



**Westgold Resources Limited: Tuckabianna West Project Area  
Reconnaissance and Targeted Flora Survey, September 2019**



This document describes the results of a combined reconnaissance and targeted flora survey carried out by Maia Environmental Consultancy (Maia) for Westgold Resources Limited (Westgold). The survey was carried out over one polygon at Westgold's Tuckabianna West project area southeast of Cue in the Mid West region of Western Australia.

Photographs on front page: flora and vegetation of the Tuckabianna West project area.

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## Acronyms and Abbreviations

|                     |                                                                      |
|---------------------|----------------------------------------------------------------------|
| <b>BC Act</b>       | <i>Biodiversity Conservation Act 2016</i>                            |
| <b>BVA / VA</b>     | Beard vegetation association                                         |
| <b>BVSA / VSA</b>   | Beard vegetation system association                                  |
| <b>BoM</b>          | Bureau of Meteorology                                                |
| <b>Coffey</b>       | Coffey Environments Australia                                        |
| <b>CSF</b>          | Conservation significant flora                                       |
| <b>DBCA</b>         | Department of Biodiversity Conservation and Attractions              |
| <b>DEC</b>          | Former Department of Environment and Conservation (current DBCA)     |
| <b>DMIRS</b>        | Department of Mines, Industry, Regulation and Safety                 |
| <b>DoAWE</b>        | Department of Agriculture, Water and Environment (federal)           |
| <b>DotE</b>         | Former Department of the Environment (current DoAWE)                 |
| <b>DotEE</b>        | Former Department of the Environment and Energy (current DoAWE)      |
| <b>DPIRD</b>        | Department of Primary Industries and Regional Development            |
| <b>DPP</b>          | Declared pest plant                                                  |
| <b>DRF</b>          | Declared rare flora                                                  |
| <b>DWER</b>         | Department of Water and Environmental Regulation                     |
| <b>EPA</b>          | Environmental Protection Authority                                   |
| <b>EPBC Act</b>     | <i>Environment Protection and Biodiversity Conservation Act 1999</i> |
| <b>ESA</b>          | Environmentally sensitive area                                       |
| <b>ESCAVI</b>       | Executive Steering Committee for Australian Vegetation Information   |
| <b>Fl, Fr</b>       | Flowering, fruiting                                                  |
| <b>GDA94</b>        | Geocentric Datum of Australia, 1994                                  |
| <b>GDE</b>          | Groundwater dependent ecosystem                                      |
| <b>GoWA</b>         | Government of Western Australia                                      |
| <b>GPS</b>          | Global Positioning System                                            |
| <b>ha</b>           | Hectare                                                              |
| <b>IBRA</b>         | Interim Biogeographic Regionalisation for Australia                  |
| <b>IUCN</b>         | International Union for Conservation of Nature                       |
| <b>LS</b>           | Land system                                                          |
| <b>L-t</b>          | Long-term                                                            |
| <b>Maia</b>         | Maia Environmental Consultancy Pty Ltd                               |
| <b>MGA50</b>        | Map Grid of Australia zone 50                                        |
| <b>mm</b>           | Millimetre                                                           |
| <b>MUR</b>          | Murchison bioregion                                                  |
| <b>MUR1 / MUR01</b> | East Murchison subregion                                             |
| <b>MWH</b>          | MWH Australia                                                        |
| <b>NVE</b>          | Native vegetation extent                                             |
| <b>NVIS</b>         | National Vegetation Information System                               |

|                         |                                        |
|-------------------------|----------------------------------------|
| <b>OppColl</b>          | Opportunistic collection               |
| <b>P (1-4)</b>          | Priority 1 to Priority 4 flora species |
| <b>PEC</b>              | Priority ecological community          |
| <b>PMST</b>             | Protected Matters Search Tool          |
| <b>R</b>                | Relevé                                 |
| <b>RE</b>               | Range extension                        |
| <b>SOI</b>              | Species of interest                    |
| <b>sp.</b>              | Species - single                       |
| <b>subsp.</b>           | Subspecies                             |
| <b>Survey Area / TW</b> | Tuckabianna West                       |
| <b>T</b>                | Threatened flora species               |
| <b>TEC</b>              | Threatened ecological community        |
| <b>TPFL</b>             | Threatened and Priority Flora database |
| <b>var.</b>             | Variety                                |
| <b>WA</b>               | Western Australia                      |
| <b>WAH / WAHerb</b>     | Western Australian Herbarium           |
| <b>Westgold</b>         | Westgold Resources Limited             |
| <b>WoNS</b>             | Weed of National Significance          |
| <b>x</b>                | Crossed with / hybrid                  |
| <b>*</b>                | Indicates a weed species               |
| <b>?</b>                | Queried / unconfirmed genus or species |

## Summary

### Background and Methods

- Westgold Resources Limited (Westgold) plans to expand its Tuckabianna West project area in the Mid West region of Western Australia (WA). Maia Environmental Consultancy Pty Ltd (Maia) was engaged by Westgold to carry out a combined reconnaissance and targeted flora survey over the approximately 752 ha project area (the Survey Area). The Survey Area is approximately 22 km southeast of Cue at its closest.
- A desktop assessment was carried out and then a survey in late September 2019.

### Desktop Study Results

- One threatened flora species listed under both the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and *Biodiversity Conservation Act 2016* (BC Act) has been located within 35 km of the Survey Area – *Eremophila rostrata* subsp. *rostrata* (Critically Endangered). However, the closest record is 3 km away and its typical habitat does not occur in the Survey Area. Database and literature searches produced a list of 31 priority (P) flora species that have been recorded within 50 km of the Survey Area (seven P1, two P2, 18 P3 and four P4). Ten of the 31 priority species were recorded in the transport corridors surveyed in the vicinity of Cue in 2017 and 2018 and at Westgold's Mt Fingall project area in September 2019, therefore some of the 31 priority species could occur in the Survey Area.
- Two Weeds of National Significance (WoNS) and pest plants declared in WA (DPP) have been located previously in the surrounding area (*Opuntia stricta* (Prickly Pear) and *Tamarix aphylla* (Tamarisk)). One potential DPP was located in an area surveyed in September 2019 - *Argemone ?mexicana* (?Mexican Poppy). Twenty-four general weed species were collated from the desktop study and 13 of them have been recorded during surveys carried out by Maia in the surrounding area. Six of the 24 weed species are listed as having high ecological impact and rapid invasiveness ratings.
- The Survey Area does not lie in a threatened ecological community (TEC). A small section of the south-eastern corner of the Survey Area (0.07 ha) intersects a buffer in place around the 'Lake Austin vegetation complexes (banded ironstone formation)' P1 priority ecological community (PEC).
- The Survey Area does not intersect a Red Book Area, an environmentally sensitive area, or areas managed by, or of interest to, the Department of Biodiversity Conservation and Attractions (DBCA). Neither does it intersect a Schedule 1 area.

### Survey Results - Flora

- One hundred and ten (110) taxa from 54 genera and 27 families were recorded in the Survey Area (73% perennial and 27% annual).
- No threatened flora species and one priority flora species were recorded in the Survey Area – the P3 species *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) at one location.
- No regional endemic species were located in the Survey Area or any new or unusual species.
- Eight range extension species were located in the Survey Area.
- Sandalwood (*Santalum spicatum*) was recorded at one location in the Survey Area.
- No WoNS or DPP species were located, while three general weed species were recorded (*Cuscuta planiflora* (Small-seeded Dodder), *Lysimachia arvensis* (Pimpernel) and *Rumex vesicarius* (Ruby Dock)). Ruby Dock has high ecological impact and rapid invasiveness ratings.

### Survey Results - Vegetation

- Five vegetation types were mapped in the different habitats of the Survey Area - all *Acacia* shrublands of different density and species mixes (*AaTSSL*, *ATOSL*, *ATSSL* (1), *ATSSL* (2) and *ATSSL* (3)). They were mapped on along or in a small rocky outcrop, undulating plains, minor drainage channels, broad drainage channels and depressions.
- The most extensive vegetation type was *ATSSL* (1), which was mapped over 35.3% of the Survey Area on undulating plains and minor drainage channels, and the least extensive was *AaTSSL*, which was mapped over only 0.1% of the Survey Area (on the small rocky outcrop).
- Vegetation condition was assessed as mostly good (45%) and very good (28%), while 3% of the Survey Area was in poor condition and 24% was degraded to completely degraded.

## Ecological Communities

- The tip of the south-eastern corner of the Survey Area intersects the edge of a buffer in place around a section of the Lake Austin vegetation complexes (banded ironstone formation) (BIF) P1 PEC. There is no publicly available detailed description for this PEC, and Maia is not aware of any report or paper describing the vegetation of the Lake Austin banded ironstone ranges. However, the vegetation in that area is mapped as **ATSSL (3)** a tall sparse Acacia shrubland that is mapped on undulating plains, minor drainage channels and depressions, and not on BIF outcrops or hills, or on the mid or footslopes of a BIF outcrop or hill.
- A small outcrop of either BIF or a volcanic ash unit was located in the Survey Area and vegetation type **AaTSSL** was mapped on it (a Tall Sparse Shrubland of *Acacia aptaneura* with a Sparse Shrubland of *Thryptomene decussata* and a Low Sparse Shrubland of *Ptilotus obovatus*). Similar vegetation has been mapped in areas surveyed to the southwest of the Survey Area on BIF hills and outcrops of the Gabanintha Land System (LS). A large polygon of the Gabanintha LS is mapped to the east and southeast of the Survey Area and it is in the centre of the buffer for the Lake Austin vegetation complexes (banded ironstone formation) P1 PEC in that area; however, the small outcrop in the Survey Area is in the Violet LS.

## Groundwater and Sheet Flow Dependent Ecosystems

- Some of the trees and larger shrubs along the larger unnamed and ephemeral creeks in the Survey Area could depend on groundwater at some time during their life cycle.
- Mulga groves / bands can be seen in the northern section of the Survey Area and they could depend on sheet flow of water across the plains in that area.

## Conservation Significance

- The *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) is assessed as having moderate local significance (the local area being the Survey Area). A maximum potential impact to the species was calculated (using the whole of the Survey Area as the impact area, as the area to be disturbed is not known), and the impact is estimated to be 0.2%.
- The five vegetation types of the Survey Area also occur in the surrounding areas. They were rated as having moderate or low (**ATSSL (1)**) local significance. The highest maximum potential impact to the vegetation types mapped in the Survey Area is 35% to **ATSSL (1)** if the whole of the Survey Area were to be cleared. The next highest maximum potential impact would be to **ATSSL (2)** (31%) and **ATSSL (3)** (6%). The remaining potential impacts are less than 5%. Already disturbed areas comprise 24% of the Survey Area.
- The local significance of the pre-European vegetation system association (18.0) in the Survey Area is rated as low. More than 99% of the vegetation association and system association currently remains in the bioregion and subregion.
- The local significance of the Sherwood and Yanganoo land systems was assessed as low and the Violet LS as moderate.

## Recommendations

- While an estimate of the impact to the total number of plants (known to Maia) of the P3 species *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) located in the Survey Area was only 0.2% (if the whole of the Survey Area were to be cleared), impact to this species in the Survey Area should be avoided or minimised, as it has not been located in the area previously (the closest record is in Cue, approximately 22 km to the northwest from the closest part of the project area).
- Impact to the vegetation of the Survey Area should be minimised and impact to the small rocky outcrop should be avoided, as it is the only patch of this vegetation in the Survey Area.
- Sandalwood, *Santalum spicatum*, is a valuable resource and impact to it should be avoided whenever possible. If the tree is to be removed and passed on for processing, relevant licences should be applied for.
- Drainage should be managed to ensure that impact to potentially sheet flow dependent mulga vegetation is minimised and also to vegetation associated with the drainage lines of the Survey Area.
- Only three weed species were located when the survey was carried out and every effort should be made to prevent the spread of these weeds from and between Westgold's different project areas and to prevent the introduction of new weed species to the Tuckabianna West project area.

# Westgold Resources Limited: Tuckabianna West Project Area

## RECONNAISSANCE AND TARGETED FLORA SURVEY, SEPTEMBER 2019

## 1 INTRODUCTION

### 1.1 SCOPE OF WORK

Westgold Resources Limited (Westgold) plans to expand its Tuckabianna West project area southeast of Cue in the Mid West region of Western Australia (WA).

Maia Environmental Consultancy Pty Ltd (Maia) was engaged by Westgold to carry out a combined reconnaissance and targeted flora survey over a polygon at Tuckabianna West (the Survey Area) in spring (late September) 2019. This report presents the results of a desktop study carried out over the Survey Area and the results of the field survey; it also presents a discussion of the significance of the flora and vegetation of the Survey Area.

### 1.2 SURVEY AREA LOCATION AND SIZE

The Survey Area lies in the Shire of Cue and is approximately 22 kilometres (km) southeast of the centre of Cue at its closest point (**Map 1, Section 9**).

The Tuckabianna West polygon covers 751.38 hectares (ha).

## 2 BACKGROUND INFORMATION

### 2.1 RAINFALL

The closest weather stations recording climate statistics are Cue and Yarraquin (Bureau of Meteorology (BoM) stations 7017 and 7159 respectively). **Table 2.1** lists the long-term mean rainfall data for January to December and actual rainfall data for January to December 2019 for these two stations (BoM, 2020).

**Table 2.1: Long-term and 2019 total monthly and annual rainfall (mm) – Cue and Yarraquin**

|                                                                              | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep | Oct | Nov  | Dec  | Jan-Dec |
|------------------------------------------------------------------------------|------|------|------|------|------|------|------|------|-----|-----|------|------|---------|
| Cue (site number 7017; long-term data collected between 1894 and 2019)       |      |      |      |      |      |      |      |      |     |     |      |      |         |
| <b>2019 (mm)</b>                                                             | 0    | 12.0 | 4.6  | 42.7 | 0    | 40.9 | 6.4  | 1.6  | 0   | 0   | 0    | 18.4 | 126.6   |
| <b>L-t (mm)</b>                                                              | 27.9 | 29.4 | 24.4 | 18.9 | 24.3 | 28.1 | 25.1 | 16.7 | 6.7 | 6.6 | 9.4  | 15.0 | 232.5   |
| Yarraquin (site number 7159; long-term data collected between 1967 and 2019) |      |      |      |      |      |      |      |      |     |     |      |      |         |
| <b>2019 (mm)</b>                                                             | 0    | 2.0  | 31.7 | 35.6 | 0.0  | 39.1 | 10.2 | 7.2  | 0.0 | 1.2 | 0.0  | 5.2  | 132.2   |
| <b>L-t (mm)</b>                                                              | 32.7 | 32.9 | 31.3 | 22.1 | 24.4 | 28.0 | 26.4 | 16.9 | 6.9 | 8.7 | 11.0 | 15.9 | 257.2   |

Note: L-t = long-term mean monthly and annual rainfall (millimetres (mm)).

Total rainfall recorded at Cue over the three full months before the survey (June, July, August 2019) was 48.9 mm, which is 21.0 mm less than the long-term mean total for those three months (69.9 mm). Total rainfall recorded at Yarraquin over June, July and August 2019 was 56.5 mm, which is 14.8 mm less than the long-term mean total for those three months (71.3 mm).

Based on these data the condition of the vegetation at Tuckabianna could have been below average.

## 2.2 BIOREGIONAL SETTING

Information on the bioregion, sub-region, geology, soil landscape units, land systems, pre-European vegetation associations, the main findings of any earlier surveys carried out in or in the vicinity of the Survey Area (including conservation significant flora (CSF) species, groundwater dependent ecosystems (GDE), sheet flow dependent vegetation, environmentally sensitive areas (ESA), conservation estate, Schedule 1 areas, former leasehold areas, Environmental Protection Authority (EPA) Red Book areas and significant water bodies, rivers and drainage lines and any other significant ecosystems is summarised in **Table 2.2**.

