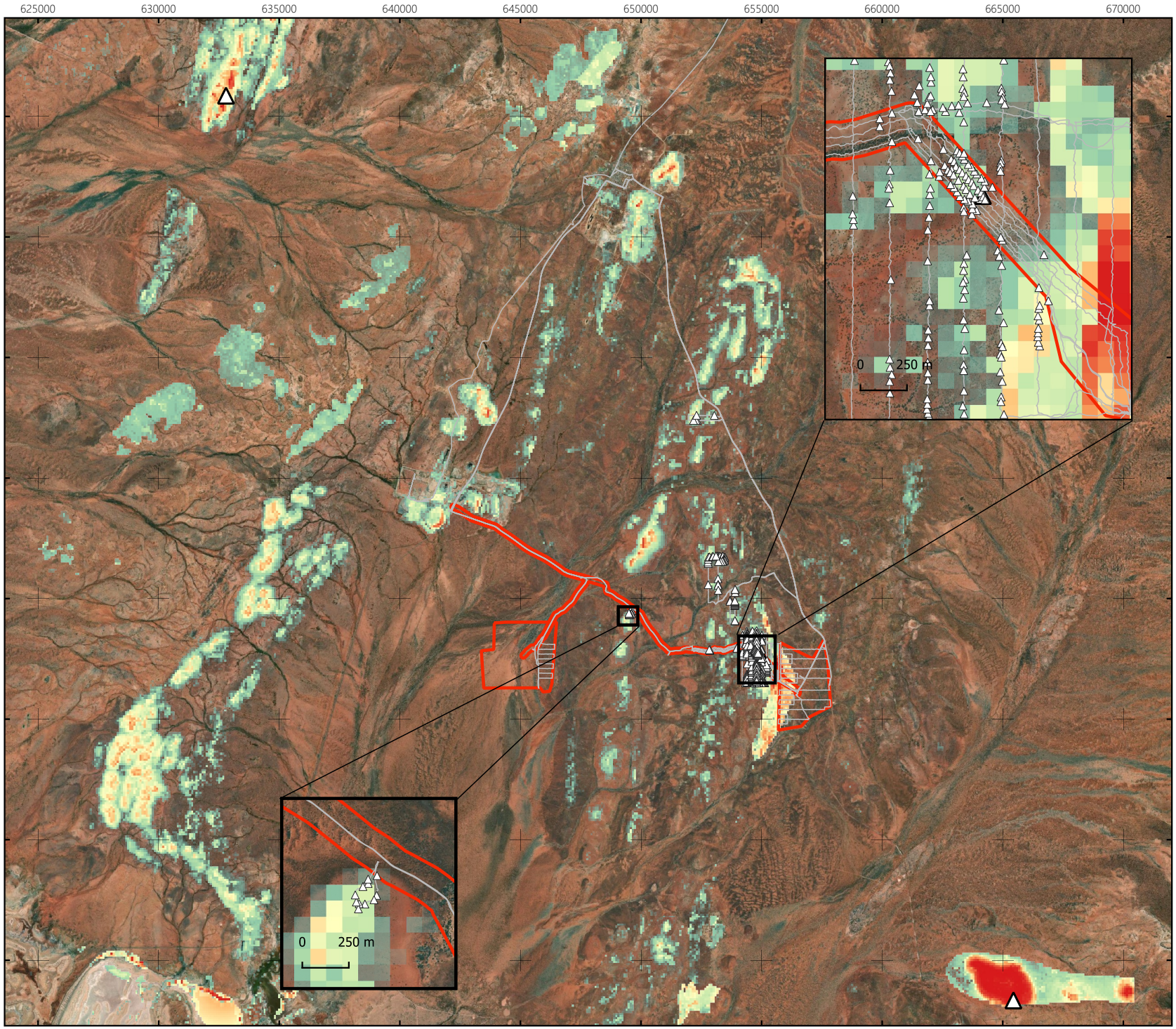
Date: 23-11-2020

Eremophila retropila Species Distribution Model

Albury Heath & Euro

MAP 3.3

Prepared for Westgold



Legend

- Previous records: Heliotropium mitchellii
- Targeted records: Heliotropium mitchellii
- Traverse
- Study Area

Probability of occurrence

- 0
- 0.1
- 0.2
- 0.3
- 0.4
- 0.5
- 0.6
- 0.7
- 0.8
- 0.9
- 1

N

0 1 2 3 4 km

Scale 1:220000 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: CJW Date: 23-11-2020

Heliotropium mitchellii Species Distribution Model

Albury Heath & Euro

MAP

Prepared for Westgold

3.4

3.1.4. Introduced Flora

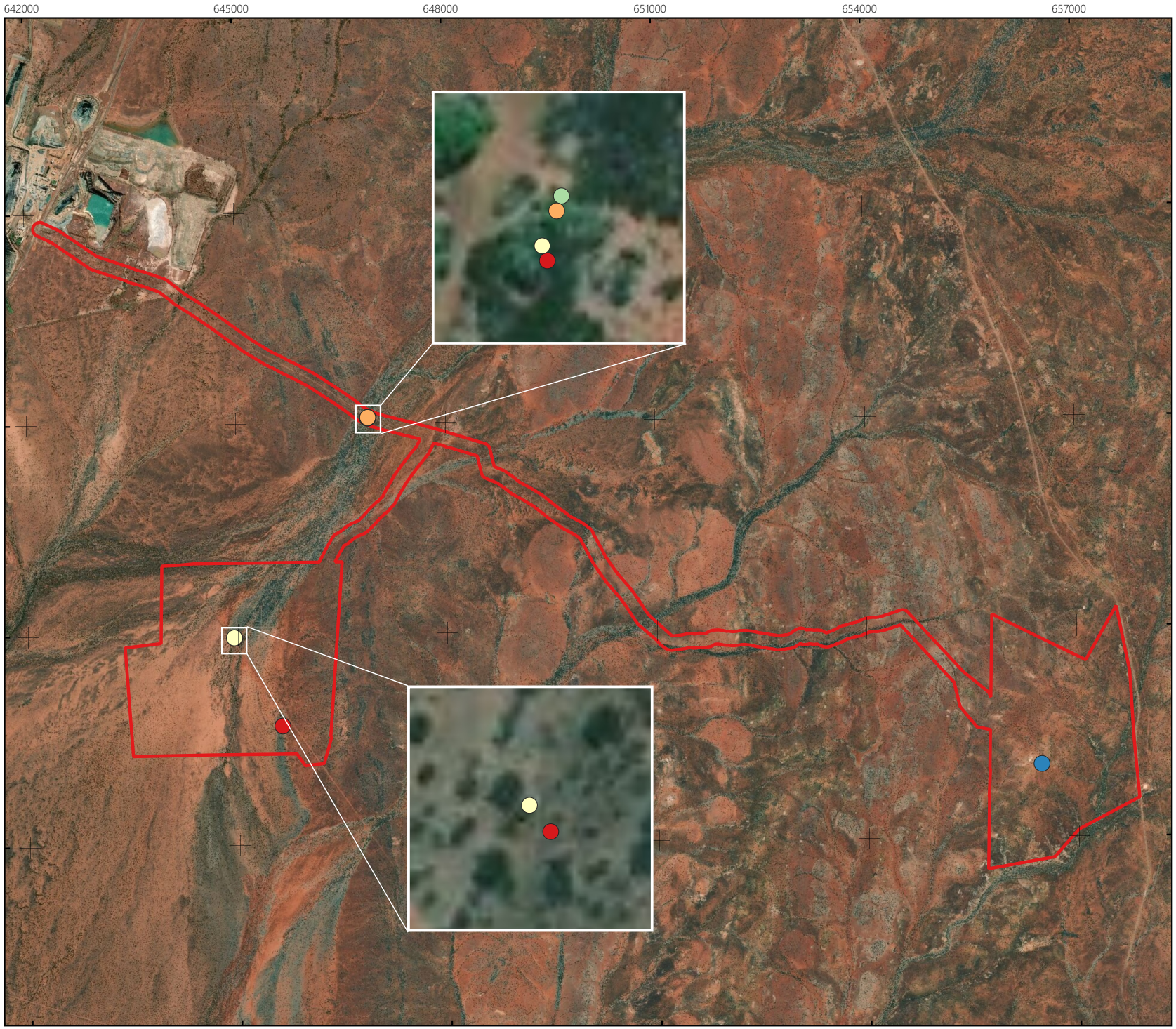
Five environmental weed species were recorded at the Survey Area. Four of these are associated with creeklines and drainage along the Haul Road and in the Euro Survey Area. One taxon was associated with heavy disturbance in the Albury Survey Area. Locations are mapped on Map 3.5 and supplied electronically.

Three of these records represent the southern or inland extent of the population for this species:

- **Malvastrum americanum* (southern extent);
- **Bidens bipinnata* (southern extent); and
- **Ricinus communis* (inland extent).

Table 3.4: Introduced Flora Recorded Weeds recorded from the Survey Area in the reconnaissance survey.

Taxon	Common Name	Family	No. of Plants	No. of Locations	Vegetation & Landform
**Bidens bipinnata*	Bipinnate Beggartick	ASTERACEAE	250	3	D1 and D2: Creekline, drainage
**Cenchrus setiger*	Birdwood Grass	POACEAE	100	1	D2: Creekline
**Malvastrum americanum*	Spiked Malvastrum	MALVASTRUM	100	2	D1 and D2: Creekline, drainage
**Ricinus communis*	Castor Oil	EUPHORBIACEAE	5	1	D2: Creekline
**Rumex vesicarius*	Ruby Dock	POLYGONACEAE	1	1	Flat plain, completely cleared/developed area



Legend

- Survey Area

Introduced Flora

- *Bidens bipinnata
- *Cenchrus setiger
- *Malvastrum americanum
- *Ricinus communis
- *Rumex vesicarius

N

0 1 2 3 km

Scale 1:85000 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: JFH

Date: 23-11-2020

Introduced Flora Recorded from the Survey Area

Albury Heath & Euro

Prepared for
Westgold Resources Ltd

Map
3.5

3.2. Vegetation

3.2.1. TEC & PEC Desktop Assessment

No Threatened or Priority Ecological Communities (TECs or PECs) were recorded in the Survey Area. Six PECs were returned in the database searches of which two were assigned a High likelihood of occurrence (Table 3.5; Map 1.1).

The Trillbar Land System was the closest PEC to the Survey Area, 4 km to the north and overlapping the Study Area perimeter by 100 m. This is defined by gently sloping stony plains with low rises of metamorphic rocks and gilgaied drainage foci; supporting shrublands of Snakewood, Mulga, Bluebush, and Samphire with patches of tussock grassland.

Yagahong Land System was recorded 11 km west and south-east of the Survey Area. This Land System is characterized by gently sloping stony plains, low rises, and drainage foci with shrublands of Snakewood, Mulga, Bluebush, and Samphire with patches of tussock grassland.

Table 3.5: PEC Results of the Desktop Assessment

Likelihood	Status	Name	Description	Proximity to the Survey Area
High	Priority 3	Yagahong Land System	Rough greenstone ridges, hills and cobble-strewn footslopes supporting Mulga shrublands	11 km west and 11 km south-east
		Trillbar Land System	Gently sloping stony plains with low rises of metamorphic rocks and gilgaied drainage foci; supporting shrublands of snakewood, Mulga, bluebush, and samphire with patches of tussock grassland.	4 km north
Medium	Priority 1	Hillview Calcrete	Hillview calcrete groundwater assemblage type on Murchison palaeodrainage on Hillview Station.	25 km south-east
Low	Priority 1	Nowthanna Calcrete	Nowthanna Hill calcrete groundwater assemblage type on Murchison palaeodrainage on Yarrabubba Station.	23 km south-east
		Polelle Calcrete	Polelle calcrete groundwater assemblage type on Murchison palaeodrainage on Polelle Station.	8 km south-west
	Priority 3	Austin Land System	Saline stony plains with low rises and drainage foci supporting low halophytic shrublands with scattered Mulga and snakewood.	16 km south-west

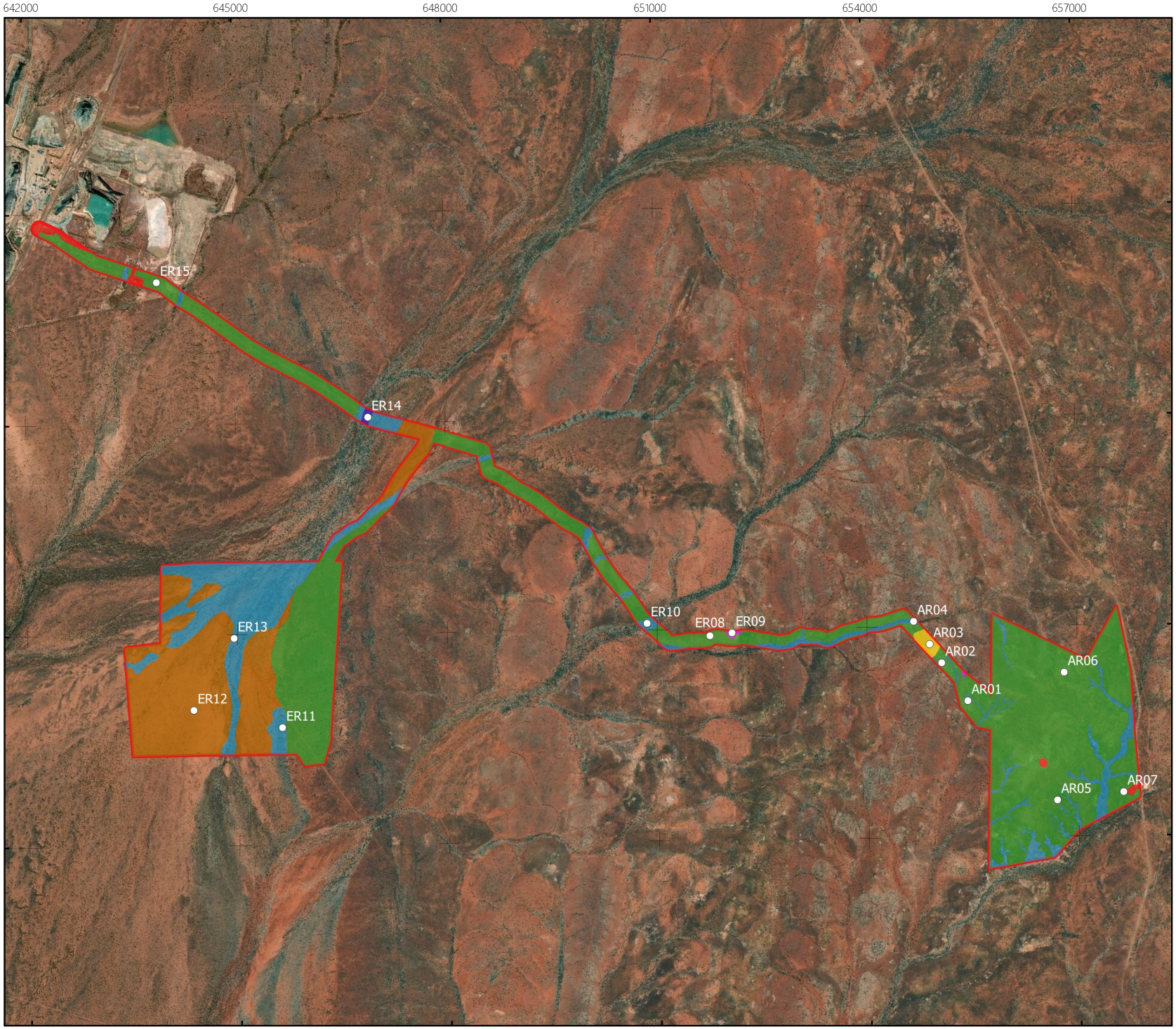
3.2.2. Vegetation Assessment

The Survey Area was comprised of mostly flat stony or clay plains with some small isolated rocky breakaways scattered along the haul road. Minor drainage lines and floodplains intersect the flat plains. Six vegetation types were recorded from the Survey Area (Table 3.6, Map 3.6).

