Western Botanical

Targeted Priority Flora Survey of the Fish Underground Project, July 2025

Prepared for: Brightstar Resources Limited

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Contents

1. Executive Summary

Brightstar Resources Limited are currently developing the Fish Underground Project within tenements M39/138 and M39/139. The Project is located approximately 100 km south-east of Laverton, within the Great Victoria Desert IBRA region.

Western Botanical have previously conducted Targeted Flora and Vegetation surveys of the Fish Haul Road Alignment (WB453), and Lord Byron Tenement (M39/138 and M39/139) (WB530) in 2007. Further Targeted Flora and Vegetation surveys were conducted in 2020 (WB929).

Western Botanical was engaged in July 2025 to undertake a Targeted Priority Flora Assessment of the Study Area, consisting of five polygons totalling 22.46 ha. The Desktop assessment recorded 26 Priority flora that have been recorded within 50 kms of the Fish Project, with five of these considered to have potential to occur within the Study Area. The field survey was conducted over two days, 15th and 16th July 2025.

The current field survey resulted in three vegetation associations recorded, with 144 species recorded from 31 Families and 69 genera. One species was unable to be identified due to insufficient material. This species was described as a tall *Aristida* species. This *Aristida* species is unlikely to be of conservation significance, however upon recollection with appropriate material and definitive identification it will more than likely represent a significant range extension.

No Priority flora was recorded, and no Threatened or Priority Ecological communities (PEC/TECs) were encountered.

Five weed species were recorded, none of which are recorded as Weeds of National Significance.

Six species represent Range Extensions or Range Infills of greater than 100 km up to 250 km of their current known distributions on Florabase.

2. Introduction

2.1. Project Background

Brightstar Resources Limited (hereafter referred to as Brightstar) are currently developing the Fish Underground Project (hereafter referred to as the Fish Project) with tenements M39/138 and M39/139. The Project is located approximately 100 km south-east of Laverton, within the Great Victoria Desert IBRA region (Figure 1).

2.2. Previous Surveys

Western Botanical have previously conducted Targeted Flora and Vegetation surveys of the Fish Haul Road Alignment (WB453), Lord Byron Tenement (M39/139 and M39/139) (WB530) in 2007. The associated Desktop Study results from this survey indicated 23 Priority flora were known to occur in the Study Area region. The cumulative flora statistics for these surveys showed a total species count of 123 species from 21 families and 49 genera. No weed species were recorded within the study areas. Four Priority flora were recorded during the Fish Haul Road survey: *Lysiandra baeckeoides* P3 (previously *Phyllanthus baeckeoides* P1), *Olearia arida* P4 (previously P2), *Bossiaea eremaea* P3, and *Melaleuca apostiba* P3. *Calytrix praecipua* P3 and *Eucalyptus capillosa* (previously *Eucalyptus nigrifunda* P4) were previously recorded within close proximity of the haul road.

In 2020, Western Botanical was engaged to conducted further Targeted surveys of the Lord Byron and Fish Deposits (WB929) during which 15 vegetation associations were mapped and described, and 91 endemic flora species were recorded. No Threatened or Priority Flora were recorded during the survey. However, the desktop study assessed three Priority Flora as "Possible" to occur within the Study Area: *Bossiaea eremaea* P3, *Calandrinia* sp. Menzies (F. Hort et al. FH 4100) P3, and *Goodenia lyrata* P3. Two novel taxa were recorded, *Acacia murrayana* narrow phyllode form (G. & S. Cockerton WB40247) and *Eucalyptus lesouefii* pruinose adult leaf form (G. & S. Cockerton WB40262). Both novel species were abundant in the local area and had significant populations outside the Study Area. No weed species were recorded during the survey. Significantly, a large portion of the Fish Project was recently burnt just prior to the 2020 survey.

2.3. Current Survey

Brightstar, having recently acquired the Fish Project, are planning to further develop five areas across tenements M39/138 and M39/139. Western Botanical was commissioned to conduct a Targeted Priority Flora Survey over these areas to confirm the presence or absence of conservation significant flora.

The Study Area consists of five polygons totalling 22.46 ha (Figure 2):

- Expansion of the current waste rock landform (6.8 ha);
- Laydown area (0.84 ha);
- Expansion of the camp (9.63 ha);
- Spray field area (3.36 ha); and
- Spray field pipeline (1.83 ha).

Figure 1. Location of the Project

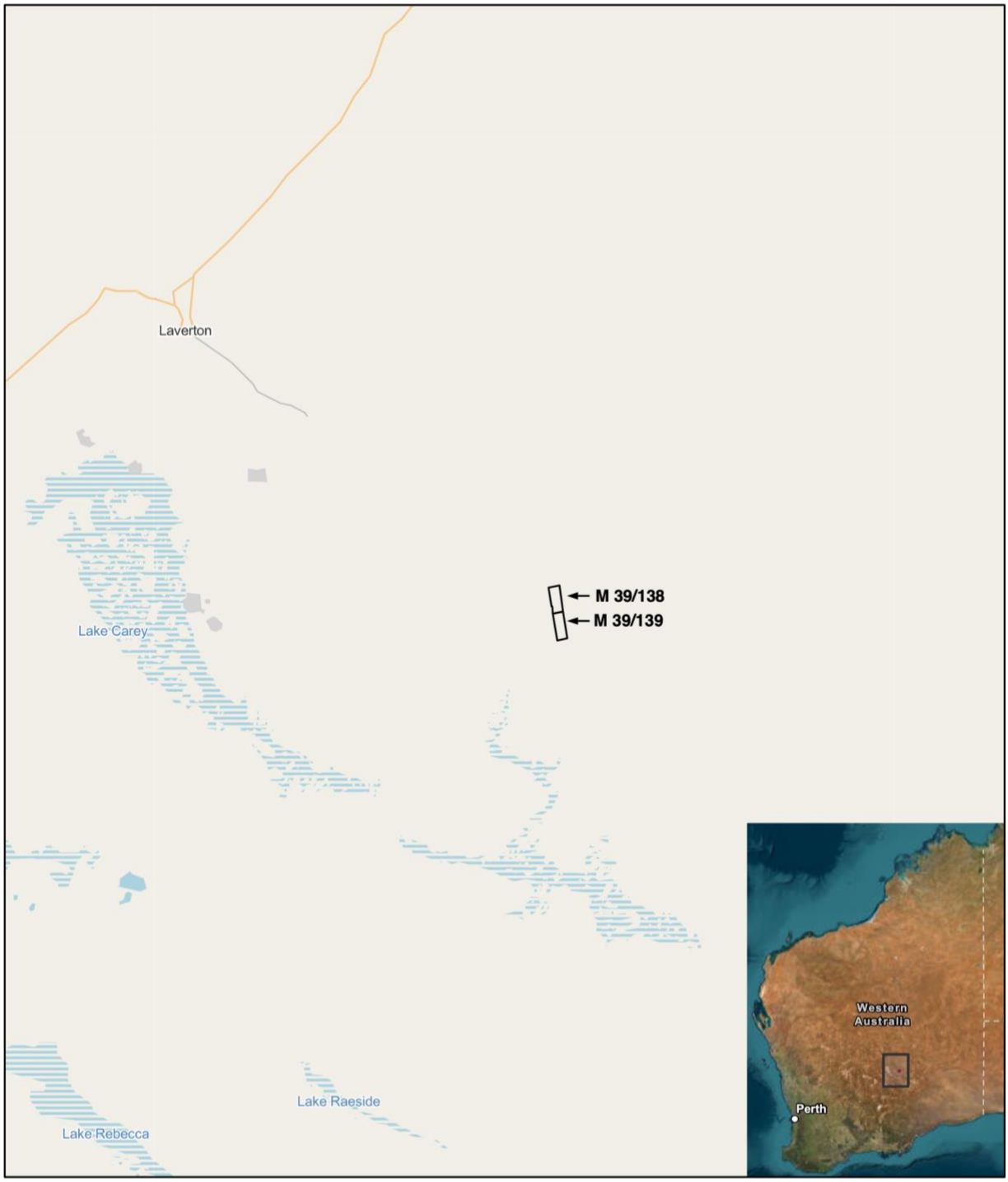

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Figure 2. Map of the Study Area

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2.4. Physical Environment

2.4.1. Climate

The climate of the region is arid, with summer and winter rain approximately 190 mm per annum (Barton & Cowan, 2001). The region inclusive of the Study Area experiences hot summers with thunderstorm and occasional cyclonic rainfall while the winters are cool and relatively dry. Rainfall recorded at Laverton Aero (Station 12305) has an annual mean of 278.2 mm (BoM, 2025).