**Table 2.2: Background information**

| Background information on the Survey Area      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bioregion and subregion<br>(Map 2A, Section 9) | Murchison bioregion (MUR) and East Murchison subregion (MUR01) (Department of the Environment (DotE), 2012).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Geology<br>(Map 2B, Section 9)                 | <p>The surface geology of the Survey Area is mapped as three units (Stewart <i>et al.</i>, 2008):</p> <ul style="list-style-type: none"> <li>• Colluvium (<b>Qrc</b>). Channel and flood plain alluvium; gravel, sand, silt, clay; may be locally calcreted.</li> <li>• Felsic volcanic rocks (<b>Afy</b>). Felsic volcanic and volcanoclastic rocks, locally amygdaloidal or fragmental; dacite, quartz-feldspar porphyry, tuff, agglomerate, andesitic lava, quartz-muscovite schist, felsic schist, felsic gneiss.</li> <li>• Alluvium (<b>Qa</b>). Colluvium and/or residual deposits, sheetwash, talus, scree; boulder, gravel, sand; may include minor alluvial or sand plain deposits, local calcrete and reworked laterite.</li> </ul>                                                                                                                                                                                                                                                     |
| Soil landscape units                           | <p>The Survey Area lies in the Murchison Province of the Western Region (Tille, 2006). The Murchison Province is described as hardpan wash plains and sandplains (with some stony plains, hills, mesas and salt lakes) on the granitic rocks and greenstone of the Yilgarn Craton.</p> <p>The Murchison Province is divided into seven soil-landscape zones and the Survey Area lies in the Yalgoo Plains zone (273), which is located in the south-western Murchison from Paynes Find to Cue and Twin Peaks Station.</p> <p>The Yalgoo Plains zone is described as Hardpan wash plains (with some sandplains, stony plains, mesas and granite outcrops) on granitic rocks (with some greenstone) of the Yilgarn Craton (Murchison Domain). The soils are Red loamy earths and Red shallow loams (often with hardpans) with Red deep sands and Red shallow sands and some Red shallow sandy duplexes. Mulga shrublands with bowgada shrublands (and some halophytic shrublands) (Tille, 2006).</p> |
| Land systems<br>(Map 2C, Section 9)            | <p>The Survey Area lies over three land systems (LS) (Department of Primary Industries and Regional Development (DPIRD), 2019c):</p> <p><b>Sherwood:</b> Breakaways, kaolinized footslopes and extensive gently sloping plains on granite supporting mulga shrublands and minor halophytic shrublands.</p> <p><b>Violet:</b> 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.</p> <p><b>Yanganoo:</b> Almost flat hardpan wash plains, with or without small wanderrie banks and weak groving; supporting mulga shrublands and wanderrie grasses on banks.</p>                                                                                                                                                                                                                                                                            |

| Background information on the Survey Area                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pre-European vegetation associations and system associations<br><b>(Map 2D, Section 9)</b>                                      | <p>One of Beard's vegetation associations (BVA) and system associations (BVSA) is mapped in the Survey Area (DPIRD, 2019b):</p> <ul style="list-style-type: none"> <li>BVA 18, BVSA 18.0: Low woodland, open low woodland or sparse woodland; mulga <i>Acacia aneura</i> and associated species.</li> </ul> <p>The pre-European and current extent of the vegetation association and vegetation system association in the Murchison region and Eastern Murchison subregion are listed in <b>Table 2.3</b> along with the amount in reserves.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Conservation significant flora species located during previous botanical surveys carried out in the vicinity of the Survey Area | <p>Yellow Taxi: No CSF recorded (Outback Ecology, 2005).</p> <p>Central Murchison Gold Project (Big Bell, City of Chester, Cuddingwarra and Day Dawn): No CSF recorded (Outback Ecology, 2012).</p> <p>Tuckabianna: No CSF recorded (Coffey, 2012a).</p> <p>Big Bell Haul Road (Option 1): 8 priority flora species in the haul road corridor surveyed – <i>Hibiscus krichauffianus</i>, <i>Prostanthera ferricola</i>, <i>Ptilotus beardii</i>, <i>Ptilotus luteolus</i>, <i>Sauropus</i> sp. Woolgorong (M. Officer s.n. 10/8/94) (all Priority (P) 3), <i>Acacia speckii</i>, <i>Dodonaea amplisemina</i> and <i>Grevillea inconspicua</i> (all P4) (Maia, 2018).</p> <p>Big Bell Haul Road Corridor, Alignment 2: 8 priority flora species in the haul road corridor surveyed – <i>Drummondita miniata</i>, <i>Prostanthera ferricola</i>, <i>Ptilotus beardii</i>, <i>Ptilotus luteolus</i>, <i>Sida picklesiana</i> (all Priority (P) 3), <i>Acacia speckii</i>, <i>Dodonaea amplisemina</i> and <i>Grevillea inconspicua</i> (all P4) (Maia, 2019).</p> |
| Protected and significant areas<br><b>(Map 3, Section 9)</b>                                                                    | <p><b>DBCA Lands of Interest:</b> The Survey Area does not intersect with any lands of interest (Department of Biodiversity, Conservation and Attractions (DBCA), 2019a)</p> <p><b>DBCA Legislated Lands and Waters:</b> The Survey Area does not intersect with any legislated lands and waters (DBCA, 2019b).</p> <p><b>Environmental Protection Authority (EPA) Redbook areas:</b> No EPA Redbook areas within 50 km of the Survey Area (DBCA, 2019c).</p> <p><b>Environmentally Sensitive Area (ESA):</b> No ESA occurs within the Survey Area; the closest ESAs are approximately 21 km northwest of the Survey Area and are <i>Eremophila rostrata</i> (Threatened (T)) locations (Department of Water and Environment Regulation (DWER), 2019a).</p> <p><b>Schedule 1 areas:</b> The Survey Area does not intersect a Schedule 1 area – the closest boundary is approximately 10 km to the northwest, and it is around the Cue Water Reserve (DWER, 2019b; Department of Mines, Industry, Regulation and Safety (DMIRS), 2019).</p>                     |
| Significant water bodies, rivers and drainage lines<br>Protected and significant areas<br><b>(Map 4, Section 9)</b>             | <p>No Ramsar wetland (DBCA, 2019d) or wetlands on the Directory of Important Wetlands (DBCA, 2019e) occur in or close to the Survey Area.</p> <p>No rivers occur within 50 km of the Survey Area. The closest point on the mapped boundary for Lake Austin is approximately 15 km south southwest of the Survey Area. Two minor non-perennial watercourses and associated tributaries cross the Survey Area (Geoscience Australia, 2006).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

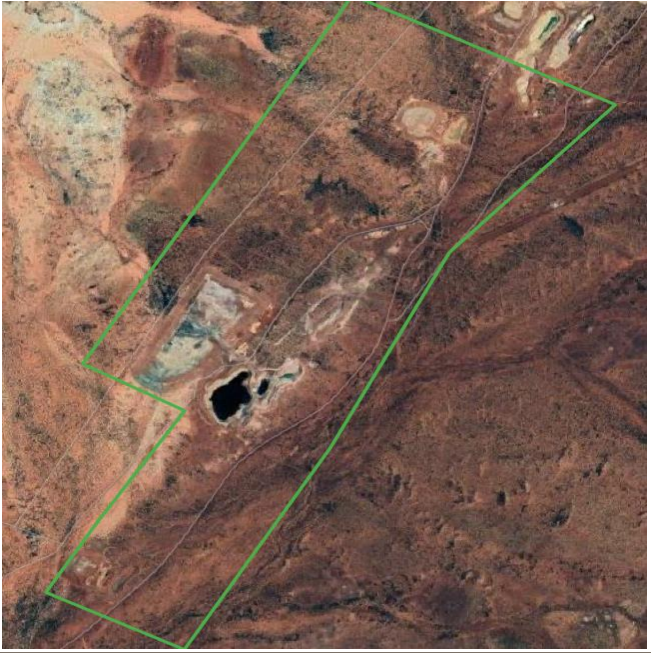
| Background information on the Survey Area |                                                                                                                                                                                                                                |                                                                                    |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Sheet flow dependent vegetation           | Patches of groved/banded mulga can be seen in the north-western section of the Survey Area and groved and weakly groved mulga is mentioned in the Violet and Yanganoo land system vegetation descriptions (this table, above). |  |
| Terrestrial GDE<br>(Map 4, Section 9)     | The south-western corner of the Survey Area intersects a polygon mapped as having low potential to be a GDE based on national assessment (BoM, 2019).                                                                          |                                                                                    |

Table 2.3: Beard's pre-European vegetation associations and system associations

|                                                                                                                           | Pre-European Extent (ha) of VA/VSA in: |                             | Current Extent (ha) of VA/VSA in:                                                                          |                             |
|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-----------------------------|------------------------------------------------------------------------------------------------------------|-----------------------------|
|                                                                                                                           | Murchison bioregion                    | Eastern Murchison subregion | Murchison bioregion                                                                                        | Eastern Murchison subregion |
| <b>VA 18</b>                                                                                                              | 12,403,172                             | 10,269,896                  | 12,363,252                                                                                                 | 10,234,838                  |
| <b>VSA 18</b>                                                                                                             | 4,308,147                              | 4,273,710                   | 4,290,395                                                                                                  | 4,256,229                   |
|                                                                                                                           | Remaining % of VA/VSA in:              |                             | Current Extent of VA/VSA Protected (IUCN 1-4) for Conservation (proportion of pre-European extent) (%) in: |                             |
|                                                                                                                           | Murchison bioregion                    | Eastern Murchison subregion | Murchison bioregion                                                                                        | Eastern Murchison subregion |
| <b>VA 18</b>                                                                                                              | 99.68                                  | 99.66                       | 0.36                                                                                                       | 0.44                        |
| <b>VSA 18</b>                                                                                                             | 99.59                                  | 99.59                       | 1.05                                                                                                       | 1.05                        |
| Source: Government of Western Australia (GoWA) (2019a). VA = vegetation association, VSA = vegetation system association. |                                        |                             |                                                                                                            |                             |

## 2.3 DATABASE SEARCHES AND RESULTS

Information on the flora species and ecological communities of the Survey Area was gathered from the sources listed in **Table 2.4**. The area over which the database searches were carried out is shown on **Map 5** and **Map 6** (**Section 9**).

**Table 2.4: Databases searched, and literature used**

| Database / literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Reference or reference number              | Buffer(s) (km)                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| EPBC Act Protected Matters Search Tool                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | DotEE (2020)                               | 10 km buffer from a central coordinate                                                                          |
| DBCA's NatureMap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | DBCA (2007-)                               |                                                                                                                 |
| DBCA's Threatened and Priority Flora database (TPFL)                                                                                                                                                                                                                                                                                                                                                                                                                                                   | DBCA 2019f, Reference #07-1219FL)          | 50 km buffer around a central coordinate                                                                        |
| DBCA's Threatened and Priority Flora List (TP List)                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                            |                                                                                                                 |
| The Western Australian Herbarium (WA Herb) – for threatened and priority flora species opportunistically collected in the area of interest                                                                                                                                                                                                                                                                                                                                                             |                                            |                                                                                                                 |
| DBCA's Threatened Ecological Communities database                                                                                                                                                                                                                                                                                                                                                                                                                                                      | DBCA 2019g, search reference # 08-01212EC) | 35 km buffer around a central coordinate                                                                        |
| <b>Co-ordinates used for EPBC Act and NatureMap searches:</b> 10 km buffer around the central coordinate 27°28' 44" S and 118° 7' 17" E. The search results are included as <b>Figures A1.1 and A1.2 (Appendix 1)</b> .<br><b>Coordinates for the DBCA Threatened Flora and Threatened Ecological Community searches:</b> 50 km buffer / 35 km buffer around the central coordinate 588,290 mE and 6,969,924 mN (Geocentric Datum of Australia, 1994 (GDA94), Map Grid of Australia, zone 50 (MGA50)). |                                            |                                                                                                                 |
| Big Bell Haul Road Corridor, Alignment 2 (L20/79)                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Maia (2019)                                | Surveys / desktop assessments previously carried out for Westgold within approximately 35 km of the Survey Area |
| Big Bell Haul Road (Option 1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Maia (2018)                                |                                                                                                                 |
| Reedys                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | MWH (2015)                                 |                                                                                                                 |
| Moyagee tenement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Coffey (2013a)                             |                                                                                                                 |
| Lake Austin Discharge Point                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Coffey (2013b)                             |                                                                                                                 |
| Tuckabianna                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Coffey (2012a)                             |                                                                                                                 |
| Comet, Silver Lake                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Coffey (2012b)                             |                                                                                                                 |
| Comet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Coffey (2012c)                             |                                                                                                                 |
| Central Murchison Gold Project                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Outback Ecology (2012)                     |                                                                                                                 |
| Yellow Taxi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Outback Ecology (2005)                     |                                                                                                                 |

### 2.3.1 Significant Flora

#### 2.3.1.1 Threatened and Priority Flora

The locations for the threatened and priority flora species resulting from the database searches are shown on **Map 5** (**Section 9**).

#### 2.3.1.2 Threatened Flora

Two flora species protected by the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) have been recorded within 50 km of the Survey Area – *Eremophila rostrata* subsp. *rostrata* and *Minuria tridens* (listed

as Critically Endangered and Vulnerable respectively (DotEE, 2019b); **Table A1.1, Appendix 1** and codes described in **Table A2.1, Appendix 2**. *Eremophila rostrata* subsp. *rostrata* is also protected by the *Biodiversity Conservation Act 2016* (BC Act) and is ranked as Critically Endangered (**Table A1.1, Appendix 1**) (Smith & Jones, 2018; GoWA, 2018a), while *Minuria tridens* is not listed as a threatened species in WA under the BC Act. *Eremophila rostrata* subsp. *rostrata* locations are shown on **Map 5, Section 9**.

Neither of these species were listed in the results of the EPBC Act Protected Matters Search Tool (PMST) search (PMST\_LA8RH0; DotEE, 2020; **Figure A1.1, (Appendix 1)**, or in the NatureMap (DBCA, 2007-) search results (**Figure A1.2, Appendix 1**).

#### 2.3.1.3 Priority Flora

A list of 31 priority species (including *Minuria tridens*) resulted from the database and literature searches (**Table A1.1, Appendix 1**) – seven P1 species, two P2 species, 18 P3 species and four P4 species (**Map 5, Section 9**).

Ten of the 31 species have been recorded by Maia during surveys carried out for Westgold within 50 km of the Survey Area (Maia, 2018, 2019 and 2020).

#### 2.3.1.4 Endemic Species

None of the 46 species listed in the NatureMap species report for the search area (DBCA, 2007-) were indicated as being endemic to the query area.

#### 2.3.1.5 Range Extension Species

Thirty-three range extension species were recorded during the three surveys carried out by Maia within 50 km of the Survey Area (Maia, 2018, 2019 and 2020).

### 2.3.2 Weeds

#### 2.3.2.1 Weeds of National Interest

- No weed of national significance (WoNS) (or their potential habitat) were listed in the EPBC Act PMST search results (DotEE, 2020) (**Figure A1.1, Appendix 1**). One WoNS was recorded in the alignment 1 corridor – *Tamarix aphylla* (Athel Pine) (Maia, 2018) and one in the alignment 2 transport corridor – *Opuntia stricta* (Prickly Pear; Maia, 2019).
- No WoNS were listed in the results of the NatureMap search (DBCA, 2007-; **Figure A1.2, Appendix 1**).
- *Opuntia ?stricta* was recorded by Outback Ecology (2012) in the Big Bell survey area and *Opuntia* sp. was recorded by Maia just outside of the alignment 1 corridor (Maia, 2018).