Table 3.6: Vegetation Types Recorded at the Survey Area

Type	Description	Landform, Soil & Geology	Sites	Area (ha)	Significance	Photograph
Flat / Undulating Plains						
F1	*Acacia macraneura* or *Acacia fuscaneura* low isolated trees to open woodland over +/-*Acacia grasbyi* or *Acacia craspedocarpa* tall isolated shrubs over *Aristida contorta* low isolated tussock grasses.	Flat plain; red brown orange, sandy clay loam; laterite, cobbles of abundant ironstone / granite.	AR01, AR02, AR05, AR06, AR07, ER08, ER15	1,157.6	-	
F2	*Eremophila fraseri* subsp. *parva* mid isolated shrubs over *Ptilotus roei* low isolated shrubs over *Aristida contorta* low isolated tussock grasses.	Flat plain; red orange, clay sand; fine ironstone gravel.	ER12	271.2	-	
F3	*Tecticornia* spp. low-mid sparse samphire shrubland over *Aristida contorta*, *Diplachne fusca* subsp. *muelleri* low sparse tussock grassland.	Flat plain; red orange, clay sand; abundant medium ironstone gravel.	ER09	2	Restricted distribution, role as refuge for *Tecticornia* spp.	

Type	Description	Landform, Soil & Geology	Sites	Area (ha)	Significance	Photograph
F4	*Acacia aptaneura* tall isolated shrubs over *Micromyrtus sulphurea*, *Grevillea inconspicua* (P4) low sparse shrubland over *Aristida contorta* low sparse tussock grassland.	Low hills; red brown, sandy loam; abundant medium granite gravel.	AR03	12.1	Restricted distribution in Survey Area, hills in the vincity are not widespread. Role as refuge for *Heliotropium mitchellii* (P1), which is only known from few records all within the vicinity of Meekatharra, *Grevillea inconspicua* (P4) and *Acacia speckii* (P4). Mostly widespread in the local and regional area.	
Drainage / Floodplains / Creeks						
D1	*Acacia aptaneura*, *A. craspedocarpa*, *A. macraneura* tall open shrubland over *A. tetragonophylla* mid sparse shrubland over *Enteropogon ramosus*, *Dichanthium sericeum* subsp. *humilius* or *Eragrostis cumingii* low open tussock grassland.	Drainage line on flats; red brown orange sandy clay; No rocks to abundant medium ironstone gravel.	AR04, ER10, ER11, ER13	275.5	-	
D2	*Eucalyptus kingsmillii* low open woodland over *Senna artemisioides* subsp. x *artemisioides*, *Acacia burkittii* tall open shrubland over **Cenchrus setiger* low open tussock grassland.	Creek bed; red orange sandy loam; Fine creek stones.	ER14	13.1	Restricted distribution in Survey Area, but drainage lines in the vicinity not restricted.	



Legend

- Releve

Vegetation Type

- F1
- F2
- F3
- F4
- D1
- D2
- Disturbed

N

0 1 2 3 km

Scale 1:85000 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: JFH

Date: 23-11-2020

Vegetation Types of the Survey Area

Albury Heath & Euro

Prepared for
Westgold Resources Ltd

Map
3.6

3.2.3. Significant Vegetation

Two vegetation types are considered significant, based on the criteria listed in section 2.3:

- F3: *Tecticornia* spp. low-mid sparse samphire shrubland over *Aristida contorta*, *Diplachne fusca* subsp. *muelleri* low sparse tussock grassland; considered significant due to its restricted distribution and role as refuge for the under sampled *Tecticornia* genus.
- F4: *Acacia aptaneura* tall isolated shrubs over *Micromyrtus sulphurea*, *Grevillea inconspicua* (Priority 4) low sparse shrubland over *Aristida contorta* sparse tussock grassland; considered significant due to the restricted distribution and as a role as refuge for the three significant flora recorded during this assessment.

One other vegetation type has restricted distributions within the Survey Area, however the landforms they occur on are widespread in the vicinity and these were therefore not considered significant.

3.2.4. Vegetation Condition

Vegetation condition in the Survey Area is presented in Table 3.7 and Map 3.7. The majority of the vegetation condition at the Survey Area was rated as Excellent or Very Good (combined total of 96.3%), with disturbances noted as low to medium grazing, low number of weeds, evidence of tracks, and small areas of cleared vegetation for tracks. The remainder was rated as Good (2.6%) with more intense clearing of vegetation for tracks and roads. A small area (1.1%) was rated as Completely Degraded surrounding dis-used mining shafts and stopes.

Table 3.7: Vegetation Condition at the Survey Area

Vegetation Condition	Area (ha)	% of Survey Area	Disturbance Details
Excellent	1,115.3	63.9	Low to medium grazing; some evidence of tracks.
Very Good	566.3	32.4	Medium grazing; moderate presence of weeds; evidence of tracks and partial clearing.
Good	45.2	2.6	Medium grazing; high presence of weeds; litter; evidence of tracks, roads, and partial clearing.
Completely Degraded	18.7	1.1	Dis-used mining operations and stopes; clearing; tracks.

Legend

Vegetation Condition

- Excellent
- Very Good
- Good
- Completely Degraded

N

0 1 2 3 km

Scale 1:85000 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: JFH

Date: 23-11-2020

Vegetation Condition of the Survey Area

Albury Heath & Euro

Map 3.7

Prepared for
Westgold Resources Ltd

3.3. Fauna Habitats

The fauna habitats within the Study Area were mapped into four categories (Table 3.8, Map 3.8):

- Open Plain;
- Mulga Woodland;
- Rock Outcrop; and
- Cleared/Developed.

Each habitat was determined based upon its potential to support different fauna assemblages, which are described in greater detail below. The habitat throughout the Study Area was extrapolated from what was observed in the Survey Area. The associated vegetation types below refer to those in Table 3.6.

Table 3.8: Fauna Habitat Types

Habitat Type	Survey Area Extent (ha)	% of Survey Area	Study Area Extent (ha)	% of Study Area	Associated Vegetation Type
Open Plain	1,416.9	81.2	29,198.1	84.9	F1, F2, F3, F4
Mulga Woodland	283.7	16.3	3,575.2	10.4	D1, D2
Rock Outcrop	0.8	<0.1	90.2	0.3	F1
Cleared/Developed	44.1	2.4	1,522.7	4.4	-
Total	1,745.5	100	34,386.2	100	-

3.3.1. Open Plain

The open plain habitat covers the vast majority of both the Survey Area (1,416.9 ha, 81.2%) and Study Area (29,198.1 ha, 84.9%). This habitat is characterised by a mixed density tall *Acacia* shrubland (*Acacia macraneura*, *A. fuscaneura*, *A. aptaneura*) over low moderately dense to isolated shrubs of *A. grasbyi*, *A. craspedocarpa*, *Eremophila fraseri*, *Micromyrtus sulphurea*, and *Grevillea inconspicua*. The understory is mostly bare ground, with sparse to moderately dense patches of *Aristida contorta* tussock grass.

The substrate of this habitat is quite variable, comprising of light orange to brown loamy clay soils with cobbles of mostly ironstone and quartz, as well as large patches of calcrete mainly to the east. Between Albury and Euro, there are also a series of low rolling hills occurring in a north-south band approximately 5 km across through the Study Area. This habitat type also includes two bigger elongate hills, the northern of which covers the eastern part of Euro. Further, there are two very large alluvial clay floodplains to the south-west of the Study Area. Although there are few rocks in the substrate there, the vegetation composition is similar enough that the fauna assemblage is not discernible from the open stony plains throughout the rest of the Study Area.

This habitat type includes an area of sparse samphire shrubland (vegetation type F3). Although the vegetation is atypical from the rest of the open plain habitat, the area it covers appears to be very small and isolated from anything similar. The fauna assemblage in this vegetation type is therefore considered to be indistinguishable from the surrounding areas.

The limited vegetation present in this habitat means that few vertebrate fauna species will be resident there, especially on the open clay floodplains. Possibilities for fauna refuge are very far apart, and there are minimal foraging resources.

Mammal species associated with this habitat type are likewise limited due to the sparse vegetation and include the Red Kangaroo (*Osphranter rufus*) and Euro (*O. robustus*) that utilise all habitats, and the Kultarr (*Antechinomys laniger*) which are typically recorded from open country amongst *Acacia* shrublands. The

conservation significant Long-tailed Dunnart (*Sminthopsis longicaudata*) may utilise this habitat, most likely in the rockier hills between Albury and Euro. Due to the reduced vegetation only micro bats that utilise open air to forage would be present (*Austronomus australis, Nyctophilus geoffroyi,* and *Scotorepens balstoni*).

Bird species associated with this habitat include most of the common species, however species such as the White-winged Fairy-Wren, Banded Whiteface, Crimson and Orange Chats, Black-faced Woodswallow, and Western Quail Thrush are often only associated with these open habitat types.

Reptile species associated with this habitat type include ground-dwelling species such as the Yellow-spotted Monitor (*Varanus panoptes*), Lozenge-marked Dragon (*Ctenophorus scutulatus*), Western Netted Dragon (*C. reticulatus*), and the Goldfields Pebble-mimic Dragon (*Tympanocryptis pseudosephos*). The rocky soils and sparse vegetation limit the occurrence of some of the smaller skinks with the Common Desert Ctenotus (*Ctenotus leonhardii*) being one of the few species recorded from this habitat type. Habitat for arboreal species is limited due to the sparseness of taller vegetation.

Figure 3.1: Open Plain Fauna Habitat

3.3.2. Mulga Woodland

The Mulga woodland habitat type has the second greatest extent in the Study Area, although it covers only an eighth as much area as the open plain habitat. It makes up 383.7 ha (16.3%) of the Survey Area and 3,575.2 ha (10.4%) of the Study Area. Most of this habitat follows along drainage lines but may also occur in isolated low-lying patches throughout the Study Area, more so to the east. It also includes the creekline which drains to the south-west along past the north-western edge of Euro. The vegetation in this habitat is typically dominated by *Acacia aptaneura*, *A. craspedocarpa* and *A. macraneura* tall open shrubland over *A. tetragonophylla* mid sparse shrubland. On the ground there is a mostly open low mixed tussock grassland of *Enteropogon ramosus*, *Dichanthium sericeum*, or *Eragrostis cumingii*. In the larger creekline there is also a sparse *Eucalyptus kingsmillii* woodland over a tall open shrubland of *Senna artemisioides* and *Acacia burkittii*.

The soil typically consists of light orange to brown sandy loam, with a low abundance of coarse to medium sized gravel. Along the middle of the drainage lines the substrate is generally much sandier, whilst the bed of the more major Creekline is very sandy.

Mammal species which are associated with this habitat type include Kangaroos (*Osphranter rufus*, *O. robustus*), Dunnarts (*Sminthopsis longicaudata*, *S. macroura*), or native rodents (*Notomys alexis*, *Pseudomys hermannsburgensis*) which may forage amongst the tussock grasses and woody debris. Micro bats (*Austronomus australis, Chalinolobus gouldii, Nyctophilus geoffroyi, Scotorepens balstoni, Vespadelus finlaysoni*) forage on invertebrates both in the open air and amongst the Mulga.

A wide variety of bird species are associated with this habitat and occur in different seasons and densities depending on local conditions and resource availability. Common species (Singing Honeyeater, Yellow-throated Miner, Spiny-cheeked Honeyeater, White-browed Babbler, Splendid Fairywren, Variegated Fairywren, Redthroat, Western Gerygone, Slaty-backed Thornbill, Chestnut-rumped Thornbill, Rufous Whistler, Crested Bellbird, Chiming Wedgebill, and Zebra Finch) forage amongst the sparse canopy of the tall Mulga shrubs. Ground foraging species (Emu, Common Bronzewing, Crested Pigeon, Diamond Dove, Little Button-quail, Western Quail-thrush, Mulga Parrot, Budgerigar, and Bourke's Parrot) utilise fallen seed and annual herb resources which can result in large fluctuations in response to rainfall and associated increased plant growth. Predatory raptor species (Wedge-tailed Eagle, Whistling Kite, Nankeen Kestrel, and Brown Falcon) are also commonly recorded hunting across this landscape.

The pockets of denser vegetation in this habitat often provide a refuge for most of the small bird species, and are also more suitable for arboreal reptile species such as the Mulga dragon (*Diporiphora amphiboluroides*), the Western Spiny-tailed Gecko (*Strophurus strophurus*), and the Tree Dtella (*Gehyra variegata*). The patches of dense leaf litter and woody debris also form suitable microhabitats for ground geckos (*Diplodactylus pulcher*, *Lucasium squarrosum*, *Nephrurus vertebralis*) and skinks (*Menetia greyii*, *Egernia depressa*). Along the major drainage line feeding south-west to Lake Annean, the sandier soils and denser leaf litter provide suitable microhabitat for fossorial skinks like the Broad Banded Sand Swimmer (*Eremiascincus richardsonii*) and the significant Meekatharra Slider (*Lerista eupoda*). The greater availability of prey also means that predatory species such as the Stripe-tailed Pygmy Monitor (*Varanus caudolineatus*), Black-headed Monitor (*Varanus tristis*), Ringed Brown Snake (*Pseudonaja modesta*) and Stimson's Python (*Antaresia stimsoni*) are most likely to be found there.

Figure 3.2: Mulga Woodland Fauna Habitat

3.3.3. Rock Outcrop

The rock outcrop habitat is minimally represented, consisting of only 0.8 ha (<0.1%) of the Survey Area and 90.2 ha (0.3%) of the Study Area. Most of this habitat occurs along a linear series running north-south through the west of the Study Area, primarily along the two large hills located just to the east of Euro. Another couple of small isolated outcrops were also observed a little to the west of Albury.

The vegetation in this habitat type is similar to the Mulga woodland and is also dominated by a tall open shrubland of *Acacia macraneura* and *A. fuscaneura* over isolated shrubs of *A. grasbyi* and *A. craspedocarpa*. There is very little to no ground cover present.