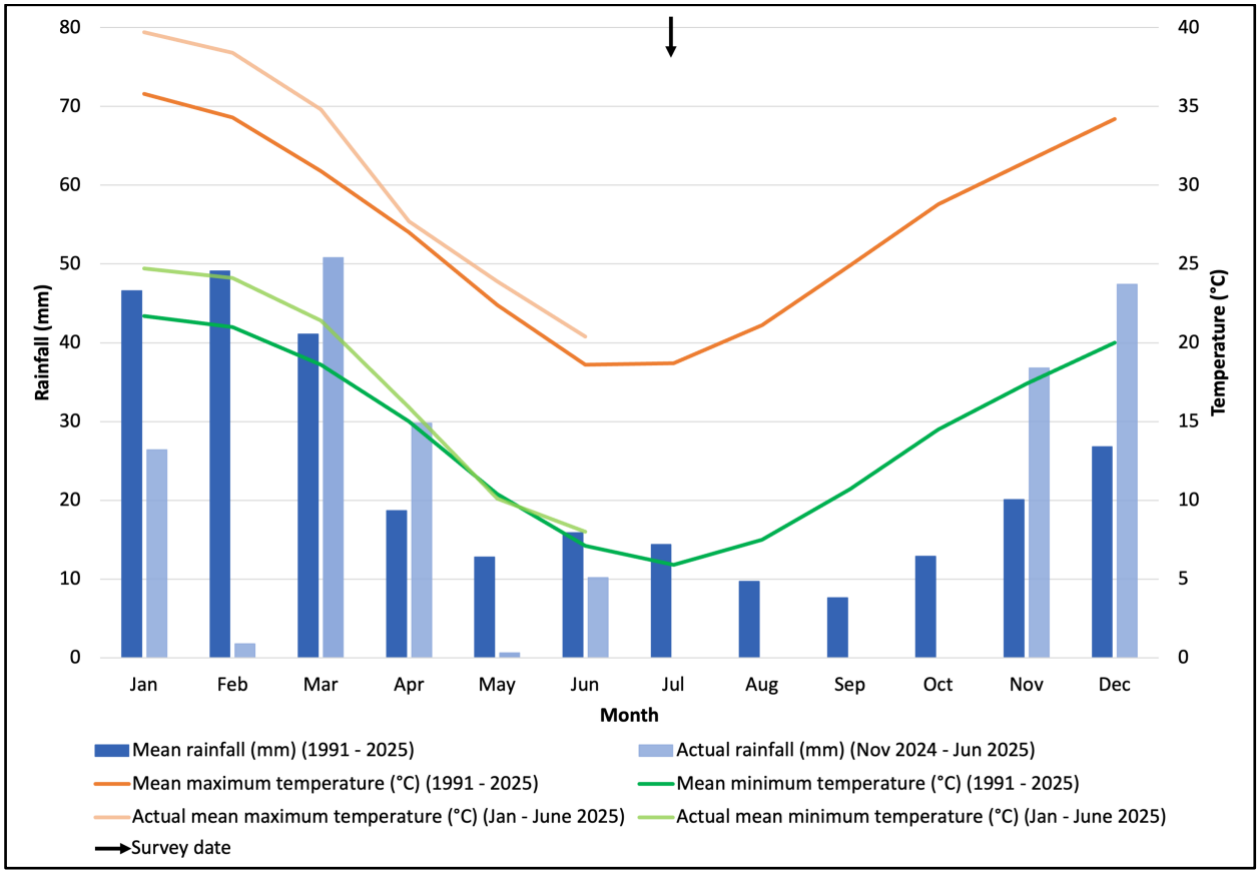

Figure 3. Long-term average climate data for Laverton Aero (weather station 12305) (1991 – 2024) (BoM, 2025)

2.4.2. Geology

The western end of the Great Victoria Desert (GVD) is underlain by Yilgarn Craton. Within the Shield subregion, there is a higher proportion of sandplains in comparison to the entire bioregion. To the east is an arid active sand-ridge desert of deep Quaternary Aeolian sands overlying Permian and Mesozoic strata of the Officer Basin.

The Fish Project is almost entirely overlain by Aeolian sandplain. Small areas of banded ironstone or chert and associated laterite and ferricrete are present on the northern margin of the now excavated Fish deposit pit area. The Study Area traverses two surface geological units (Figure 4):

- Aw: Undivided sedimentary (non-volcanic) and felsic volcanic rocks; and

- Qrc: Colluvium and/or residual deposits, sheetwash, talus, scree; boulder, gravel, sand; may include minor alluvial or sand plain deposits, local calcrete and reworked laterite.

2.5. Biological Environment

2.5.1. Interim Biogeographic Regionalisation for Australia (IBRA)

The Study Area lies on the western edge of the Shield sub-region of the Great Victoria Desert (GVD) Interim Biogeographic Region (Thackway & Cresswell, 1995). The region is characterised by Spinifex (*Triodia* sp.) and Mallee (*Eucalyptus kingsmillii*, *E. youngiana*) over hummock grassland dominated by *Triodia basedowii* occur on the aeolian sand plain. Scattered Marble Gum (*E. gongylocarpa*) and Native Pine (*Callitris* sp.) occur on the deeper sands of the sand plains. Mulga and *Acacia* woodlands occur mainly on the colluvial and residual soils. Halophytes such as Salt Bush (*Atriplex* sp.), Bluebush (*Maireana* sp.), and Samphire (*Tecticornia* sp.) occur on the margins of salt lakes and in saline drainage areas.

Landforms consist of salt lakes and major valley floors with lake derived dunes. Sand plains with patches of seif dunes running east west. Areas of moderate relief with outcropping and silcrete capped mesas and plateaus (breakaways) present. The subregion contains major a paleochannel of Ponton Creek (Barton & Cowan, 2001).

Figure 4. Surface geology of the Study Area

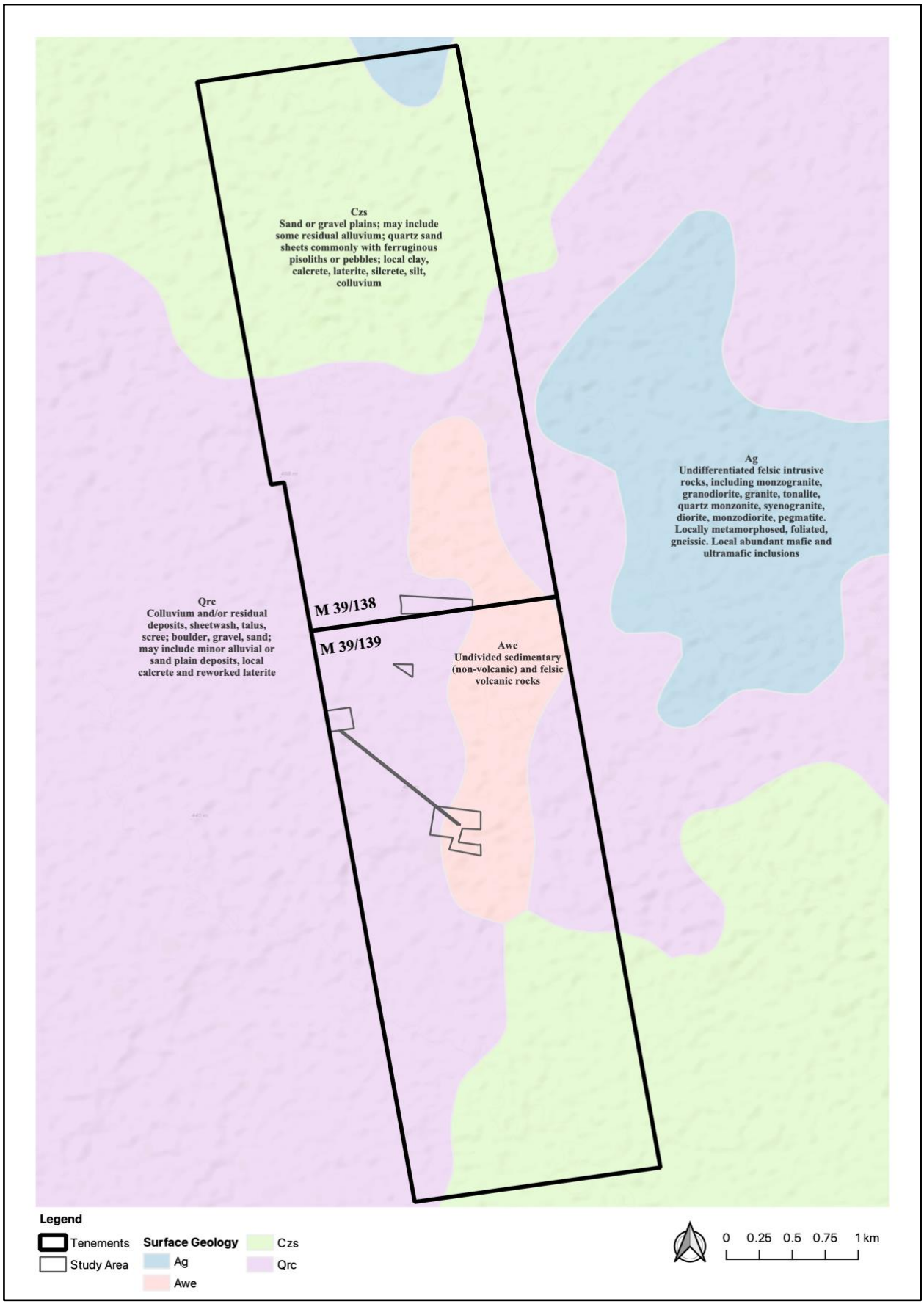
Czs
Sand or gravel plains; may include some residual alluvium; quartz sand sheets commonly with ferruginous pisoliths or pebbles; local clay, calcrete, laterite, silcrete, silt, colluvium
Ag
Undifferentiated felsic intrusive rocks, including monzogranite, granodiorite, granite, tonalite, quartz monzonite, syenogranite, diorite, monzodiorite, pegmatite. Locally metamorphosed, foliated, gneissic. Local abundant mafic and ultramafic inclusions
Qrc
Colluvium and/or residual deposits, sheetwash, talus, scree; boulder, gravel, sand; may include minor alluvial or sand plain deposits, local calcrete and reworked laterite
M 39/138
M 39/139
Awe
Undivided sedimentary (non-volcanic) and felsic volcanic rocks
Legend
Tenements
Study Area
Surface Geology
Ag
Awe
Czs
Qrc
0 0.25 0.5 0.75 1 km