#### 2.3.2.2 Plant Pests Declared in Western Australia

- No declared pest plants (DPP) were listed in the results of the EPBC Act PMST search (DotEE, 2020; DPIRD, 2020) (**Figure A1.1, Appendix 1**).
- No DPP was listed in the NatureMap search results (DBCA, 2007-; **Table A1.2, Appendix 1**).
- One potential DPP – *Opuntia ?stricta* was recorded by Outback Ecology (2012) in its Big Bell survey area and *Opuntia* sp. was recorded by Maia just outside of the alignment 1 corridor (Maia, 2018) (**Table A1.2, Appendix 1**). *Tamarix aphylla* is a DPP and was located within the alignment 1 corridor. One potential DPP – *Argemone ?mexicana* (?Mexican Poppy) was recorded by Maia in the Mt Fingall project area (Maia, 2020).

### 2.3.2.3 General Weeds

A list of 24 general weed species (excluding WoNS and DPP) was collated from the results of the EPBC Act PMST search (DotEE, 2020), NatureMap search (DBCA, 2007-) and from the results of surveys carried out in the vicinity of Survey Area (**Figures A1.1 and A1.2 and Table A1.2, Appendix 1**).

**Table A1.2 (Appendix 1)** lists the ecological impact and invasiveness rankings for the 24 general weed species identified from the database and literature searches. Six of the 24 weed species listed have high ecological impact and rapid invasiveness ratings – *Brassica tournefortii*, *Cenchrus ciliaris*, *Centaurea melitensis*, *Cynodon dactylon*, *Malvastrum americanum* and *Rumex vesicarius*.

### 2.3.3 Significant Ecological Communities

**Map 6 (Section 9)** shows the locations of conservation significant ecological communities within the database search area (threatened and priority ecological communities (TECs and PECs)).

- No federally protected TECs were listed in the EPBC Act PMST search results as likely to occur within the database search area (DotEE, 2020) (**Figure A1.1, Appendix 1**).
- No state-listed TECs were in the results of the DBCA ecological community search carried out over the wider area (DBCA, 2019b; search reference number 08-01212EC).
- Five PECs were listed in the results of the DBCA ecological community search and the buffer for one of them intersects a small section (0.07 ha) of the south-eastern corner of the Survey Area – the ‘Lake Austin vegetation complexes (banded ironstone formation)’ P1 PEC.
- The four other PECs occur outside of the Survey Area but within the database search area:
  - 1) ‘Lake Austin calcrete groundwater assemblage type on Murchison palaeodrainage on Austin Downs Station’ P1 PEC;
  - 2) ‘Taincrow calcrete groundwater assemblage type on Murchison palaeodrainage on Taincrow Station’ P1 PEC;
  - 3) ‘Austin Land System’ P3 PEC; and,
  - 4) ‘Trillbar Land System’ P3 PEC.

## 3 METHODS: SURVEY, TAXONOMY, VEGETATION MAPPING AND IMPACT ESTIMATES

### 3.1 FIELD SURVEY

The survey methodology was developed to comply with the following:

- Environmental Factor Guideline: Flora and Vegetation (EPA, 2016a); and,
- Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016b).

The Survey Area was assessed by three botanists on September 27, 2019 (3 person days spent in the Survey Area).

CSF species known to occur in the area and surrounds, any novel species and introduced species were targeted while walking. Each botanist surveyed a band of vegetation approximately 20 m wide while walking traverses in the Survey Area and recorded the location of and counted any CSF, weed species or novel species encountered.

The vegetation of the Survey Area was mapped using the flora and vegetation information collected from the 20 relevé sites assessed in September 2019. Relevé locations were chosen before the survey was carried out, using aerial imagery and Survey Area boundaries. Relevés were placed to capture each habitat visible on the aerial

imagery and the pre-European vegetation and land systems mapped in the Survey Area. The final placement of the relevés was selected while carrying out the surveys and additional relevés were assessed in any habitats encountered while the survey was being carried out that were different and could not be seen on the aerial image.

The following parameters were recorded at each relevé site:

- Location details including Global Positioning System (GPS) co-ordinates (GDA94).
- Site parameters such as soil description, topography and general habitat description, rock type and cover.
- A photograph of the site.
- Vegetation condition using the scale and criteria in EPA, 2016b.
- Notes on any disturbance to the vegetation.
- Fire history.
- A description of the vegetation structure including the height, percentage cover and dominant species within each stratum.
- The name, height, percentage cover and any other significant recording details for any other species located at the relevé.

The botanists also took extra photographs of the vegetation while walking from relevé to relevé.

The photographs and notes were used to help define vegetation type boundaries when mapping the vegetation of the Survey Area.

### 3.2 TAXONOMY AND NOMENCLATURE

One hundred and thirty-nine (139) plant specimens were collected from the Survey Area. They were identified using taxonomic keys and reference specimens.

Species names used in this report are those adopted by the WA Herbarium and they have been checked against current FloraBase records (Western Australian Herbarium (WAH), 1998-). Any undescribed taxa are referred to in the report and listed in the species list as sp. (species), subspecies as subsp. and varieties as var., while hybrids are indicated with an x and any queried (not confirmed) species or genus with a ?.

### 3.3 VEGETATION MAPPING

Aerial imagery (Landgate, 2020) was used to map the vegetation types ranging in scale from 1:500 to 1:5,000. Vegetation types were described according to the dominant species in each structural class. Data collected by the botanists at relevés and photo points were used to delineate the boundaries of each type. Statistical analyses were not carried out to define the vegetation types of the area surveyed.

Vegetation types are described using the current National Vegetation Inventory System (NVIS) methodology at the association level (Level 5). At this level up to three strata and a maximum of three taxa per stratum are used to describe an association (Executive Steering Committee for Australian Vegetation Information (ESCAVI), 2003). The NVIS structural formation terminology is outlined in **Appendix 4**; it utilises growth forms (**Table A4.1**), height classes (**Table A4.2**) and foliage cover characteristics (**Table A4.3**).

### 3.4 VEGETATION CONDITION

Vegetation condition was mapped using data collected at relevés and photo points, notes recorded while walking from site to site and any disturbance visible on aerial photographs. Vegetation condition ratings are based on the

scale developed by Trudgen (1988) and modified and adapted by Keighery (1994). The vegetation condition scale used is that for the Eremaean and Northern Botanical Provinces indicated in EPA (2016b) (**Table 3.1**).

**Table 3.1: Vegetation condition scale**

| Vegetation condition | Eremaean and Northern Botanical Provinces                                                                                                                                                                                                                                                  |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pristine             |                                                                                                                                                                                                                                                                                            |
| Excellent            | Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.                                                                                                                                                                                    |
| Very Good            | 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                 | 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             | 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  | 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.                                       |

### 3.5 IMPACT ESTIMATES

Impacts included in tables and text in the Results and Discussion sections are calculated using the Survey Area overall because the proposed location of pits and associated infrastructure in the project area is not known. The results of this report will be used to inform the selection of some of the infrastructure in the project area. The whole of the Survey Area / project area will not be cleared and therefore any direct impacts calculated are the maximum possible that could occur if the whole of the project area was cleared.

## 4 SURVEY RESULTS

### 4.1 SURVEY EFFORT

Twenty relevé sites were assessed in the Survey Area and approximately 47.07 ha (23.5 linear km) were surveyed via traverses walked (**Map 7, Section 9**). The information collected at each relevé is provided in **Table A5.1, Appendix 5** and relevé site coordinates are listed separately in **Table A5.2, Appendix 5**.

Coverage achieved over the Survey Area is detailed in **Table 4.1**. Coverage achieved along traverses is calculated by buffering the traverses in ArcGIS by 20 metres (m), which is the approximate width of the band of vegetation that the botanists were able to survey while walking traverses in the Survey Area.

**Table 4.1: Survey effort**

| Date                          | Attribute | Number of relevés | Area (ha)             |
|-------------------------------|-----------|-------------------|-----------------------|
| September 27, 2019            | Relevés   | 20                | Included in traverses |
|                               | Traverses | -                 | 47.07                 |
| Total area surveyed (ha)      |           |                   | 47.07                 |
| Area of Survey Area (ha)      |           |                   | 751.38                |
| Overall coverage achieved (%) |           |                   | 6.26                  |

## 4.2 FLORA

### 4.2.1 General Flora

The following information was collated on the general flora of the Survey Area:

- One hundred and ten (110) taxa (including hybrids, crosses and queries) were recorded from 54 genera and 27 families (73% perennial and 27% annual).
- The most common families were Fabaceae (22), Asteraceae (14) and Scrophulariaceae (14).
- The most common genera were *Acacia* (18), *Eremophila* (14) and *Maireana* (6).
- At the time of the survey 17% of the 110 taxa were flowering, 38% were fruiting and 21% were both flowering and fruiting i.e. approximately 76% of the species list was identified from specimens collected with reproductive material.

A list of the flora taxa recorded is included as **Table A6.1, Appendix 6**.

A comparison of the flora recorded in the Survey Area with that recorded in surveys of the surrounding area is included in **Table 4.2**. Survey Area diversity is similar to that recorded in the Reedys project area, where the survey was carried out in April 2015.

**Table 4.2: Taxa of the Survey Area and surrounds**

| Survey location                     | Survey type          | All taxa / natives / weed species | Survey timing (season)                                                                                         | No. of quadrats or relevés (km of traverses walked) | Area surveyed (ha) | Reference   |
|-------------------------------------|----------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------------|-------------|
| Tuckabianna West                    | Reconnaissance & TFS | 110 / 107 / 3                     | September 2019 (spring)                                                                                        | 20 (23.5 km)                                        | 47.07              | This report |
| Crème d'Or, Racecourse & Mt Fingall | Reconnaissance & TFS | 176 / 161 / 15                    | June 2019 (winter; Crème d'Or south), and September 2019 (spring; Crème d'Or north, Racecourse and Mt Fingall) | 46 (49.1 km)                                        | 122.75             | Maia (2020) |
| Big Bell haul road alignment 2      | Reconnaissance & TFS | 252 / 245 / 7                     | October 2018 (spring)                                                                                          | 63 relevés (including the 12 November 2017 relevés) | 274.5              | Maia (2019) |

| Survey location                | Survey type           | All taxa / natives / weed species | Survey timing (season) | No. of quadrats or relevés (km of traverses walked)       | Area surveyed (ha) | Reference              |
|--------------------------------|-----------------------|-----------------------------------|------------------------|-----------------------------------------------------------|--------------------|------------------------|
|                                |                       |                                   |                        | (183 km including 28 km in November 2017)                 |                    |                        |
| Big Bell haul road alignment 1 | Reconnaissance        | 198 / 194 / 4                     | November 2017 (spring) | 51 relevés (12 within the current Survey Area) (116.9 km) | 175.4              | Maia (2018)            |
| Tuckabianna                    | Level 1               | 44 / 43 / 1                       | January 2012 (summer)  | 10 quadrats (none)                                        | 0.4                | Coffey (2012a)         |
| Yellow Taxi                    | Targeted flora survey | 41 / 36 / 5                       | November 2005 (spring) | Not available                                             | 10.0               | Outback Ecology (2005) |
| Reedys                         | Level 1               | 101 / 98 / 3                      | April 2015 (autumn)    | 19 relevés                                                | Not available      | MWH (2015)             |
| Comet                          | Level 1               | 41 / 41 / 0                       | January 2012           | 10 quadrats (none)                                        | 0.4                | Coffey (2012b)         |
| Comet                          | Monitoring            | 55 / 55 / 0                       | April 2012             | 10 quadrats (not noted)                                   | 0.4 +              | Coffey (2012c)         |

Note: the numbers in this table are from the whole survey and not the portion that occurs within the database search area or within 50 km of the Survey Area; the area surveyed is the area of quadrats / relevés or traverses assessed within the Survey Area and not of the whole Survey Area.

## 4.2.2 Significant Flora

The following sections address any significant flora recorded in the Survey Area.

### 4.2.2.1 Threatened and Priority Flora

#### **Threatened Flora**

No species protected by the EPBC Act were recorded in the Survey Area.

No species protected by the BC Act were recorded in the Survey Area.

#### **Priority Flora**

One priority flora species was located in the Survey Area, *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) (P3). It is described in **Table 4.3** and its location is shown on **Map 8, Section 9**. Its coordinates have been supplied to Westgold electronically, but they are not included in this report. The number of plants known to Maia of this priority species and the maximum impact estimated to it (if the whole of the Survey Area were to be cleared) are discussed in **Section 5.1.1.2**.

**Table 4.3: Conservation significant flora species located in the Survey Area**

| Description, habitat and photographs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <p><b><i>Calotis</i> sp. Perrinvale Station (R.J. Cranfield 7096) (Priority 3)</b></p> <p><i>C</i> sp. Perrinvale Station is a small annual daisy in the Asteraceae family growing to 0.3 m high. The leaves have widely spaced teeth on their margins and scattered hairs on their surface. Red flower heads are produced in spring and these are followed by spiked fruit. The seeds have two spikes on the upper surface (WAH, 1998-).</p> <p><i>C</i> sp. Perrinvale Station was located on the plain in the middle western section of Tuckabianna West. Four fruiting plants were recorded at one location. One plant sample was collected for confirmation by the taxonomist.</p> |                                                                                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |
| <p>Top row photographs taken at site and bottom row photographs from Maia's photograph library. The photographs show the general growth habit of the herb and its fruit.</p> <p>Descriptions by the Western Australian Herbarium (WAH, 1998-). Accessed on 31 January 2020.</p>                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                      |

#### 4.2.2.2 Endemic Species

The distribution of each of the species in the species list was checked and none of the species is endemic to the bioregion or the subregion. *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) (P3) has records in the Coolgardie, Murchison and Yalgoo bioregions and it is not endemic to the area.

#### 4.2.2.3 New or Unusual Species

None of the plants collected were new species, potentially new or unusual species.

#### 4.2.2.4 Non-confirmed Taxa

The species of two taxa in the species list are queried - *Acacia ?sibilans* and *Calytrix ?amethystina*; two taxa could not be identified beyond genus - *Gunniopsis* sp. and *Nicotiana* sp.; and, one could not be identified beyond family - POACEAE sp.. The specimens collected could not be identified because they were either sterile or not in good enough condition to be identified.

*Acacia sibilans* and *Calytrix amethystina* are not conservation significant species. No conservation significant *Gunniopsis* or *Nicotiana* species occur in the Eastern Murchison subregion and therefore the specimens identified to genus only are unlikely to be conservation significant. The POACEAE sp. is not a *Triodia* species and could not be either of the two significant *Triodia* species that occur in the Eastern Murchison subregion. Three priority grass species (Poaceae family) occur in the Eastern Murchison subregion – *Aristida jerichoensis* var. *subspinulifera* (P3), *Neurachne lanigera* (P1) and *Paspalidium distans* (P4). The closest *Aristida jerichoensis* var. *subspinulifera* record is approximately 290 km from the Survey Area, the closest *Neurachne lanigera* record is approximately 180 km away and the closest *Paspalidium distans* record is 245 km away; it is therefore unlikely that these unconfirmed taxa would be these species.