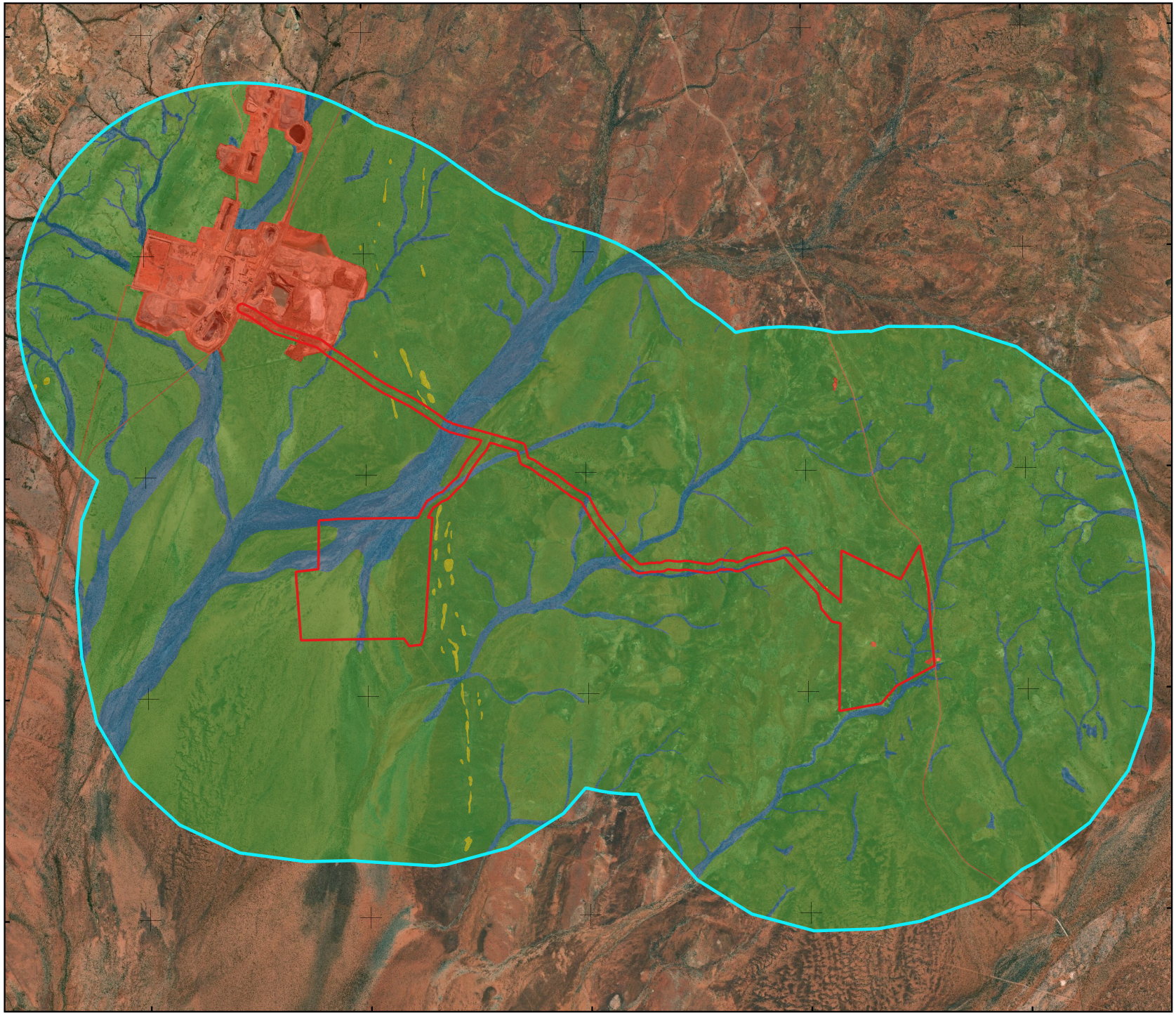
The substrate is an orange and brown loamy clay, with exposed BIF bedrock and large boulders of various sizes. The fauna assemblage in this habitat type is similar to that of the Mulga woodland, but the large boulders provide preferential shelter for a number of species including the Long-tailed Dunnart (*Sminthopsis longicaudata*), Euro (*Osphranter robustus*), Echidna (*Tachyglossus aculeatus*), Pygmy Python (*Antaresia perthensis*), Stimson's Python (*A. stimsoni*), and Yellow-spotted Monitor (*Varanus panoptes*). Rock dwelling geckos such as the Spotted Dtella (*Gehyra punctata*) and Western Marbled Velvet Gecko (*Oedura fimbria*) are restricted to this habitat.

Figure 3.3: Rock Outcrop Fauna Habitat

3.3.4. Cleared / Developed

The cleared / developed area cover 44.1 ha (2.4%) of the Survey Area and 1,522.7 ha (4.4%) of the Study Area. These areas include the existing Bluebird mine to the north-west, as well as a few small historic mines and cleared areas to the east. The Great Northern Highway which passes through the west of the Study Area and the Meekatharra-Sandstone Road to the east have also been included, along with some minor dirt roads associated with the mine. Dirt roads which are minor and not regularly cleared or maintained have not been included because they are either overgrown or have minimal impact on fauna.

No vegetation or fauna assemblages are associated with these areas.



Legend

- Survey Area
- Study Area

Fauna Habitats

- Open Plain
- Mulga Woodland
- Rock Outcrop
- Cleared / Developed

N

0 1 2 3 4 km

Scale 1:135000 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: JFH

Date: 23-11-2020

Fauna Habitat Mapping of the Study Area

Albury Heath & Euro

Prepared for
Westgold Resources Ltd

Map
3.8

3.4. Vertebrate Fauna

A total of 23 vertebrate fauna species were recorded during the survey: two native mammal species, two introduced mammal species, 18 bird species and one reptile (Table 3.9). None of these species are listed as conservation significant. The literature review and database searches identified 30 mammals (nine introduced), 152 birds (one introduced), 61 reptiles, and five frog species potentially occurring in the Study Area (Appendix F).

Table 3.9: Vertebrate Fauna Species Recorded

Common Name	Scientific Name	Conservation Status	Comments/Details
Mammals			
Echidna	*Tachyglossus aculeatus*	-	Scats
Euro	*Osphranter robustus*	-	Scats
*European Cattle	*Bos taurus*	-	Scats
*Cat	*Felis catus*	-	Tracks
Birds			
Wedge-tailed Eagle	*Aquila audax*	-	Observation/Call
Crested Pigeon	*Ocyphaps lophotes*	-	Observation/Call
Common Bronzewing	*Phaps chalcoptera*	-	Observation/Call
Spotted Nightjar	*Eurostopodus argus*	-	Observation/Call
Galah	*Cacatua roseicapilla*	-	Observation/Call
Variegated Fairy-wren	*Malurus lamberti*	-	Observation/Call
Singing Honeyeater	*Gavicalis virescens*	-	Observation/Call
Striated Pardalote	*Pardalotus striatus*	-	Observation/Call
Western Gerygone	*Gerygone fusca*	-	Observation/Call
Slaty-backed Thornbill	*Acanthiza robustirostris*	-	Observation/Call
Chestnut-rumped Thornbill	*Acanthiza uropygialis*	-	Observation/Call
Grey-crowned Babbler	*Pomatostomus temporalis*	-	Observation/Call
Masked Woodswallow	*Artamus personatus*	-	Observation/Call
Black-faced Woodswallow	*Artamus cinereus*	-	Observation/Call
Crested Bellbird	*Oreoica gutturalis*	-	Observation/Call
Rufous Whistler	*Pachycephala rufiventris*	-	Observation/Call
Torresian Crow	*Corvus orru*	-	Observation/Call
Zebra Finch	*Taeniopygia guttata*	-	Observation/Call
Reptiles			
Southern Pygmy Spiny-tailed Skink	*Egernia depressa*	-	Scats

*Introduced species

3.4.1. Conservation Significant Fauna

The desktop assessment identified fauna species that are listed under the current legislative framework. Three conservation lists have been developed at Commonwealth (EPBC Act) and State level (BC/WC Act and DBCA Priority list).

The database search indicated the potential presence of 21 significant fauna species, including one mammal, 16 birds, one reptile and three invertebrates (Table 3.10, Map 3.9).

The level 1 survey techniques were tailored to those conservation significant species potentially occurring within the Study Area. Following the field survey, the habitat across the Study Area was assessed and mapped, enabling the likelihood of occurrence for each conservation significant species to be determined (Table 3.10).

The presence of salt lakes (Lake Annean) within the database search parameters resulted in the potential species list including eight migratory wetland birds that have the potential to seasonally occur there. The habitat requirements of these birds are very similar, so to simplify analyses they have been grouped together and addressed as one in Table 3.10. These eight species are:

- Curlew Sandpiper (*Calidris ferruginea*),
- Sharp-tailed Sandpiper (*Calidris acuminata*)
- Common Greenshank (*Tringa nebularia*)
- Gull-billed Tern (*Sterna nilotica*)
- Common Sandpiper (*Actitis hypoleucos*)
- Pectoral Sandpiper (*Calidris melanotos*)
- Wood Sandpiper (*Tringa glareola*)
- Oriental Plover (*Charadrius veredus*)

Three other species listed as migratory may also occur within the Study Area but have not been grouped with the rest here because their habitat requirements are not the same as those listed above.

3.4.2. Short Range Endemic Invertebrates

Three SRE invertebrate searches were conducted by the WA Museum. There were no results returned from the Arachnida, Myriapoda or Mollusca databases.

The Crustacea database search returned one species of the tiny, worm-like Parabathynellid, *Billibathynella humphreysi*, which was recorded seven times at Mt Padbury Station in 2004, around 30 km north-east of the Study Area. This species is from the Superorder Syncarida, which is known to only occur in fresh to brackish water. Therefore, it most likely occurs in ephemeral salt lakes in the surrounding region such as smaller ones at Mt Padbury Station, or at Lake Annean to the south-west. There is a small possibility that it may seasonally and temporarily occur in the major drainage system passing through Euro, but the potential for any significant impact is low.

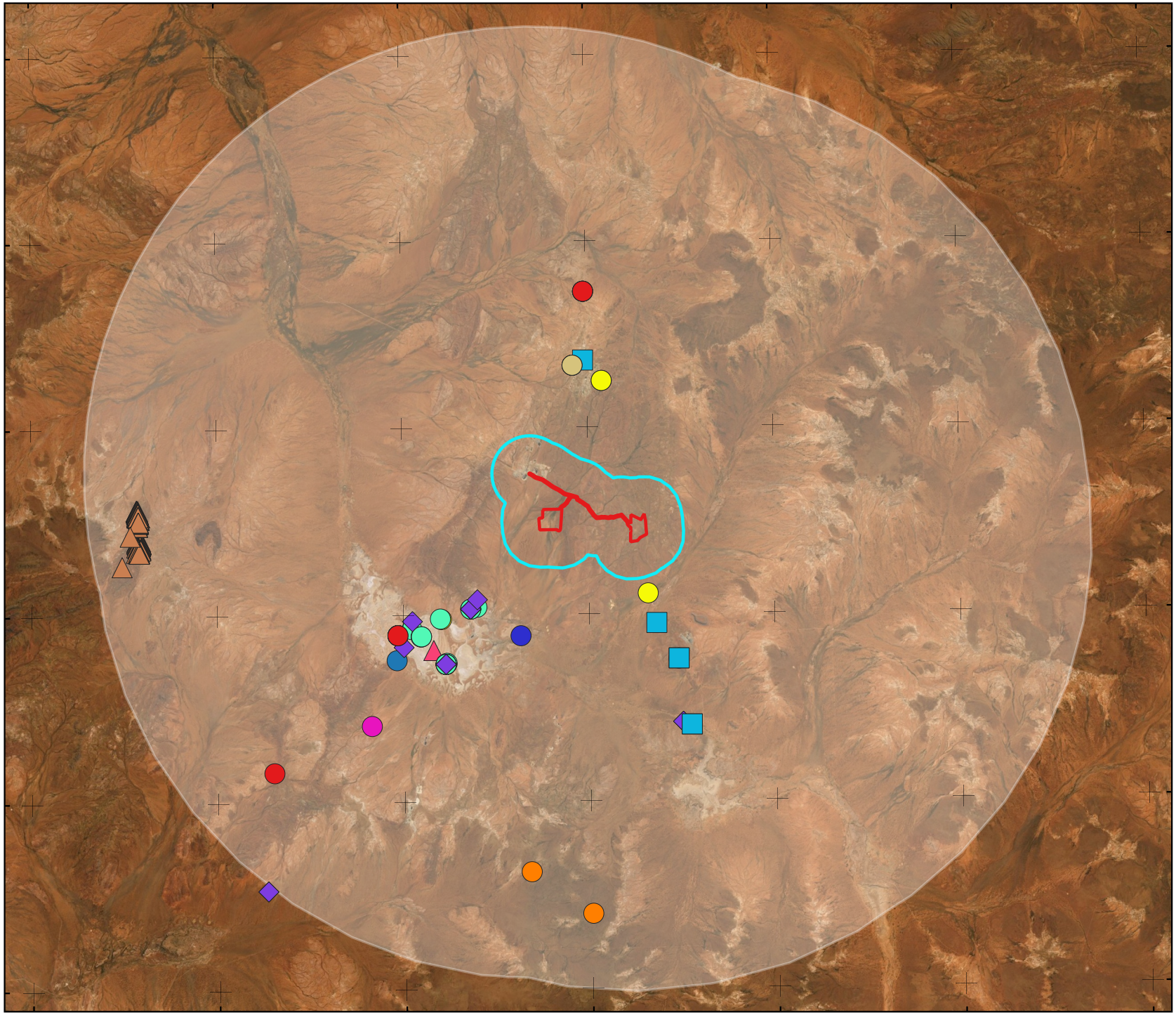
Table 3.10: Conservation Significant Fauna Species Potentially Occurring at the Study Area

Species	Conservation Status EPBCA	BCA	DBCA	Preferred Habitats	Previous Records	Likelihood of Occurrence
Mammals						
Long-tailed Dunnart (*Sminthopsis longicaudata)*	-	-	P4	Primarily rocky hills, breakaways, and plateaus with open Mulga, but may also occur in open plains with a stony substrate.	NatureMap, four recent and one older DBCA records within 25 km. Also recorded at Weld Range (ecologia, 2009d) and Jack Hills (MBS, 2005; ecologia, 2009a).	**High** Recent records nearby and suitable habitat occurs within the Study Area. The low hills and rock outcrops through the centre of the Study Area may support this species.
Birds						
Curlew Sandpiper *Calidris ferruginea*	CR, MI	CR, MI	-	Migratory/waterbird species are typically associated with coastal habitats. When there is water present, these species also inhabit inland ephemeral wetland habitat types.	NatureMap, PMST. DBCA records of these species are highly sporadic, although most have occurrences within the last 20 years.	**Low** The nearest suitable habitat is the ephemeral Lake Annean, around 10 km to the south-west of the Study Area. No wetlands exist within the Study Area itself.
Migratory/waterbirds^	MI	MI	-			
Night Parrot *Pezoporus occidentalis*	EN	CR	-	Most records are from long unburnt *Triodia* grasslands and/or Samphire shrublands featuring large dense clumps of vegetation.	No confirmed records in the area. PMST lists habitat to potentially be present within 40 km of the Study Area.	**Very Low** The nearest suitable (but poor) habitat is the samphire at the edge of Lake Annean, over 6 km to the south-west.
Malleefowl *Leipoa ocellata*	VU	VU	-	Semi-arid and arid habitats. Variety of mallee woodlands and shrublands.	Two 39-year-old DBCA records over 40 km south of the Study Area. Signs found at Weld Range (ecologia, 2009d).	**Low** No recent records nearby, and suitable habitat does not occur in the Study Area.