Figure 5. Interim Biogeographical Regionalisation for Australia (IBRA)

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2.5.2. Land Systems

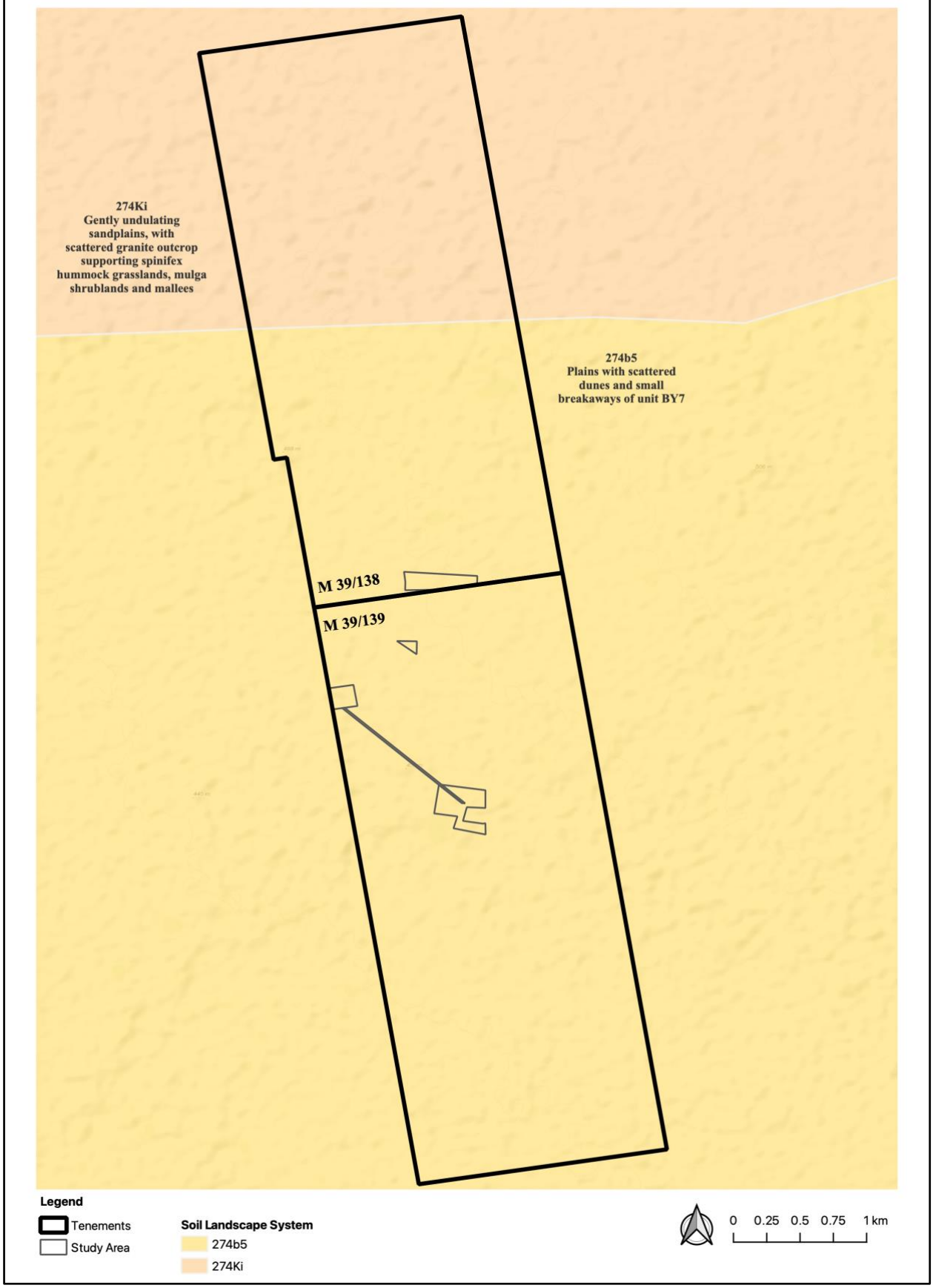
The Study Area is located within the Leemans Sandplain soil landscape zone which is located in the south-western Arid Interior between Lakes Wells and Minigwal (to the east of Laverton) (Tille, 2006). It is described as sandplains (with some gravel plains, mesas and salt lakes) on granitic rocks of the Yilgarn Craton (Eastern Goldfields Superterrane). Soils typically present include red sandy earths with red loamy earths and some red deep sands, red-brown hardpan shallow loams and calcareous loamy earths. Vegetation is dominated by Spinifex (*Triodia* spp.) grasslands with Marble Gum (*Eucalyptus gongylocarpa)*, mallee (*Eucalyptus* spp.) and mulga (*Acacia* spp.) shrublands (and some halophytic shrublands).

Within the Leemans Sandplain, the Fish Project overlies two landscape systems: 274b5 and 274Ki, with the Study Area located solely within 27b4b5 (Figure 6):

- 274b5 (100% of the Study Area, 73.64% of the Fish Project): Plains with scattered dunes and small breakaways of unit BY7 (Scarp land-low lateritic breakaways on granites and gneisses). Chief soils are red earthy sands (Uc5.21), some containing ferruginous nodules, some underlain by a red-brown hardpan. Other soils include sandy red earths (Gn2.12) on the plains and deep red sands (Uc1.23) on the dunes (CSIRO, 1991).

- 274Ki (26.36% of the Fish Project): Gently undulating sandplains, with scattered granite outcrop supporting spinifex hummock grasslands, mulga shrublands and mallee shrublands. Chief soils are deep earthy red sands, deep calcareous red earths, and deep sandy-surfaced red earths. Other soils include deep red earths, and shallow red sands on granite (Pringle et al., 1994).

Figure 6. Land systems of Study Area


274Ki
Gently undulating sandplains, with scattered granite outcrop supporting spinifex hummock grasslands, mulga shrublands and mallees
274b5
Plains with scattered dunes and small breakaways of unit BY7
M 39/138
M 39/139
Legend
Tenements
Study Area
Soil Landscape System
274b5
274Ki
0 0.25 0.5 0.75 1 km

2.5.3. Beard Pre-European Vegetation

J.S. Beard describes two vegetation associations of the Great Victoria Desert vegetation system across the Study Area (Table 1, Figure 7).