#### 4.2.2.5 Range Extension Species

Species have a typical range that is indicated by their known distribution records. Sometimes species are recorded during a survey, and they have not been located previously in the area; these species are described as range extensions. In many cases a range extension reflects a lack of surveys in a particular area or lack of submission of flora records to the WA Herbarium rather than a true range extension.

Using 100 km as the minimum distance from an existing record to define a range extension, eight range extension species were collected from the Survey Area (**Table 4.4**); however, 3 of these 8 species have been located in other areas surveyed by Maia for Westgold around Cue, and those records are not yet on FloraBase. None of these species is a threatened or priority species.

**Table 4.4: Range extension species located in the Survey Area**

| Species                                             | Location of closest NatureMap record (bioregion) | Approximate distance and direction from closest NatureMap record to the Survey Area | Range extension                                             |
|-----------------------------------------------------|--------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------|
| <i>Anthobolus leptomerioides</i>                    | Youno Downs Station (Murchison)                  | 192 km southwest                                                                    | Yes (but also located in Maia, 2018 and 2020 project areas) |
| <i>Dianella revoluta</i>                            | Ex Lake Mason (Murchison)                        | 128 km west-northwest                                                               | Yes                                                         |
| <i>Eremophila latrobei</i> subsp. <i>filiformis</i> | Ullula Station (Murchison)                       | 159 km west-southwest                                                               | Yes                                                         |
| <i>Exocarpos sparteus</i>                           | Windimurra Station (Murchison)                   | 104 km northwest                                                                    | Yes                                                         |
| <i>Roepera similis</i>                              | Ex Lake Mason (Murchison)                        | 139 km west                                                                         | Yes                                                         |
| <i>Sclerolaena fusiformis</i>                       | West of Sandstone (Murchison)                    | 128 km northwest                                                                    | Yes                                                         |
| <i>Senna artemisioides</i> subsp. <i>filifolia</i>  | Kirkalocka Station (Murchison)                   | 119 km north-northwest                                                              | Yes (also in Maia, 2020 project area)                       |
| <i>Sida fibulifera</i>                              | Ex Lake Mason (Murchison)                        | 145 km west                                                                         | Yes (but located (Maia, 2018 and 2020 project areas)        |

#### 4.2.3 Sandalwood (*Santalum spicatum*)

Sandalwood (*Santalum spicatum*) was recorded at one location in the Survey Area (**Map 8, Section 9**). *Santalum spicatum* is a slow-growing and valuable resource that occurs naturally throughout the southern part of Western Australia and into South Australia (DPaW, 2015). Sandalwood (*Santalum spicatum*) is a controlled species under the BC Act (if it has a diameter of greater than 25 mm at the smallest end when stripped of bark; or roots of sandalwood) and it cannot be taken from private land or from Crown land to be processed without a licence (flora taking (sandalwood licence) (GoWA, 2018b).

#### 4.2.4 Introduced Flora

##### 4.2.4.1 National Weeds Lists

No WoNS were recorded in the Survey Area (Australian Government, 2019).

##### 4.2.4.2 Plant Pests declared in Western Australia

No pest plants declared in WA were recorded in the Survey Area (DPIRD, 2019a).

##### 4.2.4.3 Environmental Weeds

Three general environmental weed species were recorded in the Survey Area; they are listed in **Table 4.5** and their locations are shown on **Map 9 (Section 9)**. The Midwest region impact and invasiveness ratings (DBCA 2019i) for the three weed species are also listed in **Table 4.5**; one of the three species recorded has a high ecological impact and rapid invasiveness rating - *Rumex vesicarius*.

The weed locations have been supplied to Westgold electronically and their coordinates are not listed in this report.

**Table 4.5: Weed species located in the Survey Area and ecological impact and invasiveness ratings**

| Taxa                                   | Number of plants located | Ecological impact | Invasiveness |
|----------------------------------------|--------------------------|-------------------|--------------|
| <i>Cuscuta planiflora</i> (Red Dodder) | 3                        | Unknown           | Rapid        |
| <i>Lysimachia arvensis</i> (Pimpernel) | 10                       | Low               | Rapid        |
| <i>Rumex vesicarius</i> (Ruby Dock)    | 300                      | High              | Rapid        |

Note: Columns 3 and 4 from DBCA (2019i).

### 4.3 VEGETATION

#### 4.3.1 Vegetation Types

Five vegetation types were mapped over the Survey Area. The area and cover of each is listed in **Table 4.6**, the vegetation types are described in **Table 4.7** and their distribution is shown on **Map 10 (Section 9)**. Areas already cleared (for existing roads, tracks, dumps and pits) are mapped as disturbed.

The information collected at relevés is included as **Appendix 5** and a site by vegetation type matrix as **Table A6.2, Appendix 6**.

The local significance of the five vegetation types is discussed in **Section 5**.

**Table 4.6: Vegetation types of the Survey Area – code, area and cover**

| Vegetation type code: broad floristic formation               | Mapped in the Survey Area |           |
|---------------------------------------------------------------|---------------------------|-----------|
|                                                               | Area (ha)                 | Cover (%) |
| <b>AaTSSL</b> : <i>Acacia aptaneura</i> Tall Sparse Shrubland | 0.88                      | 0.12      |
| <b>ATOSL</b> : <i>Acacia</i> Tall Open Shrubland              | 23.58                     | 3.14      |
| <b>ATSSL</b> (1): <i>Acacia</i> Tall Sparse Shrubland         | 265.05                    | 35.27     |
| <b>ATSSL</b> (2): <i>Acacia</i> Tall Sparse Shrubland         | 233.29                    | 31.05     |
| <b>ATSSL</b> (3): <i>Acacia</i> Tall Sparse Shrubland         | 46.85                     | 6.24      |
| Disturbed                                                     | 181.73                    | 24.19     |
| <b>Total area (ha) / Cover (%)</b>                            | 751.38                    | 100.00    |

**Table 4.7** provides the following information on each vegetation type:

- The broad floristic formation;
- A detailed description;
- The habitat;
- The associated species;
- The relevés assessed in the vegetation type;
- The average vegetation condition based on quadrat vegetation condition.

In order to correlate with broad floristic formation descriptions, vegetation type descriptions have been ordered using the dominant cover class as the indicator and not the dominant stratum e.g. Tall Sparse Shrubland of *Acacia pteraneura*, *A. caesaneura* and *A. tetragonophylla* with a mixed Low Sparse Shrubland mainly of *Ptilotus obovatus*, *Eremophila georgei* and *E. lachnocalyx* with +/- Low Isolated Trees of *Acacia pruinocarpa*.

The vegetation type codes used include the first letter of the genus and species of the dominant taxon or taxa in the vegetation type along with the first letters of the dominant stratum in bold font e.g. **AaTSSL** is *Acacia aptaneura* Tall Sparse Shrubland. The vegetation types are suffixed by a number to distinguish between multiples e.g. for the mixed *Acacia* Tall Sparse Shrublands – **ATSSL** (1), **ATSSL** (2) and **ATSSL** (3).

Table 4.7: Vegetation types of the Survey Area

| Code   | Broad floristic formation, vegetation type and associated information                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                | Photograph                                                                           |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| AaTSSL | <p><b>Broad floristic formation:</b> Acacia Tall Sparse Shrubland.</p> <p><b>Vegetation type:</b> Tall Sparse Shrubland of <i>Acacia aptaneura</i> with a Sparse Shrubland of <i>Thryptomene decussata</i> and a Low Sparse Shrubland of <i>Ptilotus obovatus</i>.</p>                                                                                                                                                 | <p><b>Associated species:</b> <i>Duperreya commixta</i>, <i>Eremophila latrobei</i> subsp. <i>latrobei</i>, <i>Euphorbia boophthona</i>, <i>Marsdenia australis</i>, <i>Ptilotus aervoides</i>, <i>P. helipteroides</i>, <i>P. schwartzii</i>, <i>Senna glaucifolia</i>, <i>Sida</i> sp. Golden calyces glabrous (H.N. Foote 32), <i>Solanum lasiophyllum</i>.</p> <p><b>Relevé:</b> TW-20</p> |   |
|        | <p><b>Habitat:</b> Banded iron formation / volcanic ash unit outcrop.</p>                                                                                                                                                                                                                                                                                                                                              | <p><b>Vegetation condition:</b> Very Good. Grazing and exploration activities.</p>                                                                                                                                                                                                                                                                                                             |                                                                                      |
| ATOSL  | <p><b>Broad floristic formation:</b> Acacia Tall Open Shrubland.</p> <p>Tall Open Shrubland of <i>Acacia aptaneura</i>, <i>A. pteraneura</i> with an Open shrubland of <i>A. tetragonophylla</i> and <i>A. craspedocarpa</i> (hybrid) and a Low Sparse mixed Shrubland mainly of <i>Eremophila forrestii</i> subsp. <i>forrestii</i>, <i>Senna artemisioides</i> subsp. <i>filifolia</i> and <i>Sida ectogama</i>.</p> | <p><b>Associated species:</b> <i>Abutilon cryptopetalum</i>, <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>, <i>Duperreya commixta</i>, <i>Marsdenia australis</i>, <i>Olearia humilis</i>, <i>Psydrax suaveolens</i>, <i>Senna artemisioides</i> subsp. <i>filifolia</i>, <i>Solanum lasiophyllum</i>.</p> <p><b>Relevés:</b> TW-14, TW-17</p>                                              |  |
|        | <p><b>Habitat:</b> Broad drainage areas and depressions.</p>                                                                                                                                                                                                                                                                                                                                                           | <p><b>Vegetation condition:</b> Very Good. Grazing, exploration and mining activities.</p>                                                                                                                                                                                                                                                                                                     |                                                                                      |

| Code      | Broad floristic formation, vegetation type and associated information                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                          | Photograph                                                                           |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| ATSSL (1) | <p><b>Broad floristic formation:</b> Acacia Tall Sparse Shrubland.</p> <p><b>Vegetation type:</b> Tall Sparse Shrubland of <i>Acacia pteraneura</i>, <i>A. caesaneura</i> and <i>A. tetragonophylla</i> with a mixed Low Sparse Shrubland mainly of <i>Ptilotus obovatus</i>, <i>Eremophila georgei</i> and <i>E. lachnocalyx</i> with +/- Low Isolated Trees of <i>Acacia pruinocarpa</i>.</p>                                                                                               | <p><b>Associated species:</b> <i>Acacia aptaneura</i>, <i>A. craspedocarpa</i> (hybrid), <i>Maireana suaedifolia</i>, <i>Olearia humilis</i>, <i>Ptilotus schwartzii</i>.</p> <p><b>Relevés:</b> TW-02, TW-04, TW-05, TW-18</p>                          |   |
|           | <p><b>Habitat:</b> Undulating plains and minor drainage channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                         | <p><b>Vegetation condition:</b> Good. Grazing, exploration and mining activities.</p>                                                                                                                                                                    |                                                                                      |
| ATSSL (2) | <p><b>Broad floristic formation:</b> Acacia Tall Sparse Shrubland.</p> <p><b>Vegetation type:</b> Tall Sparse Shrubland of <i>Acacia aptaneura</i>, <i>A. ramulosa</i> var. <i>linophylla</i> and <i>A. tetragonophylla</i> with a mixed Sparse Shrubland mainly of <i>Eremophila galeata</i>, <i>E. georgei</i> and <i>E. latrobei</i> subsp. <i>latrobei</i> and a mixed Low Sparse Shrubland mainly of <i>Ptilotus obovatus</i>, <i>P. schwartzii</i> and <i>Solanum lasiophyllum</i>.</p> | <p><b>Associated species:</b> <i>Acacia craspedocarpa</i>, <i>Duperreya commixta</i>, <i>Erodium cygnorum</i>, <i>Marsdenia australis</i>, <i>Ptilotus schwartzii</i>.</p> <p><b>Relevés:</b> TW-01, TW-03, TW-06, TW-08, TW-10, TW-11, TW-12, TW-13</p> |  |
|           | <p><b>Habitat:</b> Undulating plains.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <p><b>Vegetation condition:</b> Very Good. Grazing, exploration and mining activities.</p>                                                                                                                                                               |                                                                                      |

| Code      | Broad floristic formation, vegetation type and associated information                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                | Photograph                                                                          |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| ATSSL (3) | <p><b>Broad floristic formation:</b> Acacia Tall Sparse Shrubland.</p> <p><b>Vegetation type:</b> Tall Sparse Shrubland of <i>Acacia craspedocarpa</i> (hybrid) <i>A. caesaneura</i> (narrow phyllode variant) and <i>A. tetragonophylla</i> with a Sparse Shrubland mainly of <i>Eremophila galeata</i> and <i>E. clarkei</i> and a Low Sparse Shrubland of <i>Ptilotus obovatus</i> and or <i>Eremophila lachnocalyx</i>.</p> | <p><b>Associated species:</b> <i>Abutilon cryptopetalum</i>, <i>Duperreya commixta</i>, <i>Eremophila georgei</i>, <i>E. punicea</i>, <i>Lepidium oxytrichum</i>, <i>Marsdenia australis</i>, <i>Rhagodia eremaea</i>, <i>Santalum acuminatum</i>, <i>Teucrium teucriiflorum</i>.</p> <p><b>Relevés:</b> TW-07, TW-09, TW-15, TW-16, TW-19</p> |  |
|           | <p><b>Habitat:</b> Undulating plains and minor drainage channels and depressions.</p>                                                                                                                                                                                                                                                                                                                                           | <p><b>Vegetation condition:</b> Very Good. Grazing, exploration and mining activities.</p>                                                                                                                                                                                                                                                     |                                                                                     |

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### 4.3.2 Vegetation Condition

Survey Area vegetation condition ratings (**Table 4.8, Map 11**) were derived using a selection of different information (data collected at relevés and photo points, notes recorded while walking from site to site, any disturbance visible on aerial imagery and the weeds located in the different areas); they are not the same as those in **Table 4.7**, which indicate vegetation condition at the relevés only.

The dominant vegetation condition ratings in the Survey Area are Good and Very Good (73% collectively). Areas mapped as Poor cover 3% of the Survey Area and those mapped as Degraded and Completely Degraded 24% of the Survey Area. Additional comments on vegetation condition in the Survey Area are also included in **Table 4.8**.

**Table 4.8: Vegetation condition in the Survey Area**

| Vegetation condition            | Area (ha) / cover (%) in the Survey Area | Vegetation communities                         | Comments                                                                                                                                                                                                                                                       |
|---------------------------------|------------------------------------------|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Very Good                       | 209.89 / 27.93                           | AoTSSL, ATOSL, ATSSL (1), ATSSL (2), ATSSL (3) | Areas with low density of cleared drill lines and some evidence of minor grazing.                                                                                                                                                                              |
| Good                            | 337.19 / 44.88                           | ATOSL, ATSSL (1), ATSSL (2), ATSSL (3)         | Areas with a higher density of cleared drill lines - small waste piles were noted in these areas. Grazing and vegetation trampling were also noted.                                                                                                            |
| Poor                            | 22.56 / 3.00                             | ATSSL (1), ATSSL (2)                           | Areas where the vegetation has been impacted by mining activities, including small patches of vegetation surrounded by clearing. Waste piles, tracks and borrow pits are common throughout. Grazing and vegetation trampling were more obvious in these areas. |
| Degraded to Completely Degraded | 181.73 / 24.18                           | Not applicable                                 | Areas adjacent to existing mining operations, areas cleared for infrastructure, tracks and larger cleared areas such as pits. Some native vegetation remains, and regrowth may be evident, but these areas have mostly been cleared.                           |

### 4.3.3 Significant Vegetation

Significant vegetation is defined in EPA Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016b) as vegetation:

- Being identified as threatened or priority ecological communities
- Restricted distribution
- Degree of historical impact from threatening processes
- A role as a refuge
- Providing an important function required to maintain ecological integrity of a significant ecosystem.