Species	Conservation Status			Preferred Habitats	Previous Records	Likelihood of Occurrence
	EPBCA	BCA	DBCA			
Princess Parrot *Polytelis alexandrae*	VU	-	P4	Primarily restricted to the Great Sandy Desert, and may infrequently occur further west after heavy rains. Prefers sand dunes with a good cover of shrubs and spinifex, but also utilises Mulga and *Casuarina* stands.	PMST only, based upon the potential presence of suitable habitat for this species within 40 km.	**Low** No records in the vicinity. Preferred habitat of this species does not exist in the Study Area.
Grey Falcon *Falco hypoleucos*	-	VU	-	Generally open inland plains and woodland habitats.	NatureMap, plus one DBCA record within the last 20 years near the Study Area.	**High** Suitable foraging habitat occurs within the Study Area, but no breeding habitat.
Fork-tailed Swift *Apus pacificus*	MI	MI	-	Nomadic, almost entirely aerial lifestyle over a variety of habitats; associated with storm fronts.	PMST, plus one 40-year-old DBCA record next to the Study Area.	**Medium** One old record nearby, and suitable habitat occurs within the Study Area.
Grey Wagtail *Motacilla cinerea*	MI	MI	-	Occurs across Eurasia in a variety of habitats associated with moving water (rivers, streams). Some individuals migrate as far south as northern Australia.	PMST only, based upon the potential presence of suitable habitat for this species within 40 km.	**Low** Vagrant. No records nearby, and no suitable habitat present within Study Area.
Yellow Wagtail *Motacilla flava*	MI	MI	-	Occurs across Europe, Western Asia, and Africa. Utilises a variety of damp or wet habitats with low vegetation, such as meadows, marshes, waterside pastures etc.	PMST only, based upon the potential presence of suitable habitat for this species within 40 km.	**Low** Vagrant. No records nearby, and no suitable habitat present within Study Area.
Peregrine Falcon *Falco peregrinus*	-	OS	-	Widespread; coastal cliffs, riverine gorges, and wooded watercourses.	NatureMap, plus eight recent DBCA records within 40 km. Also at Weld Range (ecologia, 2009d) and Jack Hills (MBS, 2005; ecologia, 2009a).	**High** Several records within 40 km and suitable habitat occurs within the Study Area.

Species	Conservation Status EPBCA	BCA	DBCA	Preferred Habitats	Previous Records	Likelihood of Occurrence
Reptiles						
West Coast Mulga Slider/ Meekatharra Slider (*Lerista eupoda*)	-	-	P1	Open Mulga woodland on loamy soils between Cue and Meekatharra.	NatureMap, and 15 DBCA records exist within 40 km, the closest being around 8 km south-west of the Study Area. All other records are further south-west. Also recorded at Weld Range (ecologia, 2009d).	**High** Many records near the Study Area, and suitable habitat exists in Mulga woodland.
Invertebrates						
Shield-backed Trapdoor Spider (*Idiosoma nigrum*)	VU	EN	-	N/A	PMST only, based upon the potential presence of suitable habitat for this species within 40 km.	**Very Low** Recent taxonomic information (Rix *et al.*, 2018) indicates that prior records in the area are actually *I. clypeatum*, whereas *I. nigrum* is restricted to the Avon Wheatbelt over 300 km south-west.
Northern Shield-backed Trapdoor Spider (*Idiosoma clypeatum*)	-	-	P3	Little information is available, yet it is associated with ironstone ranges in the Murchison region; Blue Hills, Jack Hills, Weld Range.	There are many recent DBCA records from around 50 km west in Weld Range. Also recorded at Jack Hills (ecologia, 2009b).	**Low** No suitable habitat exists within the Study Area, and the closest records are almost 50 km away.
Fairy Shrimp (*Branchinella simplex*)	-	-	P1	Information is also scarce, but it appears to utilise salt lakes in southern inland WA.	NatureMap, and one 42-year-old DBCA record 17 km south-west of the Study Area. Only 10 other records exist, all to the south.	**Low** Suitable habitat exists, but the only record in the area is very old.

^ The remaining migratory birds are listed in the text above



Legend

- Survey Area
- Study Area

Fauna Common Name

- Long-tailed Dunnart
- Grey Falcon
- Peregrine Falcon
- Malleefowl
- Curlew Sandpiper
- Fork-tailed Swift
- Gull-billed Tern
- Common Greenshank
- Pectoral Sandpiper
- Sharp-tailed Sandpiper
- Wood Sandpiper
- West Coast Mulga / Meekatharra Slider
- Northern Shield-backed Trapdoor Spider
- Fairy Shrimp

N

0 5 10 15 20 25 km

Scale 1:800000 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: JFH

Date: 23-11-2020

Results of the Fauna Database Searches

Albury Heath & Euro

Prepared for
Westgold Resources Ltd

Map
3.9

3.5. Limitations & Constraints

Survey specific limitations and constraints for the flora and vegetation reconnaissance and fauna level 1 assessment for the Albury and Euro Survey Area are discussed in Table 3.11, .

Table 3.11: Limitations & Constraints – Flora & Fauna

Limitation	Constraint		Comment
	Recon	Targeted	
Availability of the contextual information at a regional and local scale.	No	No	There are no recent detailed vegetation surveys or datasets available for contextual information to compare Level V vegetation associations at a regional scale. Beard and geological mapping have been used. This mapping is conducted at a coarse scale (1:250,000) and provides an approximate comparison. Database searches and previous survey reports provided a significant level of information, adequate to guide field survey design and effort for the flora and fauna survey.
Competency/experience of the consultant carrying out the survey including experience in bioregion surveyed.	No	No	The botanist and zoologist involved in the field surveys have more than 10 years combined experience in flora, vegetation and fauna surveys throughout Western Australia.
Timing/weather/season/cycle.	No	No	The reconnaissance field survey was conducted in the optimal timing for a flora survey conducted in the Murchison region and Eremaean Botanical Province. Seasonal conditions were adequate, and rainfall was above the long-term median rainfall. All dominant fauna groups, assemblages and major fauna habitat types were recorded. Timing is generally not a consideration for level 1 fauna assessments. The targeted assessment was conducted with adequate survey timing considering all significant species could be sufficiently identified in the absence of reproductive material.
Disturbances (e.g. fire, flood, accidental human intervention) which affected results of survey.	No	No	No disturbances were recorded at the Survey Area that have affected the results of the assessments. No areas were recently burnt (in the past 5 years) within the Survey Area.
Remoteness and/or access problems.	No	No	There were no access restrictions at the Survey Area. Many established tracks allowed adequate access across the Survey Area as appropriate for these surveys.

Table 3.12: Limitations & Constraints – Flora Specific

Flora Specific	Recon	Targeted	Comment
Survey effort and extent.	No	No	Prior to the reconnaissance field survey, relevés were selected to represent the diversity of vegetation and geology present at the Survey Area. The 15 relevés and 16 mapping notes recorded from the Survey Area were sufficient to map and classify the vegetation for a reconnaissance level survey. Previous records of Priority Flora and areas considered potential habitat or unique landform, or geology were targeted. The targeted assessment focussed on areas of high probability for potential habitat of *Heliotropium mitchellii* as indicated by the SDM. Areas within the Survey Area and some areas outside were targeted to identify as many populations as possible.

Flora Specific	Recon	Targeted	Comment
Restrictions to, or functionality of survey equipment and tools to complete the biological assessment.	No	No	During the survey, there were no restrictions to or compromised functionality of survey equipment or tools.
Proportion of flora recorded and/or collected, any identification issues.	No	No	Only suspected or known significant or introduced flora, and flora that was part of vegetation communities were collected which is acceptable for a reconnaissance level flora survey. Two *Maireana* collections and one *Eucalyptus* collection were unable to be conclusively identified attributed to insufficient material and plants being sterile. *Tecticornia* were identified to genus only, unless it was likely to be a known suspected significant taxon.

Table 3.13: Limitations & Constraints – Fauna Specific

Limitation Fauna Specific	Constraint	Comment
Scope (what faunal groups were sampled and were some sampling methods not able to be employed because of constraints such as weather conditions).	No	Sampling techniques were adequate for a level 1 terrestrial fauna survey. All fauna groups were sampled, and no survey constraints were experienced.
Proportion of fauna identified, recorded, and/or collected.	No	All vertebrate fauna species encountered were identified in the field. Level 1 survey methods do not require the identification of all fauna species present within the project.
Sources of information.	No	Database searches and previous survey reports provided a significant level of information, adequate to guide field survey design and effort.
The proportion of the task achieved and further work which might be needed.	No	All components of a level 1 fauna assessment were completed.
Resources (degree of expertise available in animal identification to taxon level).	No	Fauna resources available were adequate and did not compromise the outcome of the survey.
Intensity (in retrospect, was the intensity adequate).	No	A level 1 assessment was adequate to identify faunal assemblages and fauna habitat present within the Survey Area. Targeted searches for significant fauna species were completed within areas of suitable habitat.
Completeness (was the relevant area fully surveyed.	No	All major fauna habitat types were sampled and defined. Habitat types that may host significant fauna species were surveyed.

4. DISCUSSION

4.1. Flora

4.1.1. Local & Regional Significance

There were no Threatened Flora taxa recorded within, or considered likely to occur within, the Survey Area during the flora and vegetation or desktop assessment.

A total of seven significant flora taxa were identified during the reconnaissance and/or targeted assessment or were identified as having high likelihood of occurrence at the Survey Area during the desktop assessment (indicated by a ^ below). Two of these taxa were identified as having high local and/or regional significance prior to the targeted assessment (see Table 4.1), being either uncommon in the local area (locally significant) and/or not broadly distributed across the bioregion, or represented in surrounding bioregions (high regional significance):

- Priority 1
    - *Eremophila retropila*^ - High regional significance
    - *Heliotropium mitchellii* - High local and regional significance
- Priority 3
    - *Calytrix verruculosa*
    - *Ptilotus luteolus*^
    - *Ptilotus lazaridis*^
- Priority 4
    - *Acacia speckii*
    - *Grevillea inconspicua*

The targeted survey recorded 5,654 more individuals from 273 records of *Heliotropium mitchellii* in the vicinity. Given the high number of individuals recorded and considering the populations have not been exhaustively counted outside of the Survey Area, following the targeted assessment this species is considered of Low local significance.

Table 4.1: Local & Regional Significance of Significant Flora

Taxa	Recorded in Survey	Recorded in Desktop	Local Significance		Regional Significance	
Priority 1						
Eremophila retropila	No	No – High likelihood	Many records within close proximity to the Survey Area.	Low	Known from one 80 km area in the Murchison IBRA region.	High
Heliotropium mitchellii	Yes – Recon & Targeted	No	Prior to targeted survey only known from two populations (5 records) within 40 km radius of Meekatharra and considered High local significance. Targeted survey recorded 5,654 more individuals in the vicinity, now considered of Low local significance.	Low	Know only from two populations across 100 km in the Murchison region.	High
Priority 3						
Calytrix verruculosa	Yes – Targeted	No – High likelihood	Common in the local area, six records within close proximity to the Survey Area.	Low	Known from approximately 20 records in the Murchison IBRA region and across a 300 km area.	Low
Ptilotus luteolus	No	No – High likelihood	Four records in local area. However, ground-truthing returned a non-confirmation of this population (identified from the database searches).	Low	Known from approximately 20 records, across a 600 km area throughout the Murchison, Carnarvon, and Gascoyne regions.	Low
Ptilotus lazaridis	No	No – High likelihood	Common in the local area with many records within the vicinity of the Survey Area.	Low	Known from multiple records across 300 km throughout the Murchison and Gascoyne regions.	Low
Priority 4						
Acacia speckii	Yes – Recon	No – High likelihood	Many records surrounding the Survey Area.	Low	Known from 46 records across 400 km throughout the Murchison, Yalgoo, and Gascoyne regions.	Low
Grevillea inconspicua	Yes – Recon & Targeted	No – High likelihood	Known from many records in the vicinity of the Survey Area and within the Study Area.	Low	Known from more than 70 records across over 400 km throughout the Murchison region.	Low

4.1.1.1. Populations of Significant Flora

The Priority 1 taxon, *Heliotropium mitchellii*, prior to this assessment was only known from two populations (five records) in the State and was recorded between 1957 and 1982. These records are all located within 40 km of Meekatharra on stony scree in Mulga shrubland. This taxon is notable given the restriction in range and absence of new records within the last 30 years, despite surveys in the vicinity during this time.

The records of *Heliotropium mitchellii* from within the Survey Area were assessed to capture the full count of individuals within the Survey Area, the proposed Haul Road will occur within this envelope and has the potential to impact 1,068 individuals (based on a 40 m width, and will change based on the haul route). The records located outside the Survey Area do not represent an exhaustive number of individuals for the population and it is likely there are more individuals present in between the traverse lines (spacing <200 m). Population extent to the north and south were traversed and found to continue beyond 2 km to the north and 1 km to the south. The boundaries to the east and west appear to be conclusive. There is potential to find more populations of *Heliotropium mitchellii* at areas with SDM probability values greater than 0.4 and basalt surface geology (A-POm-xb-f). Following the targeted assessment this species is considered of Low local significance.

The Priority 1 flora taxon, *Eremophila retropila* was not recorded in the Survey Area during the reconnaissance or targeted flora survey and is considered unlikely to occur. Should this taxon be found the population would be of high regional significance.

The remaining five significant flora identified as highly likely to occur in the Survey Area remain of low local and regional significance. They are all known from many records with a wide distribution. Two of these were identified in the targeted assessment and one in the reconnaissance, respectively: *Calytrix verruculosa*, *Grevillea inconspicua* and *Acacia speckii*. They each have a scattered low population in the Survey Area.

Database records of *Ptilotus luteolus* and *Calytrix verruculosa* within the wider Study Area were ground-truthed to confirm the presence / absence of existing populations. Collections of a *Ptilotus* species in the vicinity of the previous *P. luteolus* records were made, however these returned a confirmed identification of *Ptilotus obovatus*. No plants resembling *Calytrix verruculosa* were observed at the database locations for that species. The areas of the previous records were degraded, this could suggest the plants have been cleared. These species are still considered highly likely to occur within the Study Area due to previously being recorded. *Calytrix verruculosa* was recorded during the targeted survey from one location in a minor drainage line.

4.2. Vegetation

4.2.1. Vegetation Resembling TEC or PECs

No vegetation types at the Survey Area resemble any known TEC or PEC communities.

4.2.2. Local & Regional Significance

Local and regional significance is discussed for the vegetation types recorded at the Survey Area in Table 4.2. Regional significance was determined by comparing the vegetation types of the Survey Area with the vegetation association mapping undertaken by Beard (DPIRD, 2019) to determine the potential regional extent (Section 1.7). Local significance was determined by assessing potential for the six vegetation types to be present in the local area based on landforms.

One vegetation type was considered to have high local and high regional significance at the Survey Area:

- F3: *Tecticornia* sp. sparse samphire shrubland over *Aristida contorta*, *Diplachne fusca* subsp. *muelleri* sparse tussock grassland.

This vegetation type appears restricted to small pockets within the Survey Area which does not appear to be widespread in the local area or resemble any of the Beard vegetation associations.

One vegetation type is considered to have high local significance in the Survey Area:

- F4: *Acacia aptaneura* tall isolated shrubs over *Micromyrtus sulphurea*, *Grevillea inconspicua* (Priority 4) low sparse shrubland over *Aristida contorta* sparse tussock grassland.

This vegetation type has restricted distribution through the Survey Area and occurs on a small ferrous hill on undulating stony plains. This vegetation type is a refuge for the three significant flora recorded during the flora assessment. It appears to only be represented from the vicinity of Meekatharra.