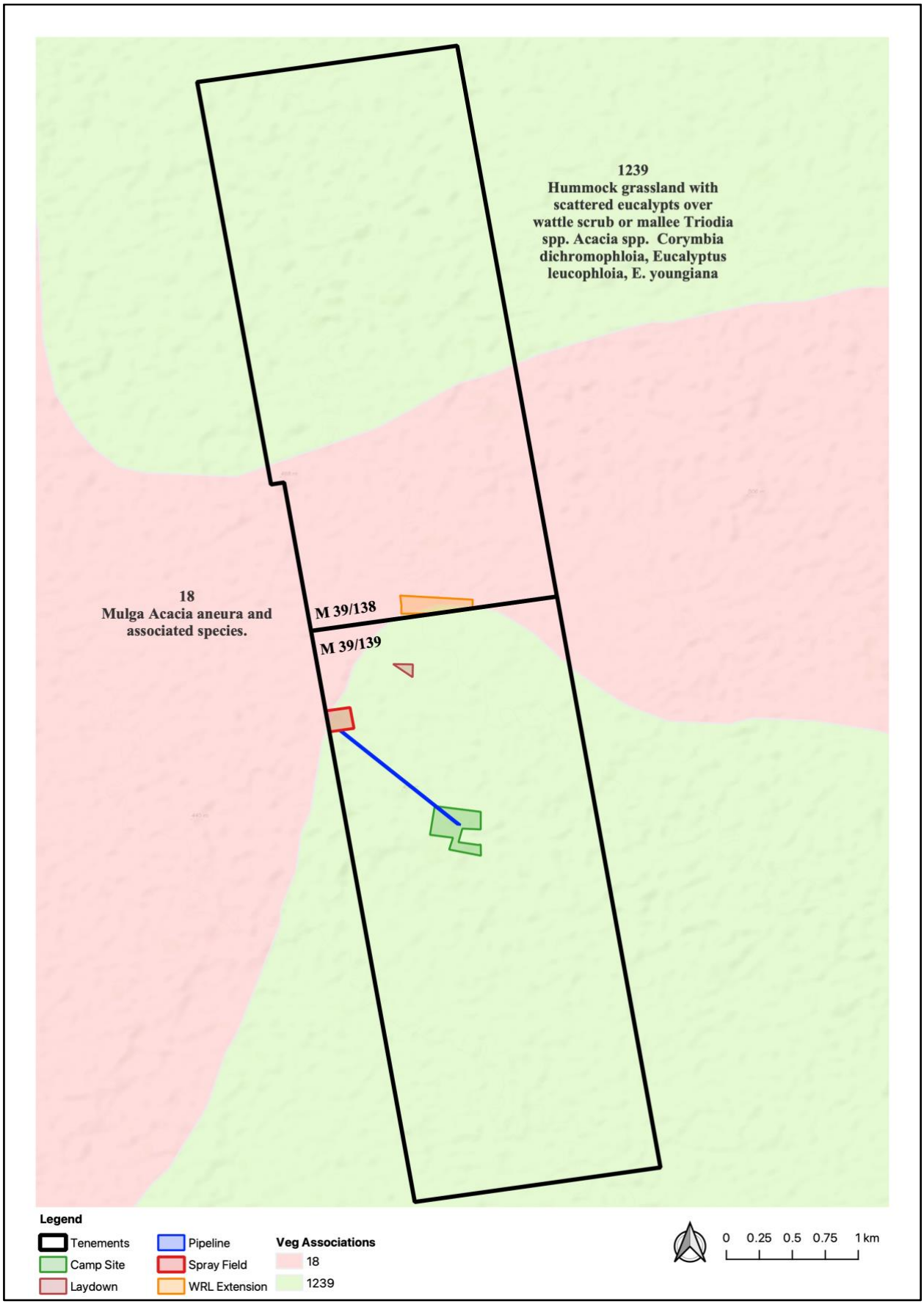
Table 1. Pre-European vegetation association systems of the Study Area (DBCA, 2019)

Veg. System	Veg. Assoc.	Description	Pre-European Extent (ha)	Current extent (ha) and % remaining	Extent (ha) and % in Study Area
Great Victoria Desert	18	*Acacia* low woodland, open low woodland or sparse woodland.	19,892,306.46	19,843,148.07 99.75%	5.42 31.81%
	1239	Hummock grasslands, open medium tree & Mallee steppe; Marble Gum & Mallee (*E. youngiana*) over hard Spinifex *Triodia basedowii* on sandplain	2,234,315.35	2,234,315.35 100%	17.04 68.19%

Approximately 68% of the Study Area is located within the Great Victoria Desert_1239 vegetation association system which is described as a hummock grassland with scattered Eucalypts over Wattle scrub or Mallee with *Triodia* spp., *Acacia* spp., *Corymbia dichromophloia*, *Eucalyptus leucophloia*, and *Eucalyptus youngiana*. The remaining 32% of the Study Area, consisting of majority of the WRL Extension, is located within the Great Victoria Desert_18 system and is described as low woodlands, open low woodlands or sparse woodlands of Mulga *Acacia aneura* and associated species.

All vegetation system associations mapped across the Study Area remain intact at a bioregional level with greater than 99% of pre-European extent remaining of each (Table 1). The Shire of Menzies (in which the Study Area is located) currently has 99% of its pre-European vegetation extent remaining (DWER, 2023).

Figure 7. Map of pre-European vegetation of the Study Area


1239
Hummock grassland with scattered eucalypts over wattle scrub or mallee Triodia spp. Acacia spp. Corymbia dichromophloia, Eucalyptus leucophloia, E. youngiana
18
Mulga Acacia aneura and associated species.
M 39/138
M 39/139
Legend
Tenements
Camp Site
Laydown
Pipeline
Spray Field
WRL Extension
Veg Associations
18
1239
0 0.25 0.5 0.75 1 km

3. Methods

3.1. Desktop Assessment

Prior to the field Assessment, Western Botanical botanists gathered information from previous surveys conducted in the region. Historical Priority flora information was collated and a list of potential Priority and conservation listed flora known from the region of the Fish Project was compiled.

These species were assessed for the likelihood to occur within the Fish Project at the time of survey measured against the vegetation associations known to occur at the site, soils, climate and prior weather, habit (Annual/Perennial), and habitat requirements for each species.

A list of potential species was compiled and were investigated at the Western Australian Herbarium with photographs and decerning features recorded for each.

3.2. Field Assessment

The field survey was conducted by Western Botanical botanists Jonathan Warden and Felicity Keet over two days from the 15th to 16th of July 2025, with subsequent travel days taking place either side. The survey consisted of on foot traverses across the entire area of each polygon, to determine the presence and distribution of any significant flora. Hand held Garmin GPS (±5m accuracy) devices were used to navigate across each polygon.

3.3. Vegetation Mapping

Vegetation mapping of the Fish Project has previously been completed by Western Botanical in August 2020 (WB929). A relevé site approximately 50m x 50m was completed at each site to record the flora present and broadly describe the vegetation association. The following parameters were recorded at each site:

General: Date, and botanists recording

Location: Site name, location within the Study Area, and digital photograph

Vegetation: Species present (dominant species and their Percentage Foliar Cover (PFC)), and structural description

Disturbance: Vegetation condition, and fire age

Physical condition: Soil, rocks, and landform description

Impacts from clearing, weeds, grazing and disease were assessed in line with EPA Technical guidance (2016) Vegetation Condition scale (adapted from Keighery 1994 and Trudgen 1988) (Appendix 3). Observations and assessment of vegetation condition across the Study Area were made during all phases of the field survey and at each relevé point.

3.4. Flora Composition and Specimen Identification

Flora not readily recognised in the field were collected and pressed for later identification, together with information pertaining to the date, location, and field description. The identification of samples was carried out using the resources of both Western Botanical's herbarium and the Western Australian Reference Herbarium (WAH).

3.5. Significant Flora

The locations of significant flora recognised during the field survey were recorded using Garmin GPS devices, datum WGS84 (accuracy ± 5 m). Specimens of Significant Flora, represented by Threatened or Priority Flora, flora considered novel or undescribed or flora representing an extension to the current known range for that species, were retained to later be vouchered at the WA Herbarium. Known populations of *Goodenia lyrata* P3 and *Calandrinia* sp. Menzies (F. Hort et al. FH 4100) were visited on 17th of July to observe the current seasonal conditions of each species, and to aid the discernment of their presence or absence within the Study Area.

3.6. Weeds

Locations of weeds were recorded using handheld GPS devices, datum WGS84 (accuracy ± 5 m).

4. Results and Discussion

4.1. Desktop Assessment

A list of 26 potential Priority species have been recorded with in 50 km of the Fish Project, of these five were considered possible of occurring within the Study Area (Table 2).

Table 2. Results of the Desktop Assessment of Likelihood for Priority Flora to exist within the Study Area

Taxon	Cons Code	Annual / Perennial	WAHERB	TPFL	Preferred Habitat	Likelihood of occurring within the Study Area
Calandrinia quartzitica	1				Salt Lake margins	Unlikely
Eremophila arachnoides subsp. *tenera*	1	P	1	1	Calcrete platforms, margins of paleochannels	Unlikely
Philotheca linearis	1	P	1		Yellow sand adjacent to granite outcrop	Unlikely
Philotheca tubiflora	1	P	1		Weathered Archaean granite breakaway plateaux	Unlikely
Tecticornia mellarium	1	P	1	1	Salt lake beds, paleochannels	Unlikely
Tecticornia sp. Lake Way (P. Armstrong 05/961)	1	P	1	1	Salt lake beds, paleochannels	Unlikely
Vittadinia cervicularis var. *oldfieldii*	1	P	1		Unknown, red alluvium	Unlikely
Eragrostis sp. Lake Carey (J. Paterson & J. Warden WB 40825)	1	P			Salt Lake margins	Unlikely
Eremophila sp. Lake Carey (E. Mattiske LM 197)	1	P			Salt Lake margins	Unlikely
Styphelia deserticola (formerly S. sp. Great Victoria Desert (N. Murdock 44)	2	P	1		Aeolian red sand dunes	Unlikely
Bossiaea eremaea	3	P	1		Aeolian sandplains	Possible
Calandrinia sp. Menzies (F. Hort et al. FH 4100)	3	A	1		Loams, gravels, hardpan plains	Possible
Calytrix hislopii	3	P	1		Weathered Archaean granite breakaway plateaux	Unlikely
Calytrix praecipua	3	P	1		Weathered Archaean granite breakaway plateaux	Unlikely
Goodenia lyrata	3	A	1		Salt lake margins, hardpan plains, drainage areas	Possible
Eucalyptus pimpiniana	3	P			Sand dunes and Sand Plains	Possible