#### 4.3.3.1 Threatened and Priority Ecological Communities

None of the vegetation types recorded in the Survey Area is similar to any of the currently listed TECs (DotEE, 2019c; DBCA, 2018).

The Lake Austin vegetation complexes (banded ironstone formation) P1 PEC relates to vegetation growing on banded ironstone. The tip of the south-eastern corner of the Survey Area intersects the boundary of a buffer for a

section of the Lake Austin vegetation complexes (banded ironstone formation) P1 PEC. The vegetation in that area is mapped as ATSSL (3) a tall sparse Acacia shrubland that is mapped on undulating plains, minor drainage channels and depressions and not on rocky outcrops or hills.

A small outcrop comprising either banded iron formation or a volcanic ash unit, was located in the Survey Area and one vegetation type was mapped on it (AaTSSL – a Tall Sparse Shrubland of *Acacia aptaneura* with a Sparse Shrubland of *Thryptomene decussata* and a Low Sparse Shrubland of *Ptilotus obovatus*). This vegetation has been mapped in areas surveyed to the southwest of the Survey Area on the Gabanintha Land System. A large polygon of the Gabanintha LS is mapped to the east and southeast of the Survey Area but it is not mapped in the Survey Area.

The vegetation is either not similar to any other PECs currently listed for the area, or does not occur in any of the land systems listed as a PEC (DBCA, 2019j).

#### 4.3.3.2 Restricted Distribution, Historical Impact and Refugia

The area has not been historically cleared and more than 99% of the pre-European extent of the vegetation association and system association occurring in the Survey Area still remains in the Murchison bioregion and Eastern Murchison subregion (**Table 2.3**). Similarly, more than 98% of the three land systems of the Survey Area currently remain (**Table 5.2**). Each of the three land systems (Sherwood, Violet and Yanganoo) is mapped in four bioregions and the vegetation system association (18.0) is mapped in 10 bioregions. The general area has been historically impacted by gold mining and prospecting activities and by grazing.

#### 4.3.3.3 Ecosystems

##### **Groundwater Dependent Ecosystems**

The south-western corner of the Survey Area is mapped as having low potential to be a terrestrial GDE based on national assessment (BoM, 2019; **Map 4, Section 9**). The vegetation types mapped in that area are tall sparse Acacia shrublands (ATSSL (1), ATSSL (2) and ATSSL (3)) and given that they are sparse shrublands it is unlikely that they will be groundwater dependent; also, there are no large drainage lines in that area.

One of the shrublands (ATOSL) is mapped along broad drainage lines and in depressions and this shrubland is open rather than sparse – it is possible that some of the taller trees and shrubs in these areas could use groundwater at some time during their life cycle.

##### **Sheet Flow Dependent Vegetation**

Mulga is the common name for *Acacia aneura* but is also applied to closely related species that often co-occur with mulga e.g. *A. ayersiana*, *A. minyura* and *A. paraneura*. Mulga covers approximately 20% of the Australian continent including the Pilbara, Gascoyne and Murchison bioregions (Page and Grierson, 2010).

Mulga vegetation has been shown to be highly dependent on sheet flow (Winkworth, 1973; Tongway and Hindley, 2004) and is sensitive to alterations to sheet flow (Saco *et al.*, 2010).

Eight of the Survey Area taxa (including variants and hybrids) are listed as mulga species: *Acacia aptaneura*, *A. ayersiana*, *A. caesaneura*, *A. caesaneura* (narrow phyllodes variant), *A. craspedocarpa*, *A. craspedocarpa* (hybrid), *A. incurvaneura* and *A. pteraneura* (**Table A6.1, Appendix 6**). Some banded mulga / mulga groving can be seen in the northern section of the Survey Area (**Figure 1**).



**Figure 1: Banded / groved mulga in the northern section of the Survey Area**

## 5 DISCUSSION: SIGNIFICANCE OF THE FLORA, VEGETATION AND ECOSYSTEMS

An assessment of the conservation significance of the flora and vegetation of the Survey Area follows. Significance is assessed at regional and local scales.

### 5.1 FLORA

#### 5.1.1 Regional and Local Significance

##### 5.1.1.1 Regional Significance

The regional significance of the one priority flora species located in the Survey Area is indicated by its current priority listing (Priority 3). The distribution of the species in the region is shown in **Table 5.1**. Information on the number of FloraBase and NatureMap records currently known and whether any of them lie in conservation tenure is also included in **Table 5.1**.

**Table 5.1: Priority flora species located in the Survey Area**

| <i>Calotis</i> sp. Perrinvale Station (R.J. Cranfield 7096) (Priority 3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p><i>C. sp.</i> Perrinvale Station (R.J. Cranfield 7096) has 24 records on FloraBase and 36 on NatureMap and the records are in the Coolgardie, Murchison and Yalgoo bioregions (WAH, 1998-; DBCA, 2007-).</p> <p>Twenty-two of the 36 NatureMap records (61%) are in former leasehold land (ex Warriendar, Thundelarra and Karara) while none of the records are in IUCN protected land (DBCA, 2007-).</p> <p>Note: Image used with the permission of the Western Australian Herbarium, Department of Biodiversity, Conservation and Attractions (<a href="https://florabase.dpaw.wa.gov.au/help/copyright">https://florabase.dpaw.wa.gov.au/help/copyright</a>). Accessed on Wednesday, 05 February 2020. The number of records in conservation tenure was estimated (some records overlap) using NatureMap (DBCA, 2007-).</p> |  |

### 5.1.1.2 Local Significance

A local conservation significance assessment for the *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) was carried out to gauge the local importance of this priority species in the Survey Area. The significance rating (low, moderate or high) considers the following parameters: its priority rank; the proportion of records known to Maia that occur in the Survey Area; the distribution within the Survey Area (limited, moderate or widespread); and, the number and cover of the vegetation type/s in which the species occurs.

A potential impact to *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) from the Tuckabianna West project is estimated by using data collated for an earlier impact estimate carried out for this species (Maia, 2016) and by adding any FloraBase and Maia records that have been recorded since then. It was estimated that there were 1,704 extant plants in WA in 2016 (after impact from projects known to Maia had been subtracted from the total estimated number of plants). Since then one more record has been added to the FloraBase for this species and, up to September 2019, Maia has not located any more plants. The additional FloraBase record does not state plant numbers located, but the frequency of occurrence is listed as uncommon. When converting frequencies to plant numbers Maia uses 1 plant when the frequency is listed as rare, uncommon, isolated plants or very sparse. Therefore, adding this record the total known plants would increase to 1,705. With the four plants located in the Tuckabianna West project area the total becomes 1,709. If all four Tuckabianna West plants were impacted by the project the impact would be 0.2% of the estimated number of extant plants.

The local significance of the *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) recorded in the Survey Area is rated as moderate.

The rating is based on the following: it is a P3 species, the 4 plants of the Survey Area comprise 0.2% of the estimated number of extant plants known to Maia, it was only recorded at one location in the Survey Area, and it occurred in only one vegetation type (ATSSL (2)), which covers 31.1% of the Survey Area.

## 5.2 LAND SYSTEMS AND VEGETATION

The regional and local significance of the land systems and vegetation of the Survey Area is discussed in the following sections.

### 5.2.1 Regional Significance

#### 5.2.1.1 Land Systems

The remaining extent of the land systems of the Survey Area is listed in **Table 5.2**. Currently more than 98% remains of each of the three land systems of the Survey Area. The regional significance of the three land systems is therefore rated as low.

**Table 5.2: Remaining Murchison bioregion extent of the land systems of the Survey Area**

| Column 1<br>Land system | 2<br>Mapped extent in Murchison<br>bioregion (ha) | 3<br>Current extent in the<br>Murchison bioregion (ha) | 4<br>Remaining extent (%) |
|-------------------------|---------------------------------------------------|--------------------------------------------------------|---------------------------|
| Sherwood                | 1,502,388                                         | 1,500,868                                              | 99.90                     |
| Violet                  | 523,231                                           | 515,276                                                | 98.48                     |
| Yanganoo                | 1,948,766                                         | 1,947,960                                              | 99.96                     |

Note: Column 2 - Murchison IBRA 7 bioregion (DotE, 2012) intersected with Soil Landscape Mapping - Rangelands (DPIRD, 2019c). Column 3 - Soil Landscape Mapping - Rangelands shapefile (DPIRD, 2019c) intersected with Native Vegetation Extent (NVE) shapefile (DPIRD, 2019e). Column 4 = Column 3 / Column 2 \* 100. Hectares - rounded up or down to nearest whole numbers.

### 5.2.1.2 Beard's Pre-European Vegetation

The remaining extent of the pre-European vegetation association of the Survey Area is presented in **Table 2.3**. Currently more than 99% remains of vegetation association 18 in the Murchison bioregion and in the Eastern Murchison subregion. The regional significance of the vegetation association is therefore rated as low.

## 5.2.2 Local Significance

The local significance of the land systems and pre-European vegetation system associations mapped in the Survey Area is considered in the following section. Local significance of the land systems and vegetation system association is based on the cover of each land system or vegetation association in the Survey Area and surrounding local area; their spread in the local area i.e. restricted, moderate, widespread; how much of their current Murchison extent is in the Survey Area; the number of CSF located in the land system or vegetation system association; and, any other attributes e.g. does the land system or vegetation system association occur within the indicative boundaries of any TEC or PEC in the local area and surrounds.

### 5.2.2.1 Land Systems

The proportion of the current Murchison extent of the three land systems (LS) that occur in the Survey Area is less than 0.1% (from 0.0001 (Sherwood) to 0.0968% (Violet); **Table 5.3**).

The following local significance ratings were derived for the land systems recorded in the Survey Area:

- **Sherwood** (low local significance): 0.0001% of its current extent occurs in the Survey Area; no CSF species located in the LS; it is not listed as a PEC; it is mapped over a very small part of the Survey Area.
- **Violet**: (moderate local significance): 0.097% of its current extent occurs in the Survey Area; one CSF species (*Calotis* sp. Perrinvale Station (R.J. Cranfield (7096)) was located in this LS in the Survey Area; it is not listed as a PEC; it is mapped over a large section of the Survey Area.
- **Yanganoo** (low local significance): 0.002% of its current extent is in the Survey Area; no CSF species located in it; it is not listed as a PEC; it is mapped over a small part of the Survey Area.

**Table 5.3: Proportion of current Murchison bioregion extent of the land systems of the Survey Area**

| Column 1<br>Land system | 2<br>Current extent in<br>Murchison bioregion<br>(ha) | 3<br>Current extent in<br>Survey Area (ha) | 4<br>Current Murchison extent<br>in the Survey Area (%) | 5<br>Survey Area land<br>system cover (%) |
|-------------------------|-------------------------------------------------------|--------------------------------------------|---------------------------------------------------------|-------------------------------------------|
| <b>Sherwood</b>         | 1,500,868.14                                          | 1.59                                       | 0.0001                                                  | 0.21                                      |
| <b>Violet</b>           | 515,275.67                                            | 498.75                                     | 0.0968                                                  | 66.38                                     |
| <b>Yanganoo</b>         | 1,947,960.24                                          | 37.46                                      | 0.0019                                                  | 4.99                                      |
| <b>Total</b>            |                                                       | 537.81                                     | -                                                       | -                                         |

Note: Column 2 - Murchison IBRA 7 bioregion (DotE, 2012) intersected with Soil Landscape Mapping - Rangelands (DPIRD, 2019c) and intersected with Native Vegetation Extent (NVE) (DPIRD, 2019e). Column 3 - Soil Landscape Mapping - Rangelands shapefile (DPIRD, 2019c) intersected with NVE shapefile (DPIRD, 2019e) and then with the Survey Area. Column 4 = Column 3 / Column 2 \* 100. Column 5 = Column 3 / total area of Survey Area \* 100. Column 3 – the total ha for all land systems (537.81) does not equal the total area of the Survey Area (751.38 ha) as some of the Survey Area has been cleared and is not mapped as NVE.

### 5.2.2.2 Pre-European vegetation

The local significance of the pre-European vegetation of the Survey Area is rated using the BVSA mapped in the Survey Area. The cover of the BVSA in the Survey Area (relative to its current extent in the Murchison bioregion) is 0.004% (**Table 5.4**).

Based on the percentages in columns 4 and 5 of **Table 5.4**, the number of CSF located in the BVSA and whether it occurs within the indicative boundary for a PEC in or around the Survey Area, the following local significance rating was derived:

- **BVSA 18.0** (low local significance): 0.13% of its current Murchison extent occurs in the Survey Area and it is mapped over all undisturbed areas in the Survey Area (the BVSA also surrounds the Survey Area and is locally widespread). One CSF was located in the BVSA and it occurs within the buffer of a number of PECs in the surrounding area.

**Table 5.4: Proportion of mapped and local extent of Beard's pre-European vegetation system association in the Survey Area**

| Column 1<br>Beard vegetation         | 2<br>Current extent in the<br>Murchison bioregion<br>(ha) (GoWA, 2019a) | 3<br>Current extent in<br>the Survey Area<br>(ha) | 4<br>Percentage of current<br>Murchison extent in the<br>Survey Area | 5<br>Cover of BVSA in<br>the Survey Area (%) |
|--------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------|
| <b>Vegetation system association</b> |                                                                         |                                                   |                                                                      |                                              |
| <b>18.0</b>                          | 4,290,395                                                               | 537.81                                            | 0.13                                                                 | 71.58                                        |

Note: Column 2 = GoWA (2019a). Column 3 = Beard pre-European vegetation mapping shapefile (DPIRD, 2019b) intersected with NVE shapefile (DPIRD, 2019e) and then with the Survey Area. Column 4 = Column 3 / Column 2 x 100. Column 5 = Column 3 / total area of Survey Area (537.81 ha) x 100. Column 3 does not equal the total area of the Survey Area (751.38 ha) and Column 5 does not equal 100% as some of the Survey Area is not mapped as NVE (DPIRD, 2019e).

#### 5.2.2.3 Vegetation Types Mapped by Maia

A significance assessment was carried out on the vegetation types mapped by Maia in the Survey Area (i.e. the local area). The following attributes were considered during the assessment: the distribution and area / cover of each vegetation type in the Survey Area, the significance or rarity of a habitat in which the vegetation type occurs, the CSF species occurring in the vegetation types, the condition of the vegetation, any other key attributes (e.g. similarity of the vegetation type to any significant ecological communities known to occur in or close to the Survey Area, drainage area, potential for sheet flow dependent ecosystem or GDE) and the vegetation type's occurrence outside the boundaries of the Survey Area (visibility on aerial imagery or having been recorded in the surrounding area). The following paragraphs highlight key information on the five vegetation types mapped in the Survey Area, and **Table 5.5** lists the factors considered in the significance assessment and the significance rating determined for each vegetation type (low, moderate or high).

**AtTSSL** is mapped over 0.1% (0.88 ha) of the Survey Area on a small outcrop. It is likely the outcrop is banded iron formation (BIF); however, it could be a volcanic ash unit (Pers. Comm., David Hollingsworth, Westgold, February 2020). No CSF species were located on the outcrop. Similar vegetation has been mapped on banded ironstone hills in the Moyagee and Lake Austin project areas, approximately 20 km southwest of the Survey Area (Coffey, 2013a and 2013b). In those areas the vegetation was mapped on hills in the Gabanintha LS, while the outcrop in the Survey Area is in the Violet LS. The Gabanintha LS does not occur in the Survey Area but it is mapped to the east/southeast (1.5 km away at its closest) and to the southwest (5.4 km away). The Gabanintha LS is a common land system of the Lake Austin vegetation complexes (banded iron formation) buffers in the surrounding areas.