Table 4.2: Local & Regional Significance of Vegetation Types

Vegetation Type	Significant (Categories in Section 2.3)	Local Significance		Regional Significance	
Stony / Clay Plains					
F1: *Acacia macraneura* or *Acacia fuscaneura* low isolated trees to open woodland over +/-*Acacia grasbyi* or *Acacia craspedocarpa* tall isolated shrubs over *Aristida contorta* low isolated tussock grasses.	No	Most common vegetation type, associated with the flat stony plain landform which is the dominant landform across the Murchison and widespread throughout the Survey Area and surrounds.	Low	Resembles widespread Beard vegetation associations.	Low
F2: *Eremophila fraseri* subsp. *parva* mid isolated shrubs over *Ptilotus roei* low isolated shrubs over *Aristida contorta* low isolated tussock grasses.	No	Associated with floodplains, which is a common landform in the local area.	Low	Resembles widespread Beard vegetation associations.	Low
F3: *Tecticornia* sp. low-mid sparse samphire shrubland over *Aristida contorta*, *Diplachne fusca* subsp. *muelleri* low sparse tussock grassland.	Yes – restricted distribution	Restricted to small pockets within F1 vegetation type. Existing as habitat for *Tecticornia* species, which are an under sampled group across WA with many species not described. Does not appear to be widespread in the local area.	High	Does not resemble any Beard vegetation associations.	High
F4: *Acacia aptaneura* tall isolated shrubs over *Micromyrtus sulphurea*, *Grevillea inconspicua* (P4) low sparse shrubland over *Aristida contorta* low sparse tussock grassland.	No	Restricted distribution in Survey Area, hills in the vicinity are not restricted. Associated with ferrous. Role as refuge for *Heliotropium mitchellii* (P1), *Grevillea inconspicua* (P4) and *Acacia speckii* (P4).	High	Resembles widespread Beard vegetation associations.	Low
Drainage / Creeklines					
D1: *Acacia aptaneura*, *A. craspedocarpa*, *A. macraneura* tall open shrubland over *A. tetragonophylla* mid sparse shrubland over *Enteropogon ramosus*, *Dichanthium sericeum* subsp. *humilius* or *Eragrostis cumingii* low open tussock grassland.	No	Many drainage lines throughout the Survey Area and surrounds.	Low	Resembles widespread Beard vegetation associations.	Low
D2: *Eucalyptus kingsmillii* low open woodland over *Senna artemisioides* subsp. x *artemisioides*, *Acacia burkittii* tall open shrubland over **Cenchrus setiger* low open tussock grassland.	No	Restricted distribution in Survey Area, however drainage lines in the vicinity are common.	Low	Resembles widespread Beard vegetation associations.	Low

4.3. Fauna

4.3.1. Fauna Habitats

The fauna habitats within the Study Area were assessed and mapped into four categories (Table 3.8, Map 3.8). The Survey Area is comprised almost entirely of open plain habitat, which occurs extensively throughout the surrounding region, and fauna typically subsist in very low numbers there. Neither of the remaining much less abundant Mulga woodland or rock outcrop habitats are considered important for any of the conservation significant fauna potentially occurring in the Study Area.

4.3.2. Conservation Significant Vertebrate Fauna

The fauna habitats recorded in the Survey Area were determined to potentially provide suitable habitat for five conservation significant vertebrate fauna species; Long-tailed Dunnart (*Sminthopsis longicaudata*), Grey Falcon (*Falco hypoleucos*), Fork-tailed Swift (*Apus pacificus*), Peregrine Falcon (*Falco peregrinus*), and West Coast Mulga Slider/ Meekatharra Slider (*Lerista eupoda*).

The Long-tailed Dunnart is classified as having a High likelihood of occurring in the Study Area (Table 3.10). This is due to the recent records nearby plus the presence of low hills through the centre, the larger of which have a series of rock outcrops along the top (Map 3.8). However, the proposed haul road mainly follows the flatter ground through this area, and the eastern side of Euro remains on the foot slope of the larger hill to the east of it. Although the Long-tailed Dunnart would still forage in the wider area, these areas do not include the rock outcrop habitats it would preferentially utilise (Van Dyck and Strahan, 2008).

Mulga woodland forms suitable habitat for the Meekatharra Slider in the Study Area, particularly where leaf litter has accumulated on sandy loam soils along the drainage lines. The major creekline draining south-west through the Study Area is continuous with this habitat around Lake Annean, where this species has been recorded multiple times recently. However, not only does the Mulga woodland habitat type cover only 16.2% of the Survey Area and 10.4% of the wider Study Area, it also appears to be common in the surrounding region.

The remaining three conservation significant fauna species (Grey Falcon, Fork-tailed Swift, and Peregrine Falcon) are wide ranging bird species that are expected to only utilise the Survey Area occasionally to forage. No suitable nesting habitat was recorded within the Survey Area.

4.3.3. Short Range Endemic Invertebrates

Short Range Endemic invertebrates are typically associated with habitats that support their primitive biology and ecology, such as moist sheltered areas on the southern slopes of hills and ranges and in protected gullies and gorges, none of which occur in the Survey Area. Dense Mulga woodland habitat can also potentially provide suitable habitat for SRE taxa, particularly along drainage lines such as those recorded in the Survey Area. The limited extent of this habitat within the Survey Area (16.2%) and the large area recorded within 5 km of the Survey Area (3,738.7 ha) indicates that the likelihood of any SRE taxa being restricted to within the Survey Area is very low.

5. CONCLUSION

5.1. Flora

No Threatened flora were recorded or considered likely to occur within the Survey Area or the wider Study Area. Seven significant flora were recorded or assigned a high likelihood of occurrence during the desktop assessment in the Survey Area.

Two of the significant flora taxa were identified as having high local and/or regional significance: *Eremophila retropila* (P1) and *Heliotropium mitchellii* (P1). Prior to this assessment, *Heliotropium mitchellii* was known from few records, none of which were recorded in the last three decades and may potentially be restricted to the Meekatharra area. There were 5,654 new records of *Heliotropium mitchellii* identified in the targeted assessment, 81% of these were recorded outside of the Survey Area. Counts for this taxon within the Survey Area were thorough and it is unlikely there are additional populations or counts within. The counts in the vicinity of the Survey Area were assessing presence and extent and are not considered exhaustive. It is likely there are additional populations of this taxon in the vicinity of the Survey Area. Following the targeted assessment this species is considered of Low local significance.

Eremophila retropila is only known from an 80 km area in the Murchison IBRA region and following the field surveys it is unlikely this taxon occurs within the Survey Area. Most of the areas of intersection between the SDM and the Survey Area were ground-truthed for presence of this taxa.

Five of the significant flora taxa were not considered to be significant at a local or reginal scale at the Survey Area. *Grevillea inconspicua* and *Acacia speckii* were recorded in the reconnaissance assessment and additional locations of *G. inconspicua* were identified from the targeted assessment. *Calytrix verruculosa* was recorded from two locations in the targeted assessment. No additional populations of *Ptilotus lazaridis* (P3), *Ptilotus luteolus* (P3) and *Acacia speckii* (P4) were recorded from the targeted assessment.

5.2. Vegetation

No vegetation at the Survey Area resembles any known TEC or PEC communities.

Of the six vegetation types recorded at the Survey Area, two were considered to have high local and/or high regional significance at the Survey Area:

- F3: *Tecticornia* sp. sparse samphire shrubland over *Aristida contorta*, *Diplachne fusca* subsp. *muelleri* sparse tussock grassland.
- F4: *Acacia aptaneura* tall isolated shrubs over *Micromyrtus sulphurea*, *Grevillea inconspicua* (Priority 4) low sparse shrubland over *Aristida contorta* sparse tussock grassland.

Vegetation type F3 appears restricted to small pockets within the Survey Area which does not appear to be widespread in the local area or resemble any of the Beard vegetation associations.

Vegetation type F4 is restricted in the Survey Area and has high significance in the local area. It occurs on a small ferrous hill on undulating stony plains and provides refuge for the three significant flora recorded during the flora assessment.

5.3. Terrestrial Fauna

The level 1 fauna survey and desktop assessment did not identify any conservation significant terrestrial fauna species that would be considerably impacted by the proposed development at Albury Heath & Euro. All five of the vertebrate fauna species identified as having a medium or high likelihood of occurrence in

the Study Area are in no way restricted to any of the habitats there, and most would in fact prefer to utilise more optimal habitats elsewhere.

It is possible a population of Long-tailed Dunnart (*Sminthopsis longicaudata*) exists in the wider Study Area, but there is only a small area of potential foraging habitat within the Survey Area. Only the Meekatharra Slider (*Lerista eupoda*) has a limited distribution in the region, but suitable habitat for it is minimally represented in both the Survey Area and wider Study Area.

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Appendix A: Conservation Codes

Appendix A1: Definitions of Conservation Categories under the EPBC Act

Category	Definition
Extinct	A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
Extinct in the Wild	A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time: (a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered	A native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
Endangered	A native species is eligible to be included in the endangered category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable	A native species is eligible to be included in the vulnerable category at a particular time if, at that time: (a) it is not critically endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
Conservation Dependent	A native species is eligible to be included in the conservation dependent category at a particular time if, at that time: (a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered, or critically endangered; or (b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.

Appendix A2: Definitions of Conservation Categories under the BC Act (DBCA 2019)

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 s 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.

Category	Definition
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.
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.

Category	Definition
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 wild. 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 species 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.
[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).	

Appendix A3: Definitions of Priority Species Classification (DBCA 2019)

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.

Category	Definition
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 A4: Legal Status Definition of Listed Plants in Western Australia

Legal Status	Definition
Declared Pest, Prohibited – s12	Prohibited organisms are declared pests by virtue of section 22(1) and may only be imported and kept subject to permits.
Declared Pest – s22(2)	Declared pests must satisfy any applicable import requirements when imported and may be subject to control keeping requirements.
Permitted – s11	Permitted organisms must satisfy applicable import requirements and import permits (where required).
Permitted, Requires Permit – r73	Regulation 73 permitted organisms may be subject to restriction under legislation other than the BAM Act (2007).
Unlisted	Unlisted organisms are prohibited in WA.
Control Categories	**Definition**
C1 Exclusion	Organisms should be excluded from parts or all of WA.
C2 Eradication	Organisms should be eradicated from all or parts of WA.
C3 Management	Organisms should have some form of management applied that will alleviate the harmful impact of the organism, reduce the numbers or distribution of the organism, or prevent or contain the spread of the organism.
Unassigned	Declared pest that are recognised as having a harmful impact under certain circumstances where their subsequent control requirements are determined by a plan or other legislative arrangements under the Act.
Keeping Categories	**Definition**
Prohibited keeping	Can only be kept under a permit for public display, education, or scientific purposes.
Restricted keeping	Kept under a permit by private individuals due to a low risk of becoming a problem for the environment.
Exempt keeping	No permit or conditions are required for keeping. Organism may be subject to restrictions under the Wildlife Conservation Act (WCA, 1950).

Appendix B: Site Data Collection Sheet

Details Included in Relevé Sampling

- Site code, date; location;
- Botanist;
- Photograph;
- Vegetation condition (as defined in Table 2.2);
- Disturbances (grazing, weeds, tracks, mounds, litter, erosion, clearing etc.);
- Time since fire (<1 year, 1-2 years, 2-5 years, >5 years); and
- Landform, geology, and soils, consistent with the Australian soils and land survey field handbook (National Committee on Soil and Terrain, 2009), including:
    - Flat: plain
    - Flat: valley floor
    - Flat: tidal
    - Slope: lower, mid, upper
    - Slope: cliff
    - Slope: simple
    - Slope: simple dune
    - Hillock
    - Crest: hill
    - Crest: dune
    - Crest: mesa
    - Ridge: hill
    - Ridge: dune
    - Open depression: drainage line
    - Open depression: creek/river
    - Open depression: floodplain
    - Closed depression: Lake edge
    - Closed depression: Swamp edge
    - Drainage line on slope: lower, mid, upper
    - Slope: Level <1°, Very gentle 1°, Gentle 3°, Moderate 10°, Steep 23°, Very steep 37°, Precipitous 60° and Cliff 80°;
    - Aspect: North, South, East, West;
    - Soil: Sand, Clay, Loam, Sandy-clay, Hard-clay, Cracking-clay, and Saline;
    - Soil Colour: Dark, Light, Red, Orange, White, Grey, Brown, Black and Yellow;
    - Rock Type: BIF, Calcrete, Creek stones, Dolerite, Granite, Ironstone, Shale, Quartz and Other;
    - Rock Abundance: No rocks, Very few (<2%), Few (2-10%), Common (10-20%), Many (20-50%), Abundant (50-90%) and Continuous (>90%); and
    - Rock Size: Fine gravel (<6 mm), Medium gravel (6-20 mm), Coarse gravel (20-60 mm), Cobbles (60-200 mm), Stones (200-600 mm) and Boulders (>600 mm).
- Dominant species – Crown cover (%) and Height (m); and
- Vegetation structure - NVIS Level V: three dominant species in three strata: upper, middle, and ground (ESCAVI, 2003).