Taxon	Cons Code	Annual / Perennial	WAHERB	TPFL	Preferred Habitat	Likelihood of occurring within the Study Area
Pigea sp. Chloroxantha (E. Bennett & D. Bright EUC 1810)	3	P	1	1	Drainage lines in nickel-rich conglomerates	Unlikely
Melaleuca apostiba	3	P	1		Salt lake margins	Unlikely
Notisia intonsa	3	A			Hardpan plains, drainage areas	Unlikely
Phyllanthus baeckeoides	3	P	1		Lateritic hills and breakaways	Unlikely
Thryptomene nealensis	3	P	1		Weathered Archaean granite breakaway plateaux	Unlikely
Conospermum toddii	4	P	1	1	Aeolian sandplains and dunes	Unlikely
Eucalyptus nigrifunda	4	P	1		Breakaways, salt lake margins	Unlikely
Frankenia glomerata	4	P	1		Breakaways, salt lake margins	Unlikely
Hemigenia exilis	4	P	1	1	Nickel-rich conglomerates	Unlikely
Olearia arida	4	P			Aeolian sandplains	Possible

4.2. Field Assessment

4.2.1. Flora

During the survey 144 species were recorded from 31 Families and 69 genera. The dominant Families were Fabaceae with 22 species, Chenopodiaceae with 19 species, Asteraceae with 16 species, and Poaceae with 15 species. The majority of the species recorded are widespread and common species in the Eastern Murchison and Western GVD bioregions.

A single grass species belonging to the *Aristida* genus was unable to be definitively identified as it had no fruiting material available. This species was described as a tall *Aristida* species growing to 0.9 m. None of the tall *Aristida* species known to the author from the region occur within 200 km of the Fish Project Study Area. This *Aristida* species is unlikely to be of conservation significance, and upon recollection with appropriate material and definitive identification it will more than likely represent a significant range extension.

The recording of 144 species across the Fish Project increases the known species across this project significantly. The historical reports recorded 129 species across the combined Lord Byron, Fish, and Gilt Key deposit areas, plus the linking haul roads. Three of the species collected represent significant range extensions of between 200 and 250 km to the current known distribution. Three further species represent significant range infills of between 100 to 200 km of their current known distribution; these specimens will be lodged with the WA herbarium (Table 3).

Table 3. Species with a Range Extension or Range Infill for the current known distribution within WA.

Genus	Species	Range Extension/ Range Infill
Portulaca	oleracea*	Range Extension 250 km
Chenopodium	desertorum	Range Extension 200 km
Eremophila	latrobei subsp. filiformis	Range Extension 200 km
Eriachne	pulchella subsp. pulchella	Range infill 100 km
Cephalipterum	drummondii	Range Infill 150 km
Pterocaulon	sphacelatum	Range Infill 200 km

4.2.2. Priority Flora

No Priority Flora species were encountered during the survey.

4.2.3. Weeds

Five weed species were recorded during the survey, with none of these weeds considered weeds of national significance (WoNS). Significantly no weeds were recorded during previous surveys. Weeds were primarily restricted to areas of disturbance around the camp site, office administration buildings and the waste rock landform (Figure 8).

- *Erodium aureum* – is described as a spreading, short-lived perennial herb, that grows from 0.04 to 0.2 m high. The flowers are pink and have been recorded from July to October. It has been recorded growing within sandy clay, loam and sandy soils. With a broad distribution across Southern and Central Western Australia (WAH, 2025).

- *Rumex vesicarius* (Ruby Dock) – is a declared pest. It is a disturbance opportunist, and common invader of rocky substrates such as waste heaps, bund walls and other historical mining disturbance areas. It is described as an erect, succulent annual herb, growing to 0.6m high, occurring across most of Western Australia (WAH, 2025).

- *Solanum nigrum* (Black Berry Nightshade) – is described as an erect perennial herb or growing from 0.3 m to 1 m high. The flowers are white and occur between January through to December. It is a disturbance opportunist, occurring across most of Western Australia (WAH, 2025).

- *Sonchus oleraceus* (Common Sowthistle) – is an erect annual herb growing to 1.5 m high, found in a variety of soils. It is a disturbance opportunist, occurring across most of Western Australia (WAH, 2025).

- *Portulaca oleracea* (Purslane) – is described as being a mixed both Native in Part of Range, and a weed that has Naturalised elsewhere. It is described as a succulent prostrate to decumbent annual herb growing to 0.2 m high. It has been recorded flowering from April through to May, and is often associated with disturbed sites (WAH, 2025).

Figure 8. Weed locations within the Study Area


M 39/138
M 39/139
Legend
Tenements
Study Area
Weed Species
Erodium aureum
Portulaca oleracea
Rumex vesicarius
Solanum nigrum
Sonchos oleraceus
0
100
200
300 m

4.2.4. Vegetation Mapping

Three vegetation Associations were described across the five polygons; these vegetation assemblages closely match those mapped within WB929. Recorded as;

- SAMA – Sandplain Spinifex Mulga and Mallee
- CPW – *Casuarina pauper* Woodland
- SAGS – Sandplain Spinifex with *Eucalyptus gongylocarpa*

4.2.5. Vegetation Descriptions

SAMA – Sandplain Spinifex Mulga and Mallee

The SAMA Association occurs as the dominant vegetation unit across the proposed Waste Rock Landform, Laydown, Spray line Corridor, and the proposed Spray Field. It is described as an open Woodland with an upper stratum dominated by *Eucalyptus concinna* to 4 m, *Eucalyptus oleosa* to 4 m, *Eucalyptus rigidula* to 4 m, *Acacia aptaneura* to 2 m and *Codonocarpus cotinifolius* to 5 m with a combined PFC 5-15%. The mid stratum layer consists of *Alyogyne pinoniana* to 1.5 m, *Senna artemisioides* subsp. *artemisioides* to 1.2 m, *Acacia aptaneura* to 1.5 m and *Sida calyxhymenia* to 1 m, with a combined PFC 5%. The lower stratum hummock grassland is dominated by *Triodia basedowii* to 0.6 m, *Eragrostis eriopoda* to 0.4 m, *Solanum lasiophyllum* to 0.5 m, *Ptilotus obovatus* subsp. *obovatus* to 0.5 m, *Solanum orbiculatum* subsp. *orbiculatum* to 0.5 m, and rejuvenating *Acacia caesaneura*, and *Acacia aneura* to 0.4 m, with a combined PFC 15-20% (Plate 1). This association was burnt approximately five years ago.

Plate 1. SAMA – Sandplain Spinifex Mulga and Mallee Vegetation Association

CPW – *Casuarina pauper* Woodland

The *Casuarina pauper* Woodland occurs around the campsite location. This vegetation unit is associated with underlying basalt rocks that have been influenced by groundwater calcrete. The land is slightly undulating and has shallow sandy loam soil over calcrete hardpan at approximately 10-20 cm. The soil surface features a discontinuous mantle of subangular ironstone, basalt and quartz rocks to 7 cm and ferruginous gravel. At the Campsite location there is a small banded ironstone formation (BIF) outcropping.

This Woodland is dominated by *Casuarina pauper* to 7 m with occasional *Acacia aneura* to 5 m, *Acacia sibirica* 4 m, *Santalum spicatum* to 3 m, *Acacia mulganeura* and *Acacia burkittii* to 4 m on the lower slopes with a PFC 10-20%. The mid stratum consists of open low scrub with *Eremophila scoparia* to 2 m and *Acacia ramulosa* var. *ramulosa* to 1.8 m, *Scaevola spinescens* both broad leaf non spiney form and narrow leaf spiney form to 1.2 m, and *Austrostipa platychaeta* to 1.2 m with a PFC 5%, over herbs and grasses including *Ptilotus obovatus* upright form 0.9 m (PFC 10%), *Maireana georgei* to 0.4 m and *Sclerolaena obliquicuspis*, *Sclerolaena diacantha*, *Sclerolaena eriacantha, Enneapogon caerulescens, Eriachne pulchella* var. *pulchella*, between 0.05 m and 0.1 m with a PFC of 10-15% (Plate 2).

Plate 2. CPW – *Casuarina pauper* Woodland Vegetation Association

SAGS – Sandplain, Spinifex with *Eucalyptus gongylocarpa*

Areas of sandplain supporting Spinifex and *Eucalyptus gongylocarpa* (Marble Gum) are present in small patches around the Fish deposit area. SAGS is a commonly encountered community on broad deep sandplains in the eastern Murchison and western GVD bioregions and commonly has Triodia basedowii, *Acacia*, *Senna* and *Eremophila* species in the understorey.

The Priority 3 *Bossiaea eremaea* is occasionally associated with SAGS vegetation associations though none were recorded within these communities within the Study Area.