**ATOSL** is mapped over 3.1% of the Survey Area (23.58 ha) on broad drainage areas and depressions. No CSF species were located in it. **ATOSL** was mapped as **MASL** over 15.9% of transport corridor alignment 1 (Maia, 2018) and as **MASL** (1) over 6.7% of transport corridor alignment 2 (Maia, 2019); both vegetation types were mapped in minor depressions and along broad drainage areas in the transport corridors. Maia (2020) also mapped **ATOSL** as **ATSL** over 1.9% of the Crème d'Or, Racecourse and Mt Fingall project areas. **ATOSL** is also similar to vegetation

association MW4 which was mapped in the Tuckabianna project area north of and adjacent to the Survey Area (Coffey, 2012a). This vegetation type therefore occurs in the areas around the Survey Area and further away from it.

**ATSSL (1)** is mapped over 35.3% of the Survey Area (265.05 ha) on the undulating plains and along minor drainage channels. No CSF species were recorded in it. **ATSSL (1)** is similar to **AcApSL** mapped over 6.4% of transport corridor alignment 1 (Maia, 2018) and to **MASL (2)** mapped over 22.9% of transport corridor alignment 2 (Maia, 2019); both vegetation types were mapped on the stony and sandy plains of those survey areas. It is also similar to vegetation association MW3 mapped in the Tuckabianna project area north of and adjacent to the Survey Area (Coffey, 2012a). It is similar to, but not the same as, the two Acacia Tall Shrubland vegetation types mapped in the Crème d'Or, Racecourse and Mt Fingall project areas (Maia, 2020). The acacias are similar, but the shrub layer species are not the same. This vegetation type therefore occurs in the surrounding area and further away from it.

**ATSSL (2)** is mapped over 31.1% of the Survey Area (233.29 ha) on undulating plains. The P3 species *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) was recorded in it. **ATSSL (2)** was mapped as **AcApSL** over 6.40% of transport corridor alignment 1 Maia (2018) and as **MASL (2)** over 22.9% of transport corridor alignment 2 (Maia, 2019); the two vegetation types were mapped on the stony and sandy plains of the transport corridors. **ATSSL (2)** is similar to vegetation type **ATSSL** mapped in the Crème d'Or project area (Maia, 2020) and also similar to vegetation association MW2 mapped in the Tuckabianna project area north of and adjacent to the Survey Area (Coffey, 2012a). This vegetation type therefore occurs in the surrounding area and further away from it.

**ATSSL (3)** is mapped over 6.2% of the Survey Area (46.85 ha) on undulating plains, minor drainage channels and depressions. No CSF species were located in it. This vegetation type is most similar to **MASL** which was mapped over 15.9% of transport corridor alignment 1 (Maia, 2018) and as **MASL (1)** over 6.7% of transport corridor alignment 2 (Maia, 2019); the two vegetation types were mapped over minor depressions and broad drainage in the transport corridor alignments. Maia (2020) also mapped **ATSSL (3)** as **ATSL** over 1.9% of the Crème d'Or, Racecourse and Mt Fingall project areas. **ATSSL (3)** is also similar to vegetation association MW3 which was mapped in the Tuckabianna project area north of and adjacent to the Survey Area (Coffey, 2012a). This vegetation type therefore occurs in the surrounding area and further away from it.

These sparse to open Acacia shrublands occur widely in the surrounding areas - the species comprising the upper and lower strata varying to differing degrees.

## 5.3 ECOLOGICAL COMMUNITIES AND ECOSYSTEMS

### 5.3.1 Threatened and Priority Ecological Communities

The Survey Area is not close to any currently listed TEC, the closest is more than 60 km west northwest of the Tuckabianna West Survey Area (Walg Rock; Australian Government, 2020).

The tip of the south-eastern corner of the Survey Area intersects the edge of the buffer around a section of the Lake Austin vegetation complexes (banded ironstone formation) P1 PEC. There is no publicly available description for this PEC and Maia is not aware of any report or paper on the vegetation of the Lake Austin banded ironstone ranges. **ATSSL (3)** is mapped in this area and it is a vegetation type that occurs on the undulating plains and minor drainage channels and depressions of the Survey Area. No hills can be seen on the aerial image in this section of the Survey Area and it is on the edge of the buffer around the PEC. It is unlikely that the vegetation in this area comprises the PEC.

A small outcrop of either banded iron formation or a volcanic ash unit was located in the Survey Area and **AaTSSL** was mapped on it. As this area could be banded iron formation it could be an unmapped expression of the Lake Austin banded iron formation P1 PEC; however, it is not in the same LS as the main BIF ridge to the east, southeast

and southwest of the Survey Area. The ridge is in the Gabanintha LS, while the small rocky outcrop in the Survey Area is in the Violet LS, which tends to be in the areas around the BIF ranges and is described as undulating gravelly plains on greenstone, laterite and hardpan, with low stony rises and minor saline plains (DPIRD, 2019c).

### 5.3.2 Sheet flow Dependent Ecosystems

Banded / groved mulga can be seen in some areas of the northern section of the Survey Area and it could be dependent on sheet flow of water across the plains in those areas.

### 5.3.3 Groundwater Dependent Ecosystems

Some of the trees and larger shrubs located along the larger non-perennial watercourses and unnamed ephemeral drainage lines in the Survey Area could use groundwater at some time during their life cycle.

**Table 5.5: Local significance assessment of the vegetation types mapped in the Survey Area**

| Vegetation type (VT) | Cover in Survey Area         |               | Conservation significant flora in VT                        | Average vegetation type condition (relevés)             | Land system/s           |
|----------------------|------------------------------|---------------|-------------------------------------------------------------|---------------------------------------------------------|-------------------------|
|                      | ha                           | %             |                                                             |                                                         |                         |
| AaTSSL               | 0.88                         | 0.12          | None                                                        | Very Good                                               | VLS                     |
| ATOSL                | 23.58                        | 3.14          | None                                                        | Very Good                                               | VLS                     |
| ATSSL (1)            | 265.05                       | 35.27         | None                                                        | Good                                                    | SLS, VLS, YLS           |
| ATSSL (2)            | 233.29                       | 31.05         | <i>Calotis</i> sp. Perrinvale Station (R.J. Cranfield 7096) | Very Good                                               | SLS, VLS, YLS           |
| ATSSL (3)            | 46.85                        | 6.24          | None                                                        | Very Good                                               | VLS, YLS                |
| Disturbed            | 181.73                       | 24.19         | -                                                           | Degraded to Completely degraded                         | -                       |
| <b>Total</b>         | <b>751.38</b>                | <b>100.00</b> |                                                             |                                                         |                         |
| Vegetation type      | Beard vegetation association |               | Any other key attributes increasing conservation value?     | Visible and/or has been mapped outside the Survey Area? | Significance assessment |
| AaTSSL               | 18                           |               | ?BIF                                                        | Yes                                                     | Moderate                |
| ATOSL                | 18                           |               | ?GDE, ?sheet flow (mulga groves/bands), drainage            | Yes                                                     | Moderate                |
| ATSSL (1)            | 18                           |               | ?Sheet flow (mulga groves/bands)                            | Yes                                                     | Low                     |
| ATSSL (2)            | 18                           |               | ?Sheet flow (mulga groves/bands)                            | Yes                                                     | Moderate                |
| ATSSL (3)            | 18                           |               | Drainage                                                    | Yes                                                     | Moderate                |
| Disturbed            | -                            |               | -                                                           | -                                                       | Not assessed            |

Notes: CSF = conservation significant flora, VT = vegetation type; in land systems (LS) column SLS = Sherwood LS; VLS = Violet LS; YLS = Yanganoo LS.

## 6 SUMMARY AND RECOMMENDATIONS

The dot points in the following sections summarise the main results of the survey and provide recommendations on the management of the flora and vegetation recorded in the Survey Area.

### 6.1 FLORA

- One hundred and ten taxa from 54 genera and 27 families were recorded in the Survey Area (73% perennial and 27% annual).
- No threatened flora species protected by the EPBC Act or BC Act were located in the Survey Area.
- One Priority 3 flora species was located in the Survey Area - *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096).
- No locally endemic, new or unusual species were collected from the Survey Area.
- Eight range extension species were located in the Survey Area.
- Sandalwood (*Santalum spicatum*) was recorded in the Survey Area.
- No WoNS or declared plants were located in the Survey Area. Three general weed species were located and one of them is listed as having high ecological impact and rapid invasiveness by DBCA (*Rumex vesicarius*).

### 6.2 VEGETATION

- Five vegetation types were mapped in the different habitats of the Survey Area:
  - Four different Acacia Tall Sparse Shrublands - *AaTSSL*, *ATSSL* (1), *ATSSL* (2) and *ATSSL* (3) - that differed in the mix of *Acacia* species in the upper stratum and the shrub species in the shrub stratum. These vegetation types were mapped over a rocky outcrop (either banded iron formation or volcanic ash unit), on undulating plains and along minor drainage channels and in depressions;
  - One Acacia Tall Open Shrubland - *ATOSL* – that was mapped on broad / diffuse drainage channels and depressions.
- The dominant vegetation type was *ATSSL* (1) (Acacia Tall Sparse Shrubland), mapped over 35.3% of the Survey Area on undulating plains and minor drainage channels, while *AaTSSL* (*Acacia aptaneura* Tall Sparse Shrubland) was mapped over the smallest area, 0.1% (on a small outcrop).
- The condition of the vegetation over most of the Survey Area was rated as very good and good (73% combined). The remainder was rated as poor (3%) and degraded to completely degraded (24%).

### 6.3 SIGNIFICANCE OF THE FLORA AND VEGETATION AND POTENTIAL IMPACTS

- The regional significance of the *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) is indicated by its priority listing – P3 – while the local significance was rated as moderate. A maximum potential impact to the *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) located in the Survey Area was calculated using the whole of the Survey Area as the impact area (because the actual area to be disturbed is not known). The estimated impact was 0.23% of the extant plants known to Maia.
- The regional significance of the three land systems of the Survey Area (Sherwood, Violet and Yanganoo) was assessed as low, while the local significance was rated as low for the Sherwood and Yanganoo LS and moderate for the Violet LS.
- The regional significance of the single pre-European vegetation association in the Survey Area (BVA 18) was rated as low, as was the local significance for the single vegetation system association (BVSA 18.0). More than 99% of the vegetation association and system association currently remains in the Murchison bioregion and the Eastern Murchison subregion.
- All five vegetation types mapped in the Survey Area also occur in the surrounding areas. They were rated as having moderate or low (*ATSSL* (1)) local significance. The highest maximum potential impact estimated for the vegetation types mapped in the Survey Area is 35.3% to *ATSSL* (1). This impact was calculated using

the area of **ATSSL** (1) mapped over the whole of the Survey Area, as the actual disturbance areas are not known. The next highest maximum potential impacts would be to **ATSSL** (2) (31.1%) and **ATSSL** (3) (6.2%). The remaining possible impacts would be less than 5%. Already disturbed areas comprise 24.2% of the Survey Area.

#### 6.4 ECOLOGICAL COMMUNITIES AND ECOSYSTEMS AND SIGNIFICANT AREAS

- No TEC occurs in the Survey Area, the closest is approximately 40 km to the northwest of the Survey Area.
- The tip of the south-eastern corner of the Survey Area (0.07 ha) intersects the edge of a buffer in place around a section of the Lake Austin vegetation complexes (banded ironstone formation (BIF)) P1 PEC. There is no publicly available description for this PEC and Maia knows of no report or paper describing the vegetation of the Lake Austin banded ironstone ranges. The vegetation in the area intersecting the PEC buffer is mapped as **ATSSL** (3) a tall sparse Acacia shrubland that is mapped on undulating plains, minor drainage channels and depressions, and not on rocky outcrops or hills or the midslopes and footslopes of a BIF range.
- A small outcrop, of either BIF or a volcanic ash unit, was located in the Survey Area and vegetation type **AaTSSL** was mapped on it (a Tall Sparse Shrubland of *Acacia aptaneura* with a Sparse Shrubland of *Thryptomene decussata* and a Low Sparse Shrubland of *Ptilotus obovatus*). Similar vegetation has been mapped in areas surveyed to the southwest of the Survey Area on rocky hills and outcrops of the Gabanintha LS. A large polygon of the Gabanintha LS is mapped to the east and southeast of the Survey Area and it is the centre of the buffer for the Lake Austin vegetation complexes (banded ironstone formation) P1 PEC in that area; however, the small outcrop in the Survey Area is in the Violet LS.
- Some of the trees and larger shrubs located along the larger unnamed and ephemeral creeks in the Survey Area could use groundwater at some time during their life cycles.
- Mulga bands / groves can be seen in the northern section of the Survey Area and they could depend on sheet flow of water across the plains.
- Sandalwood (*Santalum spicatum*) was recorded in one area and as this is a valuable resource and it should be retained if possible.
- The Survey Area does not intersect a Schedule 1 area, any DBCA Lands of Interest, DBCA Legislated Lands and Waters, EPA Red Book Area or ESA.

#### 6.5 RECOMMENDATIONS

- While an estimate of the impact to the total number of plants (known to Maia) of the P3 species *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096) located in the Survey Area was only 0.2% (if the whole of the Survey Area were to be cleared), impact to this species in the Survey Area should be avoided or minimised, as it has not been recorded in the area previously (the closest record is in Cue, approximately 22 km to the northwest of the Survey Area).
- Impact to the vegetation of the Survey Area should be minimised as much as possible. Impact to the vegetation on the small rocky outcrop should be avoided if possible, as it is the only patch of this vegetation in the Survey Area.
- *Santalum spicatum* is a valuable resource and impact to this species should be avoided whenever possible. If the tree is to be cut down and passed on for processing relevant licences should be applied for.
- Three weed species were located in the Survey Area and every effort should be made to prevent the spread of these existing weed species from and between Westgold's different project areas and to prevent the introduction of new weed species into the Tuckabianna West project area.
- Drainage should be managed to minimise impact to any areas of groved / banded mulga in areas that will not be cleared for the project.
- Clearing of vegetation along watercourses should be avoided or minimised.

## 7 SURVEY LIMITATIONS AND PROJECT TEAM

### 7.1 SURVEY LIMITATIONS

Technical Guidance, Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016b), states that any survey-specific issues / limitations should be addressed in a limitations section and that the following set of limitations should be addressed as standard, whether they were a limitation of survey or not:

- Availability of contextual information at a regional and local scale;
- Competency / experience of the team carrying out the survey, including experience in the bioregion surveyed;
- Proportion of flora recorded and / or collected, any identification issues;
- Was the appropriate area fully surveyed (effort and extent);
- Access restrictions within the survey area;
- Survey timing, rainfall, season of survey; and
- Disturbance that may have affected the results of survey such as fire, flood or clearing.

Each of these issues / limitations is discussed with respect to the Survey Area in **Table 7.1**.