Appendix C: Relevé Site Data

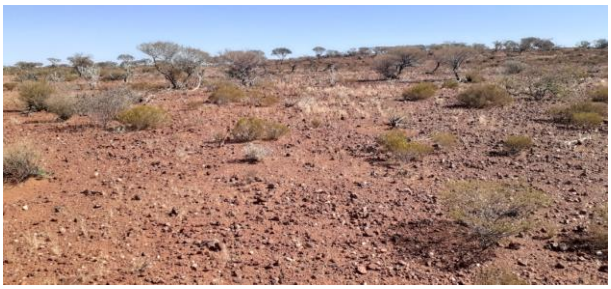
Site: AR01	Type: Relevé	Size: n/a	Date: 10/06/2020	Botanist: Carmel Winton
Landform:	Flat, Plain			
Slope, aspect:	1°- Very Gentle			
Soil:	Sandy clay loam, Red, Brown			
Rocks:	Ironstone			
Abundance:	50-90% - Abundant			
Size:	60-200 mm - Cobbles			
Fire:	>5 years			
Condition:	Excellent			
Notes:				
Veg Unit:	F1			
Location:	50S 655429 7036940			

Species	Height	Cover	Species	Height	Cover
Acacia grasbyi	1.5	2	*Maireana sp. 2*	0.2	18
Acacia macraneura	2.5	3	*Ptilotus exaltatus*	0.1	0.1
Acacia synchronicia	1	1	*Ptilotus roei*	0.05	0.1
Aristida contorta	0.2	0.1			

Site: AR02	Type: Relevé	Size: n/a	Date: 10/06/2020	Botanist: Carmel Winton
Landform:	Hill, Slope, Mid			
Slope, aspect:	10° - Moderate, S			
Soil:	Sandy loam, Red Brown			
Rocks:	Laterite			
Abundance:	20-50% Many			
Size:	20-60 mm - Coarse gravel			
Fire:	> 5 yrs			
Condition:	Excellent			
Notes:	Grazing (Low), Weeds (Medium)			
Veg Unit:	F1			
Location:	50 S 655062 7037485			

Species	Height	Cover	Species	Height	Cover
Acacia fuscaneura	3	5	*Enneapogon caerulescens*	0.2	1
Acacia macraneura	4	2	*Indigofera monophylla*	0.5	1
Acacia ramulosa var. linophylla	2	1			

Site: AR03	Type: Relevé	Size: n/a	Date: 10/06/2020	Botanist: Carmel Winton
Landform:	Hill, Slope, Mid			
Slope, aspect:	10° - Moderate			
Soil:	Sandy loam, Red Brown			
Rocks:	Granite			
Abundance:	50-90% Abundant			
Size:	6-20 mm - Medium gravel			
Fire:	>5 years			
Condition:	Excellent			
Notes:	Grazing (Low)			
Veg Unit:	F4			
Location:	50 S 654893 7037752			

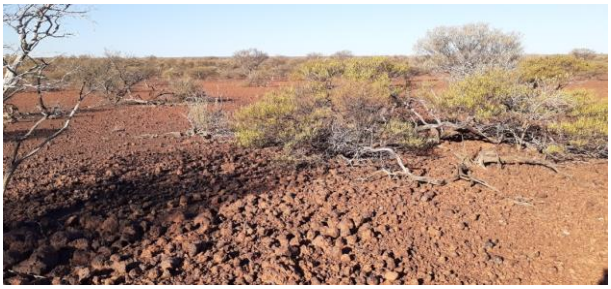


Species	Height	Cover	Species	Height	Cover
Acacia aptaneura	2	2	*Micromyrtus sulphurea*	0.5	4
Aristida contorta	0.2	2	*Ptilotus obovatus*	0.3	0.1
Grevillea inconspicua	0.5	1	*Senna artemisioides subsp. helmsii*	0.5	1
Halgania cyanea var. Allambi Stn (B.W. Strong 676)	0.5	0.1			

Site: AR04	Type: Relevé	Size: n/a	Date: 1006/2020	Botanist: Carmel Winton
Landform:	Drainage, Drainage line on flat			
Slope, aspect:	1° - Very Gentle			
Soil:	Sand, Red Brown			
Rocks:	Laterite			
Abundance:	10 -20% Common			
Size:	6-20 mm - Medium gravel			
Fire:	>5 years			
Condition:	Excellent			
Notes:				
Veg Unit:	D1			
Location:	50 S 654667 7038078			

Species	Height	Cover	Species	Height	Cover
Abutilon cryptopetalum	0.5	1	*Enteropogon ramosus*	0.4	18
Acacia aptaneura	6	40	*Hakea lorea subsp. lorea*	6	1
Acacia tetragonophylla	2	7			

Site: AR05	Type: Relevé	Size: n/a	Date: 10/06/2020	Botanist: Carmel Winton
Landform:	Flat, Plain			
Slope, aspect:	3° - Gentle			
Soil:	Sand, Dark Red			
Rocks:	Ironstone			
Abundance:	>90% Continuous			
Size:	60-200 mm - Cobbles			
Fire:	>5 years			
Condition:	Excellent			
Notes:	Undulating			
Veg Unit:	F1			
Location:	50 S 656694 7035513			



Species	Height	Cover	Species	Height	Cover
Acacia grasbyi	1.5	8	*Acacia sclerosperma subsp. sclerosperma*	1.5	1
Acacia macraneura	3	2	*Ptilotus schwartzii*	0.2	0.1

Site: AR06	Type: Relevé	Size: n/a	Date: 10/06/2020	Botanist: Carmel Winton
Landform:	Flat, Plain			
Slope, aspect:	<1° - Level			
Soil:	Sandy loam, Red Orange			
Rocks:	Ironstone			
Abundance:	50-90% Abundant			
Size:	20-60 mm - Coarse gravel			
Fire:	>5 years			
Condition:	Excellent			
Notes:				
Veg Unit:	F1			
Location:	50 S 656810 7037329			

Species	Height	Cover	Species	Height	Cover
Acacia fuscaneura	5	4	*Hakea preissii*	0.5	1
Acacia macraneura	5	2	*Sida ectogama*	0.5	1
Aristida contorta	0.2	1			

Site: AR07	Type: Relevé	Size: n/a	Date: 10/06/2020	Botanist: Carmel Winton
Landform:	Flat, Plain			
Slope, aspect:	<1° - Level			
Soil:	Sandy clay loam, Red Orange			
Rocks:	Ironstone			
Abundance:	50-90% Abundant			
Size:	6-20 mm - Medium gravel			
Fire:	> 5 yrs			
Condition:	Very Good			
Notes:				
Veg Unit:	F1			
Location:	50 S 657642 7035620			

Species	Height	Cover	Species	Height	Cover
Acacia fuscaneura	7	12	*Eremophila forrestii*	1.5	1
Acacia grasbyi	1.5	2	*Eremophila fraseri subsp. parva*	1.5	1
Acacia pruinocarpa	7	2	*Ptilotus roei*	0.1	0.1
Aristida contorta	0.2	0.1	*Ptilotus rotundifolius*	1.5	0.5
Dodonaea rigida	1.5	1			

Site: ER08	Type: Relevé	Size: n/a	Date: 11/06/2020	Botanist: Carmel Winton
Landform:	Flat, Plain			
Slope, aspect:	<1° - Level			
Soil:	Sandy clay loam, Red Orange			
Rocks:	Granite			
Abundance:	50-90% Abundant			
Size:	60-200 mm - Cobbles			
Fire:	>5 years			
Condition:	Excellent			
Notes:				
Veg Unit:	F1			
Location:	50 S 651753 7037908			

Species	Height	Cover	Species	Height	Cover
Acacia aptaneura	4	2	*Duma florulenta*	0.3	0.1
Acacia craspedocarpa	3	3	*Eremophila forrestii subsp. forrestii*	1	0.1
Acacia tetragonophylla	2	0.1	*Eremophila latrobei subsp. latrobei*	1	0.1
Aristida contorta	0.2	6			

Site: ER09	Type: Relevé	Size: n/a	Date: 11/06/2020	Botanist: Carmel Winton
Landform:	Hill: crest			
Slope, aspect:	<1° - Level			
Soil:	Clay loam, Red Orange			
Rocks:	Ironstone			
Abundance:	50-90% Abundant			
Size:	6-20 mm - Medium gravel			
Fire:	>5 years			
Condition:	Excellent			
Notes:				
Veg Unit:	F3			
Location:	50 S 652069 7037946			

Species	Height	Cover	Species	Height	Cover
Aristida contorta	0.2	1	*Sclerolaena cuneata*	0.2	0.1
Diplachne fusca subsp. muelleri	0.2	1	*Streptoglossa liatroides*	0.2	0.1
Maireana sp. 1	0.2	0.1	*Tecticornia sp. 1*	0.5	5
Hakea preissii	0.5	1	*Tecticornia sp. 2*	0.5	2

Site: ER10	Type: Relevé	Size: n/a	Date: 11/06/2020	Botanist: Carmel Winton
Landform:	Drainage: drainage line on flat			
Slope, aspect:	<1° - Level			
Soil:	Sandy clay loam, Red Orange			
Rocks:	Ironstone			
Abundance:	50-90% Abundant			
Size:	6-20 mm - Medium gravel			
Fire:	>5 years			
Condition:	Excellent			
Notes:	Major drainage			
Veg Unit:	D1			
Location:	50 S 650856 7038096			

Species	Height	Cover	Species	Height	Cover
Acacia craspedocarpa	4	8	*Acacia tetragonophylla*	2	4
Acacia fuscaneura	5	3	*Aristida contorta*	0.2	1
Acacia macraneura	7	4	*Cleome viscosa*	0.3	0.1
Acacia pruinocarpa	7	1	*Eragrostis cumingii*	0.3	5
Acacia craspedocarpa	4	8	*Eriachne helmsii*	0.3	3
Acacia sclerosperma subsp. sclerosperma	2.5	3			

Site: ER11	Type: Relevé	Size: n/a	Date: 11/06/2020	Botanist: Carmel Winton
Landform:	Drainage, Floodplain			
Slope, aspect:	<1° - Level			
Soil:	Clay, Light Orange Brown			
Rocks:	Ironstone			
Abundance:	20-50% Many			
Size:	6-20 mm - Medium gravel			
Fire:	>5 years			
Condition:	Excellent			
Notes:				
Veg Unit:	D1			
Location:	50 S 645628 7036673			

Species	Height	Cover	Species	Height	Cover
**Bidens bipinnata*	0.2	1	*Eragrostis pergracilis*	0.2	18
Acacia aptaneura	3	3	*Grevillea berryana*	6	3
Acacia incurvaneura	4	7	*Psydrax latifolia*	1	1
Eragrostis cumingii	0.2	9			

Site: ER12	Type: Relevé	Size: n/a	Date: 11/06/2020	Botanist: Carmel Winton
Landform:	Drainage, Floodplain			
Slope, aspect:	<1° - Level			
Soil:	Clayey sand, Red Orange			
Rocks:	Ironstone			
Abundance:	20-50% Many			
Size:	<6 mm - Fine gravel			
Fire:	> 5 yrs			
Condition:	Excellent			
Notes:				
Veg Unit:	F2			
Location:	50 S 644364 7036933			

Species	Height	Cover	Species	Height	Cover
Aristida contorta	0.2	0.5	*Ptilotus roei*	0.2	0.1
Eremophila fraseri subsp. parva	1.5	1			

Site: ER13	Type: Relevé	Size: n/a	Date: 11/06/2020	Botanist: Carmel Winton
Landform:	Drainage, Drainage line on flat			
Slope, aspect:	<1° - Level			
Soil:	Clay, Red Brown			
Rocks:	No rocks			
Abundance:				
Size:				
Fire:	2-5 years			
Condition:	Very Good			
Notes:				
Veg Unit:	D1			
Location:	50 S 644951 7037951			

Species	Height	Cover	Species	Height	Cover
**Bidens bipinnata*	0.5	2	*Dysphania rhadinostachya subsp. rhadinostachya*	0.2	0.1
**Malvastrum americanum*	0.3	1	*Eragrostis falcata*	0.4	4
Acacia aptaneura	6	4	*Eremophila fraseri subsp. parva*	2.5	4
Acacia craspedocarpa	5	5	*Euphorbia tannensis subsp. eremophila*	0.3	0.1
Acacia tetragonophylla	2.5	5	*Ptilotus polystachyus*	0.5	0.1
Dichanthium sericeum subsp. humilius	0.5	12			

Site: ER14	Type: Relevé	Size: n/a	Date: 11/06/2020	Botanist: Carmel Winton
Landform:	Drainage, Creek/River			
Slope, aspect:	1° - Very Gentle			
Soil:	Sandy loam, Red Orange Brown			
Rocks:	Creek stones			
Abundance:	10 -20% Common			
Size:	<6 mm - Fine gravel			
Fire:	>5 years			
Condition:	Very Good			
Notes:				
Veg Unit:	D2			
Location:	50 S 646897 7041076			

Species	Height	Cover	Species	Height	Cover
**Bidens bipinnata*	0.2	1	*Acacia sclerosperma subsp. sclerosperma*	1.5	1
**Cenchrus setiger*	0.5	25	*Duperreya commixta*	2	0.1
**Malvastrum americanum*	0.3	2	*Eucalyptus ?kingsmillii*	9	25
**Ricinus communis*	3	0.1	*Senna artemisioides subsp. x artemisioides*	2	20
Abutilon cryptopetalum	0.4	0.1	*Setaria dielsii*	0.6	0.1
Acacia burkittii	6	15	*Trichodesma zeylanicum*	0.4	0.1
Acacia incurvaneura	4.5	1			

Site: ER15	Type: Relevé	Size: n/a	Date: 11/06/2020	Botanist: Carmel Winton
Landform:	Flat, Plain			
Slope, aspect:	<1° - Level			
Soil:	Sandy clay, Red Orange			
Rocks:	Ironstone			
Abundance:	50-90% Abundant			
Size:	6-20 mm - Medium gravel			
Fire:	2-5 years			
Condition:	Good			
Notes:	Major drainage			
Veg Unit:	F1			
Location:	50 S 643895 7043024			

Species	Height	Cover	Species	Height	Cover
Acacia macraneura	3	2	*Acacia pruinocarpa*	3	1

Appendix D: Likelihood of Occurrence of Significant Flora

Status	Family	Taxon	Description	Habitat	Closest Record to Survey Area (km)	Likelihood
P3	FABACEAE	*Acacia sclerosperma* subsp. *glaucescens*	Rounded shrub 2 - 3 m tall .	Bank of small watercourse.	22.1	Medium
P4	FABACEAE	*Acacia speckii*	Bushy, infundibular shrub 2 – 3 m tall, crown rounded, multi-stem from base. Phyllodes erect, pale subglaucous, nerves fine and raised, pulvinus yellowish. Legumes (old) light brown.	Rocky hills, hillslopes, and outcrops with rocky soils over granite. Or creekline, stony and gravelly red earth.	15.6	High
P1	EUPHORBIA	*Beyeria lapidicola*	1 - 2 m high.	Plain with a currently dry creek bed. Red-orange sandy clay, fine gravel. Ferrous.	68.4	Medium
P3	MYRTACEAE	*Calytrix verruculosa*	Compact shrub 75 cm high, flowers white, buds red. Leaves fresh green.	Brown clayey sand bank.	18.6	High (Recorded in Study Area)
P1	LAMIACEAE	*Dicrastylis mitchellii*	0.3 m tall (semi perennial herb).	Growing on clay soils.	63.3	Medium
P3	RUTACEAE	*Drummondita miniata*	Erect perennial 0.5 – 1 m tall upright shrub. Flowers: red bracts and grey tubes. Yellowish bush.	On top or upper edge / flat upper surface of breakaway, red brown sandy loam with quartz and finely bedded rocks.	19.4	Medium
P3	POACEAE	*Eragrostis* sp. Erect spikelets (P.K. Latz 2122)	Caespitose grass 30 cm high	Calcrete platform.	17.8	Low
P3	SCROPHULARIACEAE	*Eremophila arachnoides* subsp. *arachnoides*	Shrub 1 – 2 m tall. Flowers pale lilac.	On shallow brown loams over limestone.	60.3	Medium
P3	SCROPHULARIACEAE	*Eremophila fasciata*	Perennial erect, branched shrub, 1 - 1.5 m high. Flowers purple. Leaves dense, clustered on stem.	Growing from base to top of stony hillside, more up gullies. Brown / red ironstone gravel.	18.6	Medium
P1	SCROPHULARIACEAE	*Eremophila retropila*	Perennial, erect large spreading shrub 1 m tall, sepals reddish brown; corolla lilac, tube white inside, unspotted, stigma exerted.	Growing on stony red brown clay loams.	12.5	High
P4	GOODENIACEAE	*Goodenia berringbinensis*	Ascending, 10 – 20 cm high; ascending flowers yellow.	In red sandy loam, drying creek bed.	64.4	Medium
P4	PROTEACEAE	*Grevillea inconspicua*	1 m tall upright globular shrub with pendulous foliage and small white sparse flowers.	Greenstone or basalt outcrop on drainage line / creek.	8.0	High (Recorded in Study Area)
P3	LAMIACEAE	*Hemigenia virescens*	Compact shrub 40 cm high. Flowers purple, throat spotted mauve. Small leaves.	Yellow-red sandy clay.	28.6	Medium
P3	MALVACEAE	*Hibiscus krichauffianus*	Low or ascending shrub, (0.03-)0.2-0.7 m high. Fl. purple-pink, Mar or Oct.	Red sandy soils.	65.6	Medium
P3	MYRTACEAE	*Homalocalyx echinulatus*	Shrub, 0.45-1 m high. Fl. pink, Jun to Sep.	Laterite. Breakaways, sandstone hills.	18.6	Medium