The SAGS open Woodland is described as having an upper stratum of *Eucalyptus gongylocarpa* (Marble Gum) to 6 m with *Eucalyptus youngiana* to 5 m, with a PFC 5-10%. Over a mid-stratum of *Senna artemisioides* subsp. *artemisioides* to 1.3 m, *Senna artemisioides* subsp. *filiformis* to 1.3 m, *Eremophila clarkei* to 1 m, *Eremophila decipiens* to 1 m, *Indigofera georgei* to 0.8 m *Acacia colletioides* to 0.8 m, with a PFC 5-10%. The lower stratum consists of a hummock grassland of *Triodia basedowii* to 0.6 m (PFC 10-12%) with herbs and grasses including *Aristida holathera var. holathera* to 0.4 m, *Goodenia connata* to 0.4 m, *Monachather paradoxus* to 0.4 m *Brunonia australis* to 0.3 m, *Solanum plicatile* to 0.3 m, *Chrysocephalum apiculatum* subsp.

glanduliferum to 0.3 m, and *Goodenia glabrata* to 0.15 m with a PFC 5-8% (Plate 3). This association was burnt approximately five years ago.

Plate 3. SAGS - Sandplain, Spinifex with *Eucalyptus gongylocarpa* Vegetation Association

4.2.6. Vegetation Condition

The vegetation condition (based on Keighery scale) across the Spray Line Corridor, Spray Field study, and Laydown polygons were all considered Excellent - Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement. The only major damage was from a fire approximately five years ago. The extension to the Waste Rock Landform polygon was considered Good with more obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure with large areas disturbed with imported material. The Campsite polygon was considered as Very Good - Some relatively slight signs of damage caused by human activities (evidence of historical exploration drilling).

5. Assessment Against the 10 Clearing Principles

Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity.

With 144 species recorded within the Study Area, representing 31 families and 69 genera. All species recorded are common and widespread throughout the eastern Murchison and western Great Victoria Desert bioregions. No Threatened or Priority Flora were recorded.

The field survey was completed following above average rainfall in the two months preceding the survey, resulting in excellent representation of annual flora.

The Project is not at variance with this principle.

Principle (b) – Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

The three vegetation associations described are common and widespread throughout the eastern Murchison and western Great Victoria Desert bioregions. Vegetation representing significant habitat for indigenous fauna was not recognised during the survey.

The Project is not at variance with this principle.

Principle (c) – Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

No Threatened or Priority Flora taxa gazetted as Declared Rare Flora under the Biodiversity Conservation Act 2016 (WA) or the Environment Protection and Biodiversity Conservation Act 1999 (Cth) were recorded in the Study Area

The Project is not at variance with this principle.

Principle (d) – Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.

There are no known Threatened or Priority Ecological Communities recorded within the Study Area or in the surrounding area.

The Project is not at variance with this principle.

Principle (e) – Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

The vegetation of the Study Area is not considered remnant in either a local or bioregional context. The two Pre-European Vegetation Associations across the Study Area have >99% of the

bioregional vegetation remaining. The Study Area is not considered significant as a remnant of native vegetation in either a local or bioregional context.

The Project is not at variance with this principle.

Principle (f) – Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

There are no wetlands or watercourses within the Study Area or the surrounding area. Therefore, the proposed clearing will not impact upon any watercourses or wetlands.

The Project is not at variance with this principle.

Principle (g) – Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Areas of cleared native vegetation from historic mining activities are present within the Study Area. Other than the direct impacts of mining, clearing of native vegetation for proposed activities of the Project will not cause significant land degradation.

The Project is not at variance with this principle.

Principle (h) – Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

The project area is not adjacent to, or nearby any conservation areas. clearing will not affect any conservation estate.

The Project is not at variance with this principle.

Principle (i) – Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

The proposed clearing is unlikely to result in a deterioration of groundwater and there was no surface water observed around the site.

The Project is not at variance with this principle.

Principle (j) – Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.

No surface water was observed and no major drainage areas were noted. Native vegetation clearing is highly unlikely to cause, or exacerbate the incidence of flooding.

The Project is not at variance with this principle.

6. Limitations

Limitation	Discussion
Available sources of contextual information	Adequate contextual information was available in the form of DBCA database records and previous reports. This is not considered a limitation.
The Scope of the survey	The project was adequately scoped and funded with sufficient time allowed for a thorough field investigation, building on previous works conducted in the Study Area. This is not considered a limitation.
Proportion of flora collected and identified	144 species were recorded within the Study Area, representing 31 families and 69 genera. All species are representative of the eastern Murchison and western Great Victoria Desert bioregions. The recording of 144 species across the Fish Project increases the known species across this project significantly . The historical reports recorded 129 species across the combined Lord Byron, Fish, Gilt Key deposit areas plus the linking haul roads. The survey was completed following above average rainfall in the two months preceding the survey, resulting in excellent representation of annual flora. This is not considered a limitation.
Completeness and further work which may be needed	One grass species belonging to the *Aristida* genus was unable to be definitively identified as it had no fruiting material available. Of all the tall *Aristida* species known to the author from the region, none of them occur within 200 km of the Fish Project Study Area. This *Aristida* species is unlikely to be of conservation significance, however a definitive identification upon recollection with appropriate material will likely represent a significant range extension. This is not considered a limitation.
Mapping reliability	Mapping of the Fish Project was previously completed in 2020. Vegetation observations and descriptions of the Study Area corresponded to previous mapping. This is not considered a limitation.
Timing: weather, season	The field survey was completed following above average rainfall in the two months preceding the survey, resulting in excellent representation of annual flora. This is not considered a limitation.
Disturbances	Outside areas of direct clearing for mining, access roads and tracks, and a fire five years prior, no disturbances were observed. This is not considered a limitation.
Intensity	While the field survey was a single pass, given the small survey area and the optimal seasonal conditions preceding the survey, the targeted survey conducted was adequate for the survey area. This is not considered a limitation.
Resources	Adequate resources of time and materials were made available for the assessment. This is not considered a limitation.
Access	Access throughout the Study Area was excellent. This is not considered a limitation.
Experience levels	The region is reasonably well known to Western Botanical. Senior Botanist Jonathan Warden has over 17 years of experience in the assessment of flora and vegetation in WA and the Goldfields region. Botanist Felicity Keet was working under the supervision of Jonathan Warden, and has two years of experience in the assessment of flora and vegetation in WA and the Goldfields. This is not considered a limitation.

7. List of Participants

Staff Member	Field Survey	Specimen Identification	Report Preparation
Jonathan Warden B.Sc. (Environmental Biology) *License No. – FB62000494*	**1**	**1**	**1**
Felicity Keet B.Sc. (Conservation Biology and Agricultural Science) *License No. – FB62000299*	**1**		**1**

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CSIRO 2025; & National Resource Information Centre, BRS (1991): Atlas of Australian Soils (digital). v3. CSIRO. Data Collection. https://doi.org/10.25919/5f1632a855c17

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Appendix 1. Department of Biodiversity Conservation and Attractions (DBCA) Framework for Conservation Significant Flora

DBCA Conservation Codes for Western Australian Flora

Under the Wildlife Conservation Act 1950, the Minister for the Environment may declare species of flora to be protected if they are considered to be in danger of extinction, rare or otherwise in need of special protection.

Specially protected flora are species which have been adequately searched for and are deemed to be, in the wild, either rare, at risk of extinction, or otherwise in need of special protection, and have been gazetted as such.

Categories of specially protected flora are:

T Threatened species

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

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

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

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

CR Critically endangered species

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

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

EN Endangered species

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

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

VU Vulnerable species

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

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

Extinct species

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

EX Extinct species

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

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

EW Extinct in the wild species

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

Currently there are no threatened fauna or threatened flora species listed as extinct in the 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 dependent fauna)

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

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

OS Other specially protected species

Fauna otherwise in need of special protection to ensure their conservation, and listing is

otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

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

P Priority species

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

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

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

1 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.

2 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.

3 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.

4 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

Last updated 3 January 2019

Appendix 2. DBCA Definitions of Threatened Ecological Communities (TEC's) and Priority Ecological Communities (PEC's)

DEFINITIONS, CATEGORIES AND CRITERIA FOR THREATENED AND PRIORITY ECOLOGICAL COMMUNITIES

1. GENERAL DEFINITIONS

Ecological Community
A naturally occurring biological assemblage that occurs in a particular type of habitat.

Note: The scale at which ecological communities are defined will often depend on the level of detail in the information source, therefore no particular scale is specified.

A **threatened ecological community** (TEC) is one which is found to fit into one of the following categories; "presumed totally destroyed", "critically endangered", "endangered" or "vulnerable".

Possible threatened ecological communities that do not meet survey criteria are added to DEC's Priority Ecological Community Lists under Priorities 1, 2 and 3. Ecological Communities that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

An **assemblage** is a defined group of biological entities.

Habitat is defined as the areas in which an organism and/or assemblage of organisms lives. It includes the abiotic factors (e.g. substrate and topography), and the biotic factors.

Occurrence: a discrete example of an ecological community, separated from other examples of the same community by more than 20 meters of a different ecological community, an artificial surface or a totally destroyed community.

By ensuring that every discrete occurrence is recognised and recorded future changes in status can be readily monitored.

Adequately Surveyed is defined as follows:

"An ecological community that has been searched for thoroughly in most likely habitats, by relevant experts."