**Table 7.1: Survey limitations**

| Limitation                                                                                                         | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Availability of contextual information at a regional and local scale</b>                                        | <b>No limitation</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                                                                    | A desktop study was carried out to gather contextual information in a regional and local context. The EPBC Act Protected Matters search tool, NatureMap and NationalMap were used to gather information along with the results of searches of the DBCA's threatened flora and ecological communities databases carried out in 2019. Relevant environmental GIS layers were downloaded and Beard's pre-European vegetation mapping, soil landscape mapping and the most recent vegetation statistics were used to provide context. Recent local information was also available from flora and vegetation surveys carried out by Maia in spring 2017 and 2018 and reports were available on other flora and vegetation surveys carried out within approximately 35 km of the Survey Area. |
| <b>Competency / experience of the team carrying out the survey, including experience in the bioregion surveyed</b> | <b>No limitation</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                                                                    | Scott Hitchcock has approximately 13 years of experience of the flora of the Murchison bioregion. He carried out surveys along two 50 km long corridors in the local area in 2017 and 2018. Christina Cox has the same years of Murchison experience as Scott and she participated on the 2017 transport corridor alignment. Michael Pezzaniti is a botanist with two years of experience in botanical surveys in WA. Michael participated in the 2018 transport corridor survey. Known conservation significant flora locations close to the Survey Area were visited at the start of the survey for the botanists to familiarise themselves with these species and their typical habitat.                                                                                             |
|                                                                                                                    | One or more specimens for each of the species encountered during the survey were collected for formal identification by a botanist / plant taxonomist.<br><br>The specimens were identified by Cate Tauss and Conrad Slee, and both botanists have more than 15 years of experience in the taxonomy of the flora of the WA. Some of the common specimens were confirmed / determined by Scott Hitchcock.                                                                                                                                                                                                                                                                                                                                                                                |

| Limitation                                                                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Proportion of flora recorded and/or collected, any identification issues</b> | <b>No limitation</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                                                                 | <p>One hundred and thirty-nine (139) plant specimens were collected from the Survey Area and a species list of 110 taxa from 27 families and 54 genera was recorded: 27% of the 110 taxa were annual and 73% perennial. Approximately 76% of the species list taxa were identified from specimens with reproductive material (flowers / fruit). Five taxa could not be confirmed beyond genus or family, either because no flowering or fruiting material was found or because the material collected was poor quality. It is unlikely that the five queried taxa are conservation significant species.</p> <p>A species list generated by NatureMap from a point close to the centre of the Survey Area and buffered by 10 km listed 46 species (DBCA, 2007-). A survey carried out in November 2017 over a proposed haul road corridor (Maia, 2018) recorded 198 species (from 51 relevés and opportunistic collections) and one carried out in October 2018 over a second proposed haul road corridor (Maia, 2019) recorded 252 taxa (from 61 relevés and opportunistic collection).</p> <p>The proportion of the flora collected and identified based on sampling (20 relevés and opportunistic collections), survey time, area surveyed, and the intensity of survey effort was therefore very good.</p> |
|                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Was the appropriate area fully surveyed (effort and extent)</b>              | <b>No limitation</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                                                                 | <p>A combined flora and vegetation reconnaissance survey and targeted flora survey was conducted over the Survey Area by three botanists over one day in September 2019. Approximately 6% (47 ha) of the 751 ha Survey Area was assessed by way of relevés and traverses.</p> <p>Given the few habitats in the Survey Area, the current degree of disturbance (25% of the Survey Area) and the sparse to open shrublands mapped in the Survey Area the coverage achieved was adequate for a reconnaissance survey.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Access restrictions within the survey area</b>                               | <b>No limitation</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                                                                 | <p>There were no access problems. The Survey Area was accessed using existing tracks and by walking from these tracks through the different habitats of the Survey Area and to its boundaries.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Survey timing, rainfall, season of survey</b>                                | <b>No limitation</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                                                                 | <p>The survey was conducted in spring (late September) 2019. Rainfall over the three full months before both surveys was below average. Therefore, the flora and vegetation could have been in below average condition in September 2019.</p> <p>However, approximately 27% of the species recorded were annual species and approximately 76% of the flora taxa recorded were fertile (flowering, fruiting or both flowering and fruiting) when the survey was carried out.</p> <p>In November 2017 a survey was carried out over a haul road corridor option and in October 2018 over an alternative haul road option. In November 2017, 15% of the species list comprised of annual species and 48% of the species list was identified from fertile material. In October 2018, 23% of the species list comprised annual species and 66% of the species list was identified from fertile material.</p> <p>Based on the above data, the season and survey timing were better in 2019 than in 2017 and 2018.</p>                                                                                                                                                                                                                                                                                               |
|                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Limitation                                                     | Comment                                                                                                                                                                                          |
|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Disturbances (fire, flood, accidental human intervention etc.) | No limitation                                                                                                                                                                                    |
|                                                                | No disturbances were evident or noted by the botanists while carrying out the survey. No floods, severe storms or fires had occurred in the weeks or months before the surveys were carried out. |

## 7.2 PROJECT TEAM

The project team and their roles are listed in **Table 7.2**.

**Table 7.2: Project team**

| Project team      |               |                         |                |
|-------------------|---------------|-------------------------|----------------|
| Name              | Qualification | Project role            | DBCA flora     |
| Scott Hitchcock   | BSc           | Report, field survey    | FB62000064     |
| Michael Pezzaniti | MSc           | Report and field survey | FB62000065     |
| Christina Cox     | PhD           | Report and field survey | FB62000152     |
| Rochelle Haycock  | BSc           | Report                  | Not applicable |

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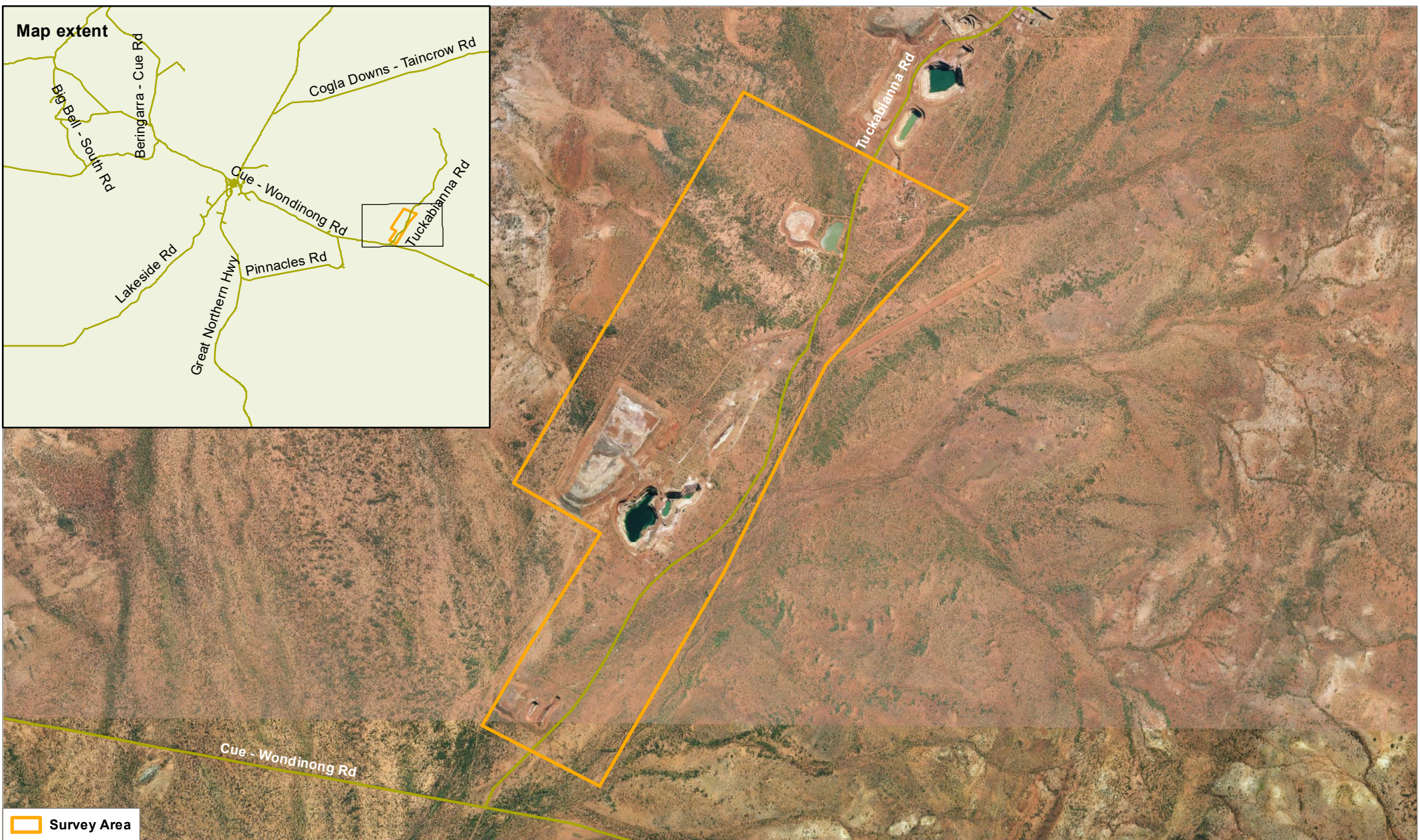
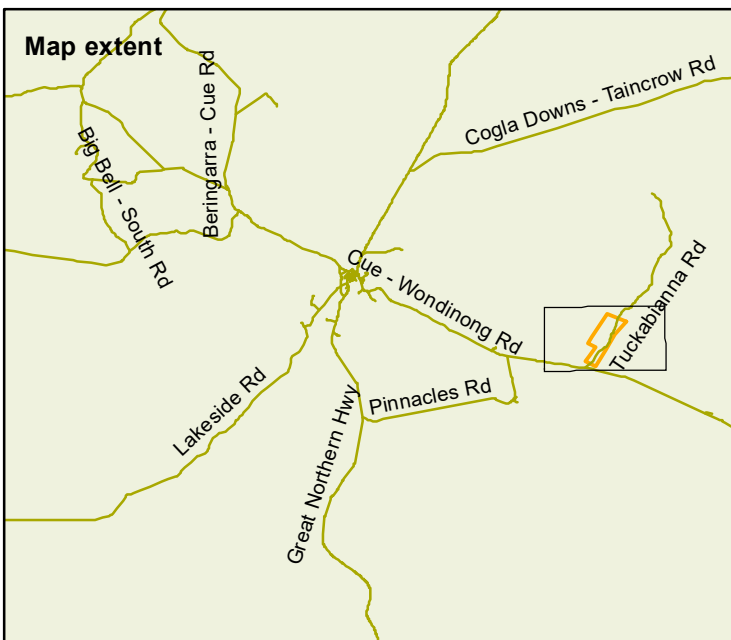
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## 9 MAPS

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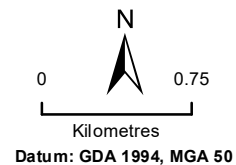
 Survey Area

**Location Map**

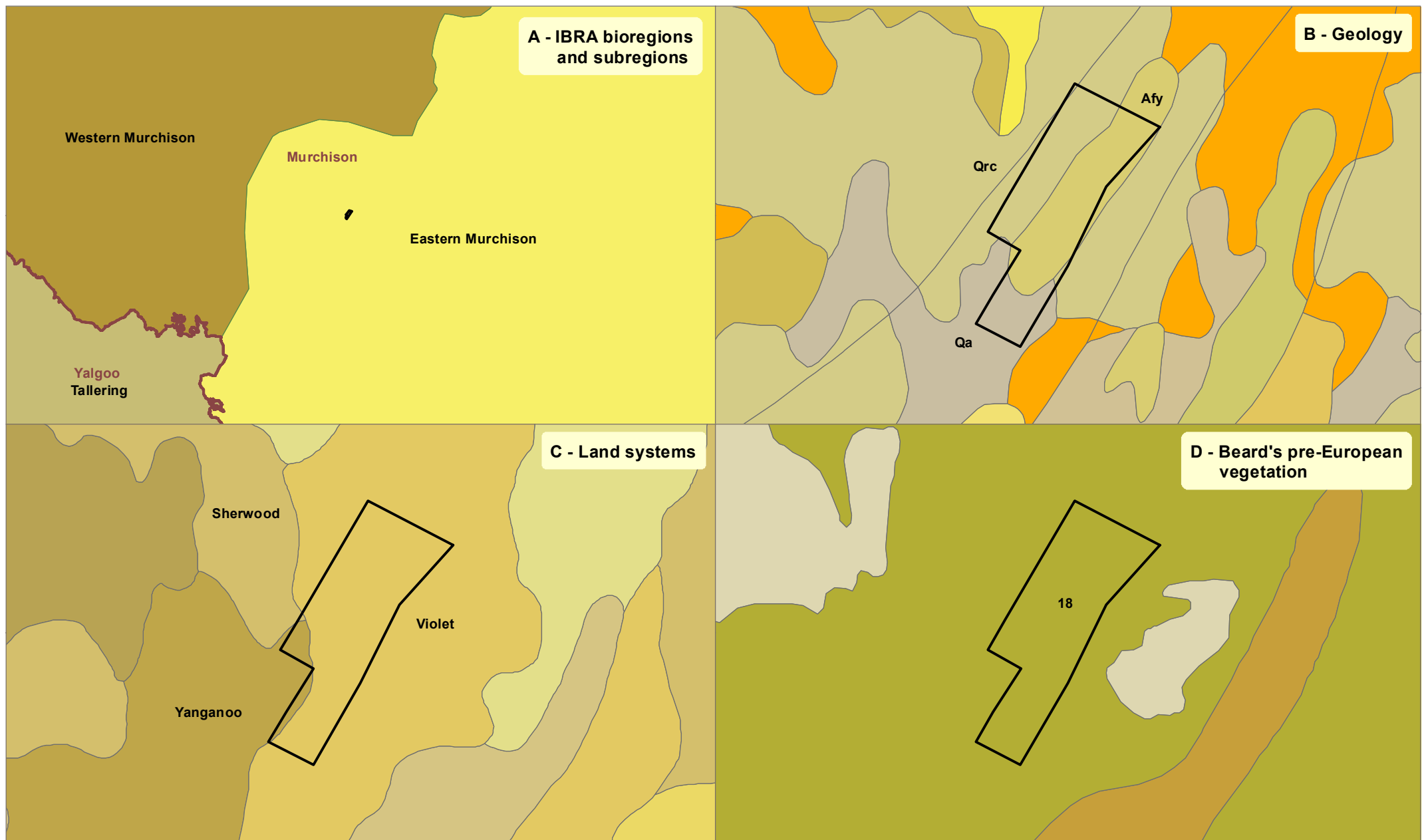
- Karatha
- Newman
- Wiluna
- Geraldton
- Perth
- Kalgoorlie

- Localities (Geoscience Australia, 20020101)
- Road Network (Main Roads, 20190516)