Status	Family	Taxon	Description	Habitat	Closest Record to Survey Area (km)	Likelihood
P1	BRASSICACEAE	*Lepidium xylodes*	Bush 1.5 m high, flowers white.	Stony, gravelly loam.	50.0	Low
P3	BRASSICACEAE	*Menkea draboides*	Prostrate annual herb 2 mm high. Flowers white.	Red clayey sand.	27.0	Medium
P3	MYRTACEAE	*Micromyrtus placoides*	Shrub, 0.5-2.3 m high, sometimes widely spreading with several stems or branches from the base.	Red-orange sandy clay, orange-yellow sandy clay to clayey loam, coarse gravel, banded ironstone, laterite, quartz, basalt. Gently undulating plains, dry creek beds, hillcrests, ridges.	71.0	Low
P3	PROTEACEAE	*Petrophile pauciflora*	Dense spiked shrub to 1 m high.	Dissected granite country.	62.6	Low
P3	LAMIACEAE	*Prostanthera petrophila*	Shrub to 1 m high.	Red-orange clay loam, ferrous stones (BIF) and boulders with some surface level plates.	67.6	Low
P1	AMARANTHACEAE	*Ptilotus actinocladus*	Unknown.	Unknown.	65.6	Low
P3	AMARANTHACEAE	*Ptilotus beardii*	Compact, perennial shrub, 0.15-0.5 m high, leaves linear, 2-10 mm long, 0.5-3 mm wide; spike pink, hemispherical, 15-30 mm long, 20-40 mm wide, 5-8 -flowered; tepals 14-17 mm long; 2 fertile stamens, staminodes 3; ovary glabrous; style slightly curved, 9.9-11.1 mm long, eccentrically fixed to ovary. Fl. pink-red, Aug to Oct.	Flat, ironstone with 0-10% loose surface rock. Well-drained dry brown sand/light clay. Clayey soils. Saline flats, low breakaways.	62.0	Low
P3	AMARANTHACEAE	*Ptilotus lazaridis*	0.4 m tall shrub. Flowers sparse and pink to red.	Clay drainage floor between calcrete platforms.	17.5	High
P3	AMARANTHACEAE	*Ptilotus luteolus*	Perennial undershrub to 0.5 m. Leaves pale lime.	On hillslope.	7.4	High
P1	ASTERACEAE	*Rhodanthe sphaerocephala*	Erect annual, herb, to 0.25 m high, with ascending branches. Fl. Oct.	Clayey loam. On flats.	65.6	Medium
P3	MALVACEAE	*Sida picklesiana*	Compact shrub with yellow flowers growing up to 1 m tall.	Breakaway scree slope.	58.0	Low
P1	RHAMNACEAE	*Stenanthemum mediale*	Erect shrub, ca 0.35 m high, leaves entire. Fl. Apr to Aug.	Red clayey sand.	68.9	Low
P3	CHENOPODIACEAE	*Tecticornia cymbiformis*	Rounded shrub to 1 m high. Flowering. Branches retain fruits from the year before. Black stem gives the shrub an overall dark appearance.	On the edge of saline area near creekline. Red-brown sandy-clay.	25.1	Low

Status	Family	Taxon	Description	Habitat	Closest Record to Survey Area (km)	Likelihood
P3	ZYGOPHYLLACEAE	*Tribulus adelacanthus*	Prostrate herb, plants villous; leaflet pairs 3-6; fruits 5-winged, lacking spines, 10-14 mm high.	Rocky hills and hillslopes with rocky soils over granite.	19.0	Medium
P3	MYRTACEAE	*Verticordia jamiesonii*	0.1 - 0.5 m high. Fl. white/pink, Sep to Oct.	Gentle hill slope. Yellow-orange clay loam with coarse gravel, pebbles, and stones/boulders. Lateritic breakaways / Ferrous (BIF).	69.2	Low

Appendix E: Flora Site by Species Matrix

Family	Species	AR01	AR02	AR03	AR04	AR05	AR06	AR07	ER08	ER09	ER10	ER11	ER12	ER13	ER14	ER15	Op-coll
AMARANTHACEAE	*Ptilotus exaltatus*	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ptilotus obovatus	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ptilotus polystachyus	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-
	Ptilotus roei	-	-	-	-	-	-	0.1	-	-	-	-	0.1	-	-	-	-
	Ptilotus rotundifolius	-	-	-	-	-	-	0.5	-	-	-	-	-	-	-	-	-
	Ptilotus schwartzii	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-
ASTERACEAE	**Bidens bipinnata*	-	-	-	-	-	-	-	-	-	-	1	-	2	1	-	-
	Streptoglossa liatroides	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-
BORAGINACEAE	*Halgania cyanea* var. Allambi Stn (B.W. Strong 676)	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
	Heliotropium mitchellii – P1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Trichodesma zeylanicum	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-
CHENOPODIACEAE	*Dysphania rhadinostachya* subsp. *rhadinostachya*	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-
	Maireana sp. 1	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-
	Maireana sp. 2	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Rhagodia eremaea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Salsola australis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sclerolaena cuneata	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-
	Tecticornia sp.	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	2
CLEOMACEAE	*Cleome viscosa*	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-
CONVOLVULACEAE	*Duperreya commixta*	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-
EUPHORBIACEAE	*Euphorbia australis*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Euphorbia porcata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Euphorbia tannensis subsp. *eremophila*	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-
	**Ricinus communis*	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-
FABACEAE	*Acacia aptaneura*	-	-	2	40	-	-	-	2	-	-	9	-	8	-	-	-
	Acacia burkittii	-	-	-	-	-	-	-	-	-	-	-	-	-	15	-	-
	Acacia craspedocarpa	-	-	-	-	-	-	-	3	-	8	-	-	5	-	-	-
	Acacia fuscaneura	-	5	-	-	-	4	12	-	-	5	-	-	-	-	-	-
	Acacia grasbyi	2	-	-	-	8	-	2	-	-	-	-	-	-	-	-	-
	Acacia incurvaneura	-	-	-	-	-	-	-	-	-	-	7	-	-	1	-	12
	Acacia macraneura	3	2	-	-	2	2	-	-	-	16	-	-	-	-	2	-
	Acacia pruinocarpa	-	-	-	-	-	-	2	-	-	1	-	-	-	-	1	-
	Acacia ramulosa var. *linophylla*	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Acacia sclerosperma subsp. *sclerosperma*	-	-	-	-	1	-	-	-	-	3	-	-	-	1	-	-
	Acacia speckii – P4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Acacia synchronicia	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Acacia tetragonophylla	-	-	-	7	-	-	-	0.1	-	4	-	-	5	-	-	-

Family	Species	AR01	AR02	AR03	AR04	AR05	AR06	AR07	ER08	ER09	ER10	ER11	ER12	ER13	ER14	ER15	Op-coll
	Indigofera monophylla	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Senna artemisioides subsp. *helmsii*	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
	Senna artemisioides subsp. x *artemisioides*	-	-	-	-	-	-	-	-	-	-	-	-	-	20	-	-
	Senna sp. Meekatharra (E. Bailey 1-26)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
GOODENIACEAE	*Scaevola spinescens*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
MALVACEAE	*Abutilon cryptopetalum*	-	-	-	1	-	-	-	-	-	-	-	-	-	0.1	-	-
	Sida ectogama	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
MALVASTRUM	**Malvastrum americanum*	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-
MYRTACEAE	*Eucalyptus ?kingsmillii*	-	-	-	-	-	-	-	-	-	-	-	-	-	25	-	-
	Calytrix verruculosa – P3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
	Micromyrtus sulphurea	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-
NYCTAGINACEAE	*Boerhavia repleta*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
POACEAE	*Aristida contorta*	-	-	2	-	-	1	0.1	6	1	1	-	0.5	-	-	-	-
	**Cenchrus setiger*	-	-	-	-	-	-	-	-	-	-	-	-	-	25	-	-
	Dactyloctenium radulans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dichanthium sericeum subsp. *humilius*	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-
	Diplachne fusca subsp. *muelleri*	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
	Enneapogon caerulescens	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Enteropogon ramosus	-	-	-	18	-	-	-	-	-	-	-	-	-	-	-	-
	Eragrostis cumingii	-	-	-	-	-	-	-	-	-	5	9	-	-	-	-	-
	Eragrostis falcata	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-
	Eragrostis pergracilis	-	-	-	-	-	-	-	-	-	-	18	-	-	-	-	-
	Eriachne helmsii	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-
	Paspalidium basicladum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Setaria dielsii	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-
POLYGONACEAE	*Duma florulenta*	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-
	**Rumex vesicarius*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PROTEACEAE	*Grevillea berryana*	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
	Grevillea inconspicua – P4	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
	Hakea lorea subsp. *lorea*	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
	Hakea preissii	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	1
RUBIACEAE	*Psydrax latifolia*	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
	Psydrax rigidula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SAPINDACEAE	*Dodonaea rigida*	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
SCROPHULARIACEAE	*Eremophila exilifolia*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Eremophila forrestii	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
	Eremophila forrestii subsp. *forrestii*	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-

Family	Species	AR01	AR02	AR03	AR04	AR05	AR06	AR07	ER08	ER09	ER10	ER11	ER12	ER13	ER14	ER15	Op-coll
	Eremophila fraseri subsp. *parva*	-	-	-	-	-	-	1	-	-	-	-	1	4	-	-	-
	Eremophila latrobei subsp. latrobei	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-
	Eremophila macmillaniana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Eremophila oppositifolia subsp. *angustifolia*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Eremophila pantonii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
SOLANACEAE	*Solanum lasiophyllum*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZYGOPHYLLACEAE	*Tribulus forrestii*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix F: Fauna Species List

		Conservation status									
		EPBC Act	BC Act	DBCA	Naturemap	DBCA	PMST	Weld Range (ecologia 2009b)	Jack Hills (MBS 2005)	Jack Hills (ecologia 2009a)	This Survey
Mammals											
Tachyglossidae											
Tachyglossus aculeatus	Short-beaked Echidna				X			X	X	X	X
Dasyuridae											
Antechinomys laniger	Kultarr				X			X			
Dasykaluta rosamondae	Little Red Kaluta				X						
Ningaui ridei	Wongai Ningaui							X			
Pseudantechinus woolleyae	Woolley's Pseudantechinus				X			X	X	X	
Sminthopsis crassicaudata	Fat-tailed Dunnart				X						
Sminthopsis dolichura	Little Long-tailed Dunnart							X			
Sminthopsis longicaudata	Long-tailed Dunnart			P4	X	X		X	X	X	
Sminthopsis macroura	Stripe-faced Dunnart				X			X	X	X	
Macropodidae											
Osphranter robustus	Euro				X			X	X	X	X
Osphranter rufus	Red Kangaroo				X			X	X	X	
Muridae											
Notomys alexis	Spinifex Hopping-mouse				X			X	X	X	
Pseudomys desertor	Desert Mouse				X						
Pseudomys hermannsburgensis	Sandy Inland Mouse				X			X	X	X	
Emballonuridae											
Taphozous hilli	Hill's Sheathtail-bat				X			X			
Molossidae											
Austronomus australis	White-striped Free-tailed Bat							X	X	X	
Vespertilionidae											
Chalinolobus gouldii	Gould's Wattled Bat				X			X		X	
Nyctophilus geoffroyi	Lesser Long-eared Bat				X			X			
Scotorepens balstoni	Inland Broad-nosed Bat				X			X		X	
Vespadelus baverstocki	Inland Forest Bat				X						

		Conservation status									
		EPBC Act	BC Act	DBCA	Naturemap	DBCA	PMST	Weld Range (ecologia 2009b)	Jack Hills (MBS 2005)	Jack Hills (ecologia 2009a)	This Survey
Vespadelus finlaysoni	Finlayson's Cave Bat				X			X		X	
Introduced Mammals											
Equidae											
Equus asinus	Donkey						X				
Camelidae											
Camelus dromedarius	Camel						X				
Bovidae											
Bos taurus	European Cattle				X			X			X
Capra hircus	Goat				X		X	X		X	
Felidae											
Felis catus	Cat				X		X	X			X
Canidae											
Canis lupus familiaris	Dog						X	X			
Vulpes vulpes	Red Fox				X		X	X			
Leporidae											
Oryctolagus cuniculus	Rabbit				X		X	X			
Muridae											
Mus musculus	House Mouse							X	X		
Birds											
Dromaiidae											
Dromaius novaehollandiae	Emu				X			X	X	X	
Anatidae											
Cygnus atratus	Black Swan				X						
Stictonetta naevosa	Freckled Duck				X						
Tadorna tadornoides	Australian Shelduck				X						
Malacorhynchus membranaceus	Pink-eared Duck				X						
Chenonetta jubata	Australian Wood Duck				X						
Anas superciliosa	Pacific Black Duck				X						

		Conservation status									
		EPBC Act	BC Act	DBCA	Naturemap	DBCA	PMST	Weld Range (ecologia 2009b)	Jack Hills (MBS 2005)	Jack Hills (ecologia 2009a)	This Survey
Anas gracilis	Grey Teal				X						
Anas rhynchotis	Australian Shoveler				X						
Aythya australis	Hardhead				X						
Biziura lobata	Musk Duck				X						
Megapodiidae											
Leipoa ocellata	Malleefowl	VU	VU			X	X	S			
Podicipedidae											
Poliocephalus poliocephalus	Hoary-headed Grebe				X						
Tachybaptus novaehollandiae	Australasian Grebe				X						
Threskiornithidae											
Threskiornis spinicollis	Straw-necked Ibis				X						
Platalea flavipes	Yellow-billed Spoonbill				X			X			
Ardeidae											
Ardea modesta	Eastern Great Egret				X						
Ardea novaehollandiae	White-faced Heron				X						
Ardea pacifica	White-necked Heron				X						
Pelecanidae											
Pelecanus conspicillatus	Australian Pelican				X						
Phalacrocoracidae											
Phalacrocorax sulcirostris	Little Black Cormorant				X						
Accipitridae											
Accipiter cirrocephalus	Collared Sparrowhawk				X			X		X	
Accipiter fasciatus	Brown Goshawk				X			X	X	X	
Hieraaetus morphnoides	Little Eagle				X						
Aquila audax	Wedge-tailed Eagle				X			X	X	X	X
Circus approximans	Swamp Harrier				X						
Circus assimilis	Spotted Harrier				X						
Elanus caeruleus	Black-shouldered Kite									X	