Community structure is defined as follows:

"The spatial organisation, construction and arrangement of the biological elements comprising a biological assemblage" (e.g. *Eucalyptus salmonophloia* woodland over scattered small shrubs over dense herbs; structure in a faunal assemblage could refer to trophic structure, e.g. dominance by feeders on detritus as distinct from feeders on live plants).

Definitions of Modification and Destruction of an ecological community:

Modification: "changes to some or all of ecological processes (including abiotic processes such as hydrology), species composition and community structure as a direct or indirect result of human activities. The level of damage involved could be ameliorated naturally or by human intervention."

Destruction: "modification such that reestablishment of ecological processes, species composition and community structure within the range of variability exhibited by the original community is unlikely within the foreseeable future even with positive human intervention."

Note: Modification and destruction are difficult concepts to quantify, and their application will be determined by scientific judgment. Examples of modification and total destruction are cited below:

Modification of ecological processes: The hydrology of Toolibin Lake has been altered by clearing of the catchment such that death of some of the original flora has occurred due to dependence on fresh water. The system may be bought back to a semblance of the original state by redirecting saline runoff and pumping waters of the rising water table away to restore the hydrological balance. Total destruction of downstream lakes has occurred due to hydrology being altered to the point that few of the original flora or fauna species are able to tolerate the level of salinity and/or water logging.

Modification of structure: The understorey of a plant community may be altered by weed invasion due to nutrient enrichment by addition of fertiliser. Should the additional nutrients be removed from the system the balance may be restored, and the original plant species better able to compete. Total destruction may occur if additional nutrients continue to be added to the system causing the understorey to be completely replaced by weed species, and death of overstorey species due to inability to tolerate high nutrient levels.

Modification of species composition: Pollution may cause alteration of the invertebrate species present in a freshwater lake. Removal of pollutants may allow the return of the original inhabitant species. Addition of residual highly toxic substances may cause permanent changes to water quality, and total destruction of the community.

Threatening processes are defined as follows:
"Any process or activity that threatens to destroy or significantly modify the ecological community and/or affect the continuing evolutionary processes within any ecological community."

Examples of some of the continuing threatening processes in Western Australia include: general pollution; competition, predation and change induced in ecological communities as a result of introduced animals; competition and displacement of native plants by introduced species; hydrological changes; inappropriate fire regimes; diseases resulting from introduced microorganisms; direct human exploitation and disturbance of ecological communities.

Restoration is defined as returning an ecological community to its pre-disturbance or natural state in terms of abiotic conditions, community structure and species composition.

Rehabilitation is defined as the re-establishment of ecological attributes in a damaged ecological community although the community will remain modified.

2. DEFINITIONS AND CRITERIA FOR PRESUMED TOTALLY DESTROYED, CRITICALLY ENDANGERED, ENDANGERED AND VULNERABLE ECOLOGICAL COMMUNITIES

Presumed Totally Destroyed (PD)
An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.

An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant **and either** of the following applies (A or B):

A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats or

B) All occurrences recorded within the last 50 years have since been destroyed

Critically Endangered (CR)
An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.

An ecological community will be listed as **Critically Endangered** when it has been adequately surveyed and s found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C):

A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply (i or ii):

i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years);

ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated.

B) Current distribution is limited, and one or more of the following apply (i, ii or iii):

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years);

ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes; iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes.

C) The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).

Endangered (EN)
An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.

An ecological community will be listed as **Endangered** when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B, or C):

A) The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement **and either or both** of the following apply (i or ii):

i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years);

ii) modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated.

B) Current distribution is limited, **and one or more of** the following apply (i, ii or iii):

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years);

ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes;

iii) there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes.

C) The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).

Vulnerable (VU)
An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

An ecological community will be listed as **Vulnerable** when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium (within approximately 50 years) to long-term future. This will be determined on the basis of the best available information by it meeting **any one or more of** the following criteria (A, B or C):

A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated.

B) The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations.

C) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long-term future because of existing or impending threatening processes

3. DEFINITIONS AND CRITERIA FOR PRIORITY ECOLOGICAL COMMUNITIES

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community List under priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community. Ecological communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

Priority One: Poorly-known ecological communities

Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤ 100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.

Priority Two: Poorly-known ecological communities

Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation. Communities may be included if they are

comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

Priority Three: Poorly known ecological communities

(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:

(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or;

(iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.

Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.

Priority Four: Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.

(i) Rare. Ecological communities known from few occurrences 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 communities are usually represented on conservation lands.

(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for a higher threat category.

(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.

Priority Five: Conservation Dependent ecological communities

Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

(Department of Environment and Conservation January 2013)

Appendix 3. Vegetation Condition Scale

Table 2: Vegetation condition scale from EPA (2016a) (adapted from Trudgen 1988, and Keighery 1994).

Vegetation Condition	South West and Interzone Botanical Provinces	Eremaean and Northern Botanical Provinces
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 and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	Vegetation structure significantly altered by very 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.	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor		Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but 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.	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded	The structure of the vegetation is no longer intact and 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.	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

Appendix 4. Systematic Species List

Family #	Family	Genus	Species	Cons Sign.
357	Amaranthaceae	Ptilotus	exaltatus	
357	Amaranthaceae	Ptilotus	helipteroides	
357	Amaranthaceae	Ptilotus	holosericeus	
357	Amaranthaceae	Ptilotus	obovatus (upright form)	
357	Amaranthaceae	Ptilotus	obovatus var. obovatus	
357	Amaranthaceae	Ptilotus	polystachyus	
413	Apocynaceae	Leichhardtia	australis	
413	Apocynaceae	Vincetoxicum	lineare	
128	Asparagaceae	Thysanotus	manglesianus	
460	Asteraceae	Brachyscome	ciliaris	
460	Asteraceae	Calotis	hispidula	
460	Asteraceae	Cephalipterum	drummondii	RI 150 km
460	Asteraceae	Chrysocephalum	apiculatum subsp. glandulosum	
460	Asteraceae	Chrysocephalum	puteale	
460	Asteraceae	Helipterum	craspedioides	
460	Asteraceae	Olearia	muelleri	
460	Asteraceae	Pterocaulon	sphacelatum	RI 200 km
460	Asteraceae	Rhodanthe	maryonii	
460	Asteraceae	Roebuckiella	ciliocarpa	
460	Asteraceae	Schoenia	cassiniana	
460	Asteraceae	Senecio	glossanthus	
460	Asteraceae	Siemssenia	capillaris	
460	Asteraceae	Sonchus	oleraceus	Weed
460	Asteraceae	Vittadinia	eremaea	
460	Asteraceae	Vittadinia	sulcata	
332	Brassicaceae	Lepidium	oxytrichum	
332	Brassicaceae	Stenopetalum	lineare var. lineare	

Family #	Family	Genus	Species	Cons Sign.
217	Casuarinaceae	Casuarina	pauper	
358	Chenopodiaceae	Chenopodium	desertorum	RE 200 km
358	Chenopodiaceae	Dysphania	kalpari	
358	Chenopodiaceae	Dysphania	melanocarpa forma. melanocarpa	
358	Chenopodiaceae	Enchylaena	tomentosa	
358	Chenopodiaceae	Eriochiton	sclerolaenoides	
358	Chenopodiaceae	Maireana	georgei	
358	Chenopodiaceae	Maireana	pyramidata	
358	Chenopodiaceae	Maireana	sedifolia	
358	Chenopodiaceae	Maireana	tomentosa	
358	Chenopodiaceae	Maireana	triptera	
358	Chenopodiaceae	Rhagodia	drummondii	
358	Chenopodiaceae	Salsola	australis	
358	Chenopodiaceae	Sclerolaena	cuneata	
358	Chenopodiaceae	Sclerolaena	densiflora	
358	Chenopodiaceae	Sclerolaena	diacantha	
358	Chenopodiaceae	Sclerolaena	eriacantha	
358	Chenopodiaceae	Sclerolaena	gardneri	
358	Chenopodiaceae	Sclerolaena	obliquicuspis	
358	Chenopodiaceae	Sclerolaena	parviflora	
416	Convolvulaceae	Convolvulus	clementii	
242	Euphorbiaceae	Euphorbia	drummondii	
242	Euphorbiaceae	Euphorbia	tannensis subsp. eremophila	
201	Fabaceae	Acacia	aneura	
201	Fabaceae	Acacia	aptaneura	
201	Fabaceae	Acacia	ayersiana	
201	Fabaceae	Acacia	burkittii	

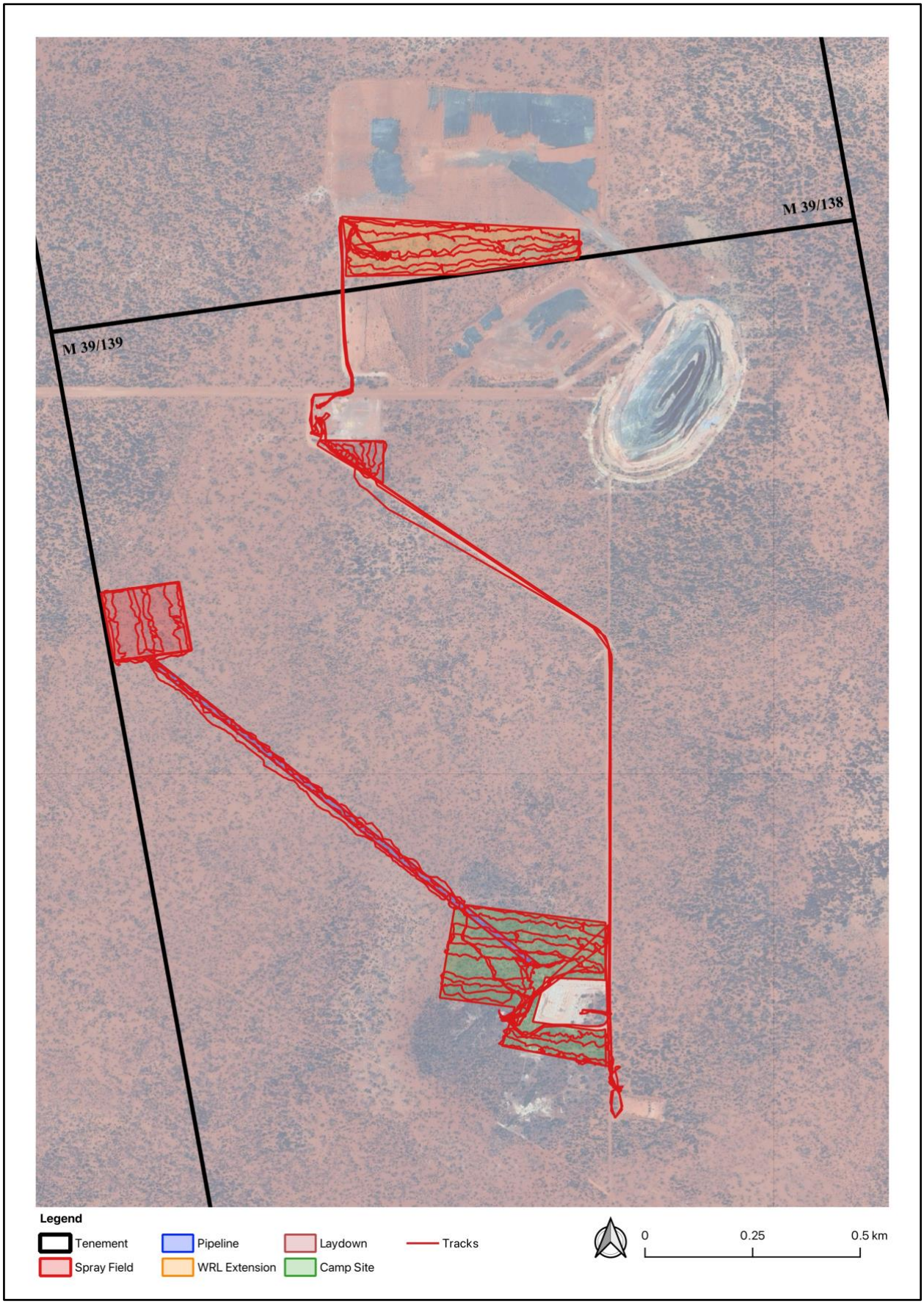
Family #	Family	Genus	Species	Cons Sign.
201	Fabaceae	Acacia	caesaneura	
201	Fabaceae	Acacia	colletioides	
201	Fabaceae	Acacia	kempeana	
201	Fabaceae	Acacia	ligulata	
201	Fabaceae	Acacia	mulganeura	
201	Fabaceae	Acacia	murrayana narrow phyllode form (G&S Cockerton WB40247)	SOI
201	Fabaceae	Acacia	oswaldii	
201	Fabaceae	Acacia	prainii	
201	Fabaceae	Acacia	ramulosa var. ramulosa	
201	Fabaceae	Acacia	sibirica	
201	Fabaceae	Acacia	tetragonophylla	
163	Fabaceae	Austrostipa	platychaeta	
201	Fabaceae	Indigofera	georgei	
201	Fabaceae	Senna	artemisioides subsp. artemisioides	
201	Fabaceae	Senna	artemisioides subsp. filifolia	
201	Fabaceae	Senna	cardiosperma	
201	Fabaceae	Senna	pleurocarpa var. pleurocarpa	
201	Fabaceae	Swainsona	kingii	
274	Geraniaceae	Erodium	aureum	Weed
274	Geraniaceae	Erodium	cygnorum	
458	Goodeniaceae	Brunonia	australis	
458	Goodeniaceae	Goodenia	connata	
458	Goodeniaceae	Goodenia	glabrata	
458	Goodeniaceae	Goodenia	glandulosa	
458	Goodeniaceae	Goodenia	peacockiana	
458	Goodeniaceae	Goodenia	ramelii	

Family #	Family	Genus	Species	Cons Sign.
458	Goodeniaceae	Goodenia	rosea	
458	Goodeniaceae	Goodenia	triodiophila	
458	Goodeniaceae	Scaevola	amblyanthera var. centralis	
458	Goodeniaceae	Scaevola	spinescens (broad leaf, non-spiny form)	
458	Goodeniaceae	Scaevola	spinescens (narrow leaf, spiny form)	
328	Gyrostemonaceae	Codonocarpus	cotinifolius	
196	Haloragaceae	Haloragis	trigonocarpa	
432	Lamiaceae	Teucrium	teucriiflorum	
339	Loranthaceae	Lysiana	murrayi	
309	Malvaceae	Abutilon	cryptopetalum	
309	Malvaceae	Abutilon	oxycarpum subsp. Prostrate (A.A. Mitchell PRP 1266)	
309	Malvaceae	Alyogyne	pinoniana	
309	Malvaceae	Seringia	velutina	
309	Malvaceae	Sida	calyxhymenia	
309	Malvaceae	Sida	cardiophylla	
309	Malvaceae	Sida	ectogama	
309	Malvaceae	Sida	fibulifera	
309	Malvaceae	Sida	sp. dark green fruits (S. van Leeuwen 2260)	
374	Montiaceae	Calandrinia	polyandra	
281	Myrtaceae	Eucalyptus	concinna	
281	Myrtaceae	Eucalyptus	gongylocarpa	
281	Myrtaceae	Eucalyptus	oleosa	
281	Myrtaceae	Eucalyptus	rigidula	
281	Myrtaceae	Eucalyptus	youngiana	
423	Oleaceae	Jasminum	calcareum	
163	Poaceae	Aristida	contorta	

Family #	Family	Genus	Species	Cons Sign.
163	Poaceae	Aristida	holathera var holathera	
163	Poaceae	Aristida	sp. tall insufficient material	
163	Poaceae	Austrostipa	scabra	
163	Poaceae	Digitaria	brownii	
163	Poaceae	Enneapogon	caerulescens	
163	Poaceae	Enneapogon	polyphyllus	
163	Poaceae	Eragrostis	dielsii	
163	Poaceae	Eragrostis	eriopoda	
163	Poaceae	Eragrostis	falcata	
163	Poaceae	Eriachne	helmsii	
163	Poaceae	Eriachne	pulchella subsp. pulchella	RI 100 km
163	Poaceae	Monachather	paradoxus	
163	Poaceae	Paspalidium	basicladum	
163	Poaceae	Triodia	basedowii	
345	Polygonaceae	Rumex	vesicaria	Weed
374	Portulacaceae	Portulaca	oleracea	Weed RE 250 Km
29	Pteridaceae	Cheilanthes	lasiophylla	
409	Rubiaceae	Psydrax	suaveolens	
338	Santalaceae	Santalum	spicatum	
299	Sapindaceae	Dodonaea	lobulata	
299	Sapindaceae	Dodonaea	rigida	
428	Scrophulariaceae	Eremophila	clarkei	
428	Scrophulariaceae	Eremophila	decipiens	
428	Scrophulariaceae	Eremophila	latrobei subsp. filiformis	RE 200km
428	Scrophulariaceae	Eremophila	latrobei subsp. glabra	
428	Scrophulariaceae	Eremophila	latrobei subsp. latrobei	

Family #	Family	Genus	Species	Cons Sign.
428	Scrophulariaceae	Eremophila	longifolia	
428	Scrophulariaceae	Eremophila	oldfieldii subsp. angustifolia	
428	Scrophulariaceae	Eremophila	scoparia	
417	Solanaceae	Duboisia	hopwoodii	
417	Solanaceae	Solanum	cleistogamum	
417	Solanaceae	Solanum	ferocissimum	
417	Solanaceae	Solanum	lasiophyllum	
417	Solanaceae	Solanum	nigrum	Weed
417	Solanaceae	Solanum	orbiculatum subsp. orbiculatum	
417	Solanaceae	Solanum	plicatile	
311	Thymelaeaceae	Pimelea	microcephala subsp. microcephala	
199	Zygophyllaceae	Roepera	aurantiaca	

Appendix 5. GPS Tracklogs


M 39/138
M 39/139
Legend
Tenement
Pipeline
Laydown
Tracks
Spray Field
WRL Extension
Camp Site
0
0.25
0.5 km

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