		Conservation status									
		EPBC Act	BC Act	DBCA	Naturemap	DBCA	PMST	Weld Range (ecologia 2009b)	Jack Hills (MBS 2005)	Jack Hills (ecologia 2009a)	This Survey
Haliastur sphenurus	Whistling Kite				X			X	X	X	
Hamirostra melanosternon	Black-breasted Buzzard				X			X	X	X	
Milvus migrans	Black Kite				X						
Otididae											
Ardeotis australis	Australian Bustard				X						
Rallidae											
Porzana fluminea	Australian Spotted Crake				X						
Fulica atra	Eurasian Coot				X						
Tribonyx ventralis	Black-tailed Native-hen				X						
Turnicidae											
Turnix castanota	Chestnut-backed Button-quail				X						
Turnix velox	Little Button-quail				X			X		X	
Burhinidae											
Burhinus grallarius	Bush Stone-curlew							X	X		
Recurvirostridae											
Cladorrhynchus leucocephalus	Banded Stilt				X						
Himantopus himantopus	Black-winged Stilt				X						
Recurvirostra novaehollandiae	Red-necked Avocet				X						
Charadriidae											
Vanellus tricolor	Banded Lapwing				X						
Erythrogonys cinctus	Red-kneed Dotterel				X						
Peltohyas australis	Inland Dotterel				X						
Charadrius ruficapillus	Red-capped Plover				X						
Charadrius veredus	Oriental Plover	MI	MI				X				
Elseyornis melanops	Black-fronted Dotterel				X						
Scolopacidae											
Actitis hypoleucos	Common Sandpiper	MI	MI				X				
Calidris acuminata	Sharp-tailed Sandpiper	MI	MI			X	X				

		Conservation status									
		EPBC Act	BC Act	DBCA	Naturemap	DBCA	PMST	Weld Range (ecologia 2009b)	Jack Hills (MBS 2005)	Jack Hills (ecologia 2009a)	This Survey
Calidris melanotos	Pectoral Sandpiper	MI	MI		X	X	X				
Calidris ferruginea	Curlew Sandpiper	CR & MI	CR			X	X				
Tringa nebularia	Common Greenshank	MI	MI			X	X				
Tringa glareola	Wood Sandpiper	MI	MI		X	X					
Laridae											
Larus novaehollandiae subsp. *Novaehollandiae*	Silver Gull				X						
Sterna nilotica	Gull-billed Tern	MI	MI		X	X					
Sterna hybrida subsp. *javanica*	Whiskered Tern				X						
Columbidae											
**Columba livia*	Domestic Pigeon				X		X				
Geopelia cuneata	Diamond Dove				X			X	X	X	
Geopelia striata	Zebra Dove				X						
Ocyphaps lophotes	Crested Pigeon				X			X	X	X	X
Phaps chalcoptera	Common Bronzewing				X			X	X	X	X
Cuculidae											
Chrysococcyx basalis	Horsfield's Bronze Cuckoo				X			X			
Chrysococcyx osculans	Black-eared Cuckoo							X			
Cacomantis pallidus	Pallid Cuckoo				X			X			
Strigidae											
Ninox novaeseelandiae	Southern Boobook							X			
Podargidae											
Podargus strigoides	Tawny Frogmouth				X			X		X	
Caprimulgidae											
Eurostopodus argus	Spotted Nightjar				X			X	X	X	X
Aegothelidae											
Aegotheles cristatus	Australian Owlet-nightjar				X			X	X	X	
Apodidae											
Apus pacificus	Pacific (Fork-tailed) Swift	MI	MI			X	X				

		Conservation status									
		EPBC Act	BC Act	DBCA	Naturemap	DBCA	PMST	Weld Range (ecologia 2009b)	Jack Hills (MBS 2005)	Jack Hills (ecologia 2009a)	This Survey
Alcedinidae											
Todiramphus pyrrhopygius	Red-backed Kingfisher				X				X	X	
Todiramphus sanctus	Sacred Kingfisher				X						
Meropidae											
Merops ornatus	Rainbow Bee-eater				X						
Falconidae											
Falco berigora	Brown Falcon				X			X	X	X	
Falco cenchroides	Australian Kestrel				X			X	X	X	
Falco hypoleucos	Grey Falcon		VU		X	X					
Falco longipennis	Australian Hobby				X			X	X		
Falco peregrinus	Peregrine Falcon		OS		X	X		X	X		
Cacatuidae											
Cacatua roseicapilla	Galah				X			X	X	X	X
Cacatua sanguinea	Little Corella				X						
Nymphicus hollandicus	Cockatiel				X			X		X	
Psittacidae											
Platycercus varius	Mulga Parrot				X			X		X	
Platycercus zonarius	Australian Ringneck				X			X	X	X	
Neophema bourkii	Bourke's Parrot				X			X			
Neophema elegans	Elegant Parrot				X			X			
Melopsittacus undulatus	Budgerigar				X			X	X	X	
Pezoporus occidentalis	Night Parrot	EN	CR				X				
Polytelis alexandrae	Princess Parrot	VU		P4			X				
Ptilonorhynchidae											
Ptilonorhynchus maculatus	Spotted Bowerbird				X						
Ptilonorhynchus maculatus subsp. *guttatus*	Western Bowerbird				X			X			
Maluridae											
Malurus lamberti	Variegated Fairy-wren				X			X		X	X

		Conservation status									
		EPBC Act	BC Act	DBCA	Naturemap	DBCA	PMST	Weld Range (ecologia 2009b)	Jack Hills (MBS 2005)	Jack Hills (ecologia 2009a)	This Survey
Malurus leucopterus	White-winged Fairy-wren				X			X			
Malurus splendens	Splendid Fairy-wren				X			X	X	X	
Meliphagidae											
Certhionyx variegatus	Pied Honeyeater				X						
Acanthagenys rufogularis	Spiny-cheeked Honeyeater				X			X	X	X	
Lichmera indistincta	Brown Honeyeater				X				X		
Conopophila whitei	Grey Honeyeater							X			
Epthianura aurifrons	Orange Chat				X			X			
Epthianura tricolor	Crimson Chat				X			X	X	X	
Manorina flavigula	Yellow-throated Miner				X			X	X	X	
Purnella albifrons	White-fronted Honeyeater				X					X	
Gavicalis virescens	Singing Honeyeater				X			X	X	X	X
Ptilotula penicillata	White-plumed Honeyeater							X		X	
Pardalotidae											
Pardalotus rubricatus	Red-browed Pardalote				X						
Pardalotus striatus	Striated Pardalote				X				X	X	X
Acanthizidae											
Pyrrholaemus brunneus	Redthroat				X			X	X	X	
Smicrornis brevirostris	Weebil							X			
Gerygone fusca	Western Gerygone				X			X	X	X	X
Acanthiza apicalis	Broad-tailed (Inland) Thornbill				X			X	X	X	
Acanthiza chrysorrhoa	Yellow-rumped Thornbill				X			X	X	X	
Acanthiza robustirostris	Slaty-backed Thornbill				X			X		X	X
Acanthiza uropygialis	Chestnut-rumped Thornbill				X			X	X	X	X
Aphelocephala leucopsis	Southern Whiteface				X			X	X	X	
Aphelocephala nigricincta	Banded Whiteface				X						
Pomatostomidae											
Pomatostomus superciliosus	White-browed Babbler				X			X	X	X	

		Conservation status									
		EPBC Act	BC Act	DBCA	Naturemap	DBCA	PMST	Weld Range (ecologia 2009b)	Jack Hills (MBS 2005)	Jack Hills (ecologia 2009a)	This Survey
Pomatostomus temporalis	Grey-crowned Babbler				X			X	X	X	X
Psophodidae											
Cinclosoma castaneothorax	Chestnut-breasted Quail-thrush				X			X	X	X	
Cinclosoma clarum	Western Chestnut Quail-thrush				X						
Cinclosoma marginatum	Western Quail-thrush				X						
Psophodes occidentalis	Western Wedgebill				X				X	X	
Artamidae											
Artamus personatus	Masked Woodswallow				X			X			X
Artamus cinereus	Black-faced Woodswallow				X			X	X	X	X
Artamus cyanopterus	Dusky Woodswallow				X						
Artamus minor	Little Woodswallow				X			X	X	X	
Cracticidae											
Cracticus nigrogularis	Pied Butcherbird				X			X	X	X	
Cracticus torquatus	Grey Butcherbird				X			X	X	X	
Cracticus tibicen	Australian Magpie				X			X	X	X	
Campephagidae											
Coracina novaehollandiae	Black-faced Cuckoo-shrike				X			X	X	X	
Coracina maxima	Ground Cuckoo-shrike				X			X		X	
Lalage tricolor	White-winged Triller				X			X	X	X	
Neosittidae											
Daphoenositta chrysoptera	Varied Sittella				X				X	X	
Pachycephalidae											
Colluricincla harmonica	Grey Shrike-thrush				X			X	X	X	
Oreoica gutturalis	Crested Bellbird				X			X	X	X	X
Pachycephala rufiventris	Rufous Whistler				X			X	X	X	X
Rhipiduridae											
Rhipidura albiscapa	Grey Fantail				X			X			
Rhipidura leucophrys	Willie Wagtail				X			X	X	X	

		Conservation status									
		EPBC Act	BC Act	DBCA	Naturemap	DBCA	PMST	Weld Range (ecologia 2009b)	Jack Hills (MBS 2005)	Jack Hills (ecologia 2009a)	This Survey
Monarchidae											
Grallina cyanoleuca	Magpie-lark				X			X		X	
Corvidae											
Corvus bennetti	Little Crow				X			X	X	X	
Corvus orru	Torresian Crow				X			X	X	X	X
Petroicidae											
Melanodryas cucullata	Hooded Robin				X			X		X	
Microeca fascinans	Jacky Winter				X				X		
Petroica goodenovii	Red-capped Robin				X			X	X	X	
Megaluridae											
Cincloramphus mathewsi	Rufous Songlark							X	X	X	
Hirundinidae											
Cheramoeca leucosterna	White-backed Swallow				X			X	X		
Hirundo neoxena	Welcome Swallow				X			X			
Petrochelidon ariel	Fairy Martin				X			X			
Petrochelidon nigricans	Tree Martin				X				X		
Dicaeidae											
Dicaeum hirundinaceum	Mistletoebird				X			X			
Estrildidae											
Emblema pictum	Painted Finch									X	
Taeniopygia guttata	Zebra Finch				X			X	X	X	X
Motacillidae											
Motacilla flava	Yellow Wagtail	MI	MI				X				
Motacilla cinerea	Grey Wagtail	MI	MI				X				
Anthus australis	Australian Pipit				X			X	X	X	
Reptiles											
Cheluidae											
Chelodina steindachneri	Flat-shelled Turtle				X						

		Conservation status									
		EPBC Act	BC Act	DBCA	Naturemap	DBCA	PMST	Weld Range (ecologia 2009b)	Jack Hills (MBS 2005)	Jack Hills (ecologia 2009a)	This Survey
Carphodactylidae											
Nephrurus vertebralis	Midline Knob-tailed Gecko				X			X			
Nephrurus wheeleri subsp. *wheeleri*	Banded Knob-tailed Gecko				X						
Diplodactylidae											
Diplodactylus conspicillatus	Fat-tailed Gecko								X		
Diplodactylus pulcher	Fine-faced Gecko				X			X	X		
Lucasium stenodactylum	Sandplain Gecko								X	X	
Lucasium squarrosum					X			X			
Oedura fimbria	Western Marbled Velvet Gecko							X	X	X	
Rhynchoedura ornata	Western Beaked Gecko				X				X	X	
Strophurus strophurus					X				X		
Strophurus wellingtonae	Western Shield Spiny-tailed Gecko				X			X			
Gekkonidae											
Gehyra punctata	Spotted Dtella							X	X	X	
Gehyra variegata	Variegated Dtella				X			X	X	X	
Heteronotia binoei	Bynoe's Gecko				X			X	X	X	
Agamidae											
Gowidon longirostris	Long-nosed Dragon							X	X		
Ctenophorus caudicinctus	Ring-tailed Dragon				X			X	X	X	
Ctenophorus nuchalis	Central Netted Dragon				X			X	X	X	
Ctenophorus isolepis	Central Military Dragon				X						
Ctenophorus reticulatus	Western Netted Dragon				X			X	X		
Ctenophorus salinarum	Salt Pan Dragon				X						
Ctenophorus scutulatus	Lozenge-marked Dragon				X			X	X		
Diporiphora amphiboluroides	Mulga Dragon				X				X	X	
Moloch horridus	Thorny Devil							X			
Pogona minor	Western Bearded Dragon							X	X	X	
Tympanocryptis pseudosephos (*prior T. cephalus*)	Goldfields Pebble-mimic Dragon				X			X	X		

		Conservation status									
		EPBC Act	BC Act	DBCA	Naturemap	DBCA	PMST	Weld Range (ecologia 2009b)	Jack Hills (MBS 2005)	Jack Hills (ecologia 2009a)	This Survey
Pygopodidae											
Delma butleri									X		
Pygopus nigriceps	Western Hooded Scaly-foot							X			
Scincidae											
Cryptoblepharus buchananii					X						
Ctenotus helenae	Clay-soil Ctenotus				X						
Ctenotus leonhardii					X			X	X		
Ctenotus schomburgkii					X			X	X		
Ctenotus severus					X			X	X	X	
Ctenotus uber	Spotted Ctenotus				X			X			
Cyclodomorphus melanops	Spinifex Slender Blue-tongue								X	X	
Egernia depressa	Southern Pygmy Spiny-tailed Skink				X			X	X	X	X
Eremiascincus richardsonii	Broad-banded Sand Swimmer				X			X	X		
Lerista bipes					X						
Lerista desertorum					X						
Lerista eupoda	West Coast Mulga Slider/Meekatharra Slider			P1	X	X		X			
Lerista macropisthopus					X					X	
Lerista nichollsi								X			
Lerista rhodonoides								X	X	X	
Lerista timida	Timid Slider				X						
Menetia greyii	Common Dwarf Skink				X			X	X	X	
Varanidae											
Varanus caudolineatus	Stripe-tailed Pygmy Monitor				X			X	X		
Varanus giganteus	Perentie							X		X	
Varanus gouldii	Bungarra or Sand Monitor				X					X	
Varanus panoptes	Yellow-spotted Monitor				X			X	X	X	
Varanus tristis	Black-headed Monitor							X	X		
Typhlopidae											

		Conservation status									
		EPBC Act	BC Act	DBCA	Naturemap	DBCA	PMST	Weld Range (ecologia 2009b)	Jack Hills (MBS 2005)	Jack Hills (ecologia 2009a)	This Survey
Ramphotyphlops hamatus								X	X	X	
Pythonidae											
Antaresia perthensis	Pygmy Python				X			X	X	X	
Antaresia stimsoni	Stimson's Python				X						
Elapidae											
Brachyurophis approximans	NW Shovel-nosed Snake							X	X		
Demansia psammophis	Yellow-faced Whipsnake									X	
Furina ornata	Moon Snake							X			
Parasuta monachus	Monk Snake				X			X			
Pseudechis butleri	Spotted Mulga Snake				X			X			
Pseudonaja mengdeni	Western Brown Snake				X					X	
Pseudonaja modesta	Ringed Brown Snake				X			X			
Simoselaps bertholdi	Jan's Banded Snake				X						
Suta fasciata	Rosen's Snake				X			X			
Amphibians											
Hylidae											
Cyclorana maini	Sheep Frog				X				X		
Cyclorana platycephala	Water-holding Frog				X				X		
Litoria rubella	Little Red Tree Frog				X			X	X		
Limnodynastidae											
Neobatrachus sutor	Shoemaker Frog				X						
Platyplectrum spenceri	Centralian Burrowing Frog				X				X		
Invertebrates											
Thamnocephalidae											
Branchinella simplex	Fairy Shrimp			P1	X	X					
Idiopidae											
Idiosoma clypeatum	Northern Shield-backed Trapdoor Spider			P3		X					
Idiosoma nigrum	Shield-backed Trapdoor Spider	VU	EN				X				