**The Survey Area**



**Map: 1**  
**Prepared for:** Westgold  
**Drawn by:** SH  
**Date:** 6/02/2020  
**Version:** 1    **Size:** A4



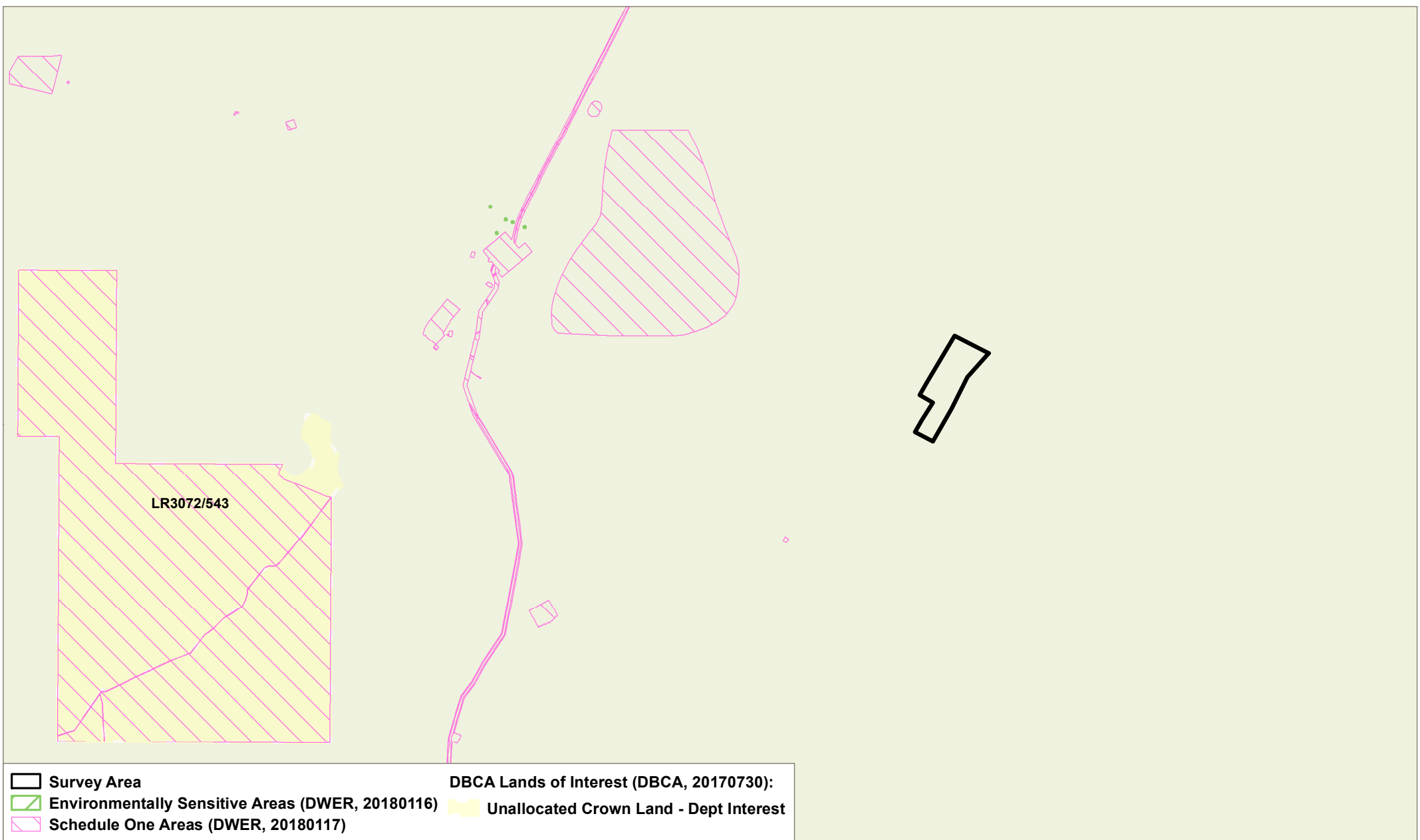
 Survey Area

**IBRA Bioregions and Subregions,  
Geology, Land Systems and  
Beard's Pre-European Vegetation  
(Vegetation System Association)**

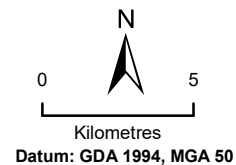


  
Datum: GDA 1994, MGA 50

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## Protected and Significant Areas



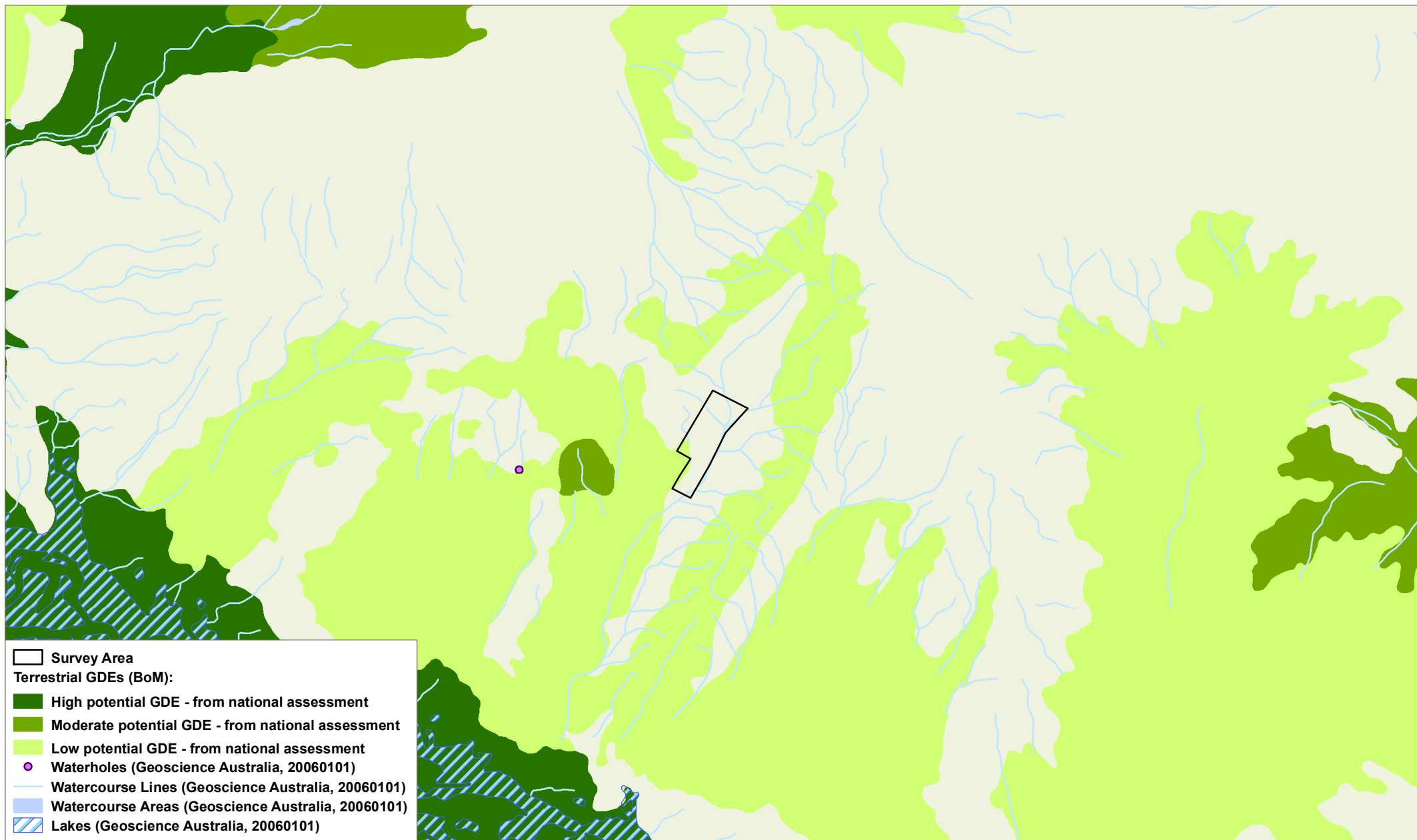
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**Prepared for:** Westgold

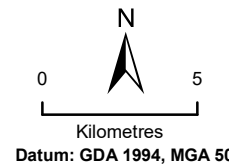
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**Date:** 6/02/2020

**Version:** 1 **Size:** A4



## Watercourses, Wetlands and Terrestrial Groundwater Dependent Ecosystems



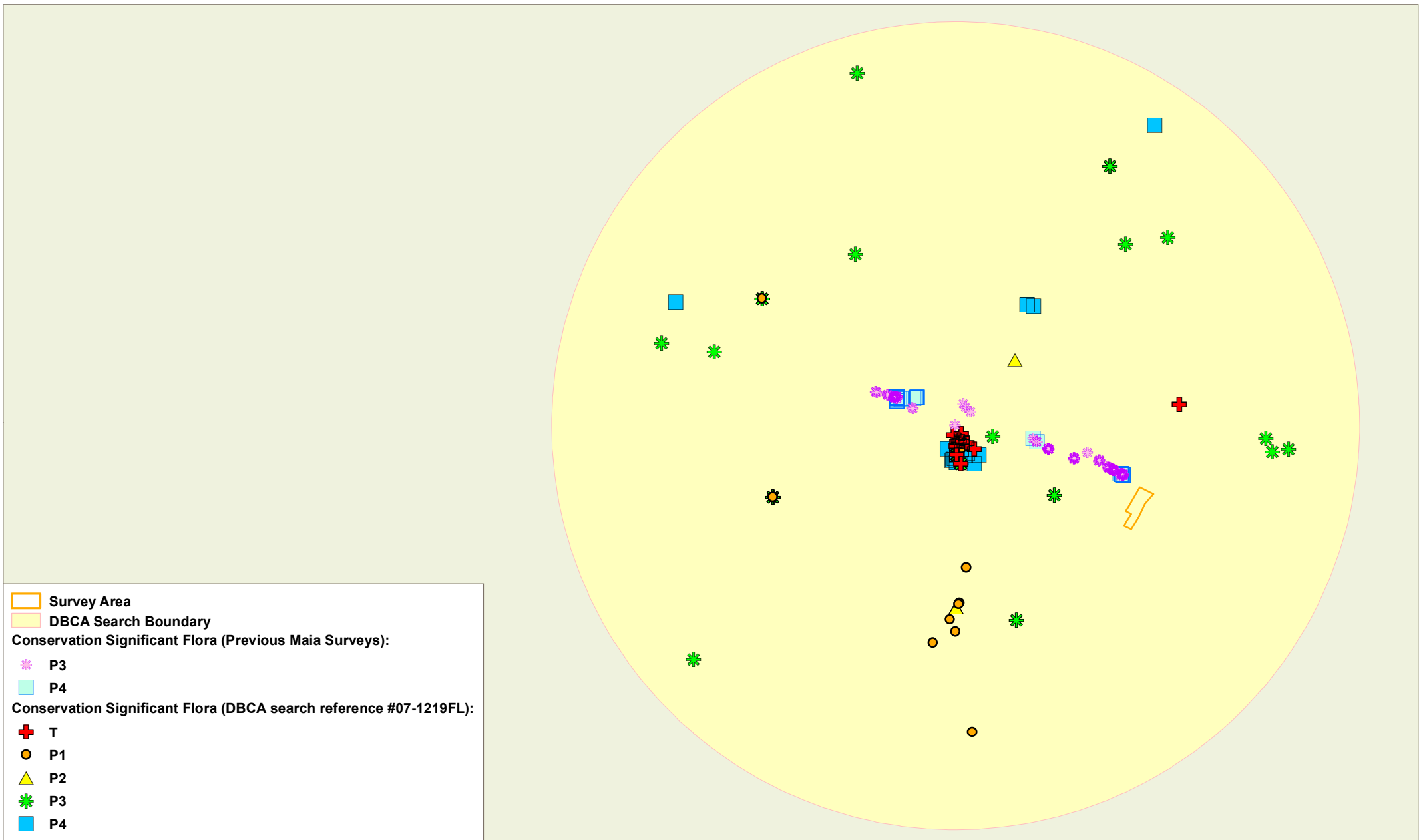
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**Prepared for:** Westgold

**Drawn by:** SH

**Date:** 6/02/2020

**Version: 1    Size: A4**



Survey Area

DBCA Search Boundary

**Conservation Significant Flora (Previous Maia Surveys):**

P3

P4

**Conservation Significant Flora (DBCA search reference #07-1219FL):**

T

P1

P2

P3

P4

**Location Map**

• Karatha  
• Newman  
• Wiluna  
• Geraldton  
• Perth  
• Kalgoorlie

### Conservation Significant Flora (Previous Maia Surveys and DBCA Search Reference #07-1219FL)

0 12.5  
Kilometres

Datum: GDA 1994, MGA 50

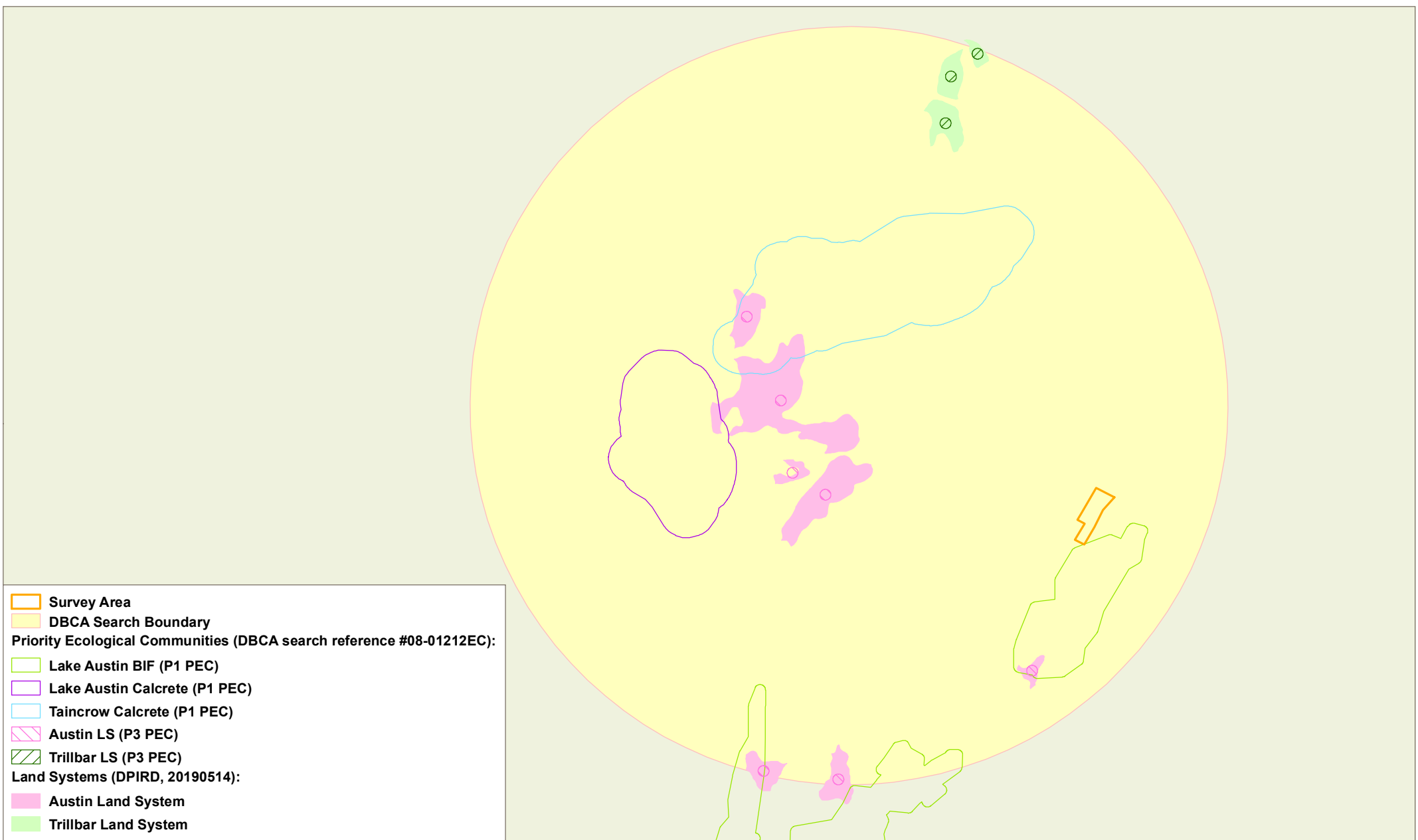
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**Prepared for:** Westgold

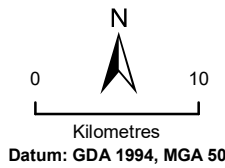
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### Priority Ecological Communities (DBCA Search Reference #08-01212EC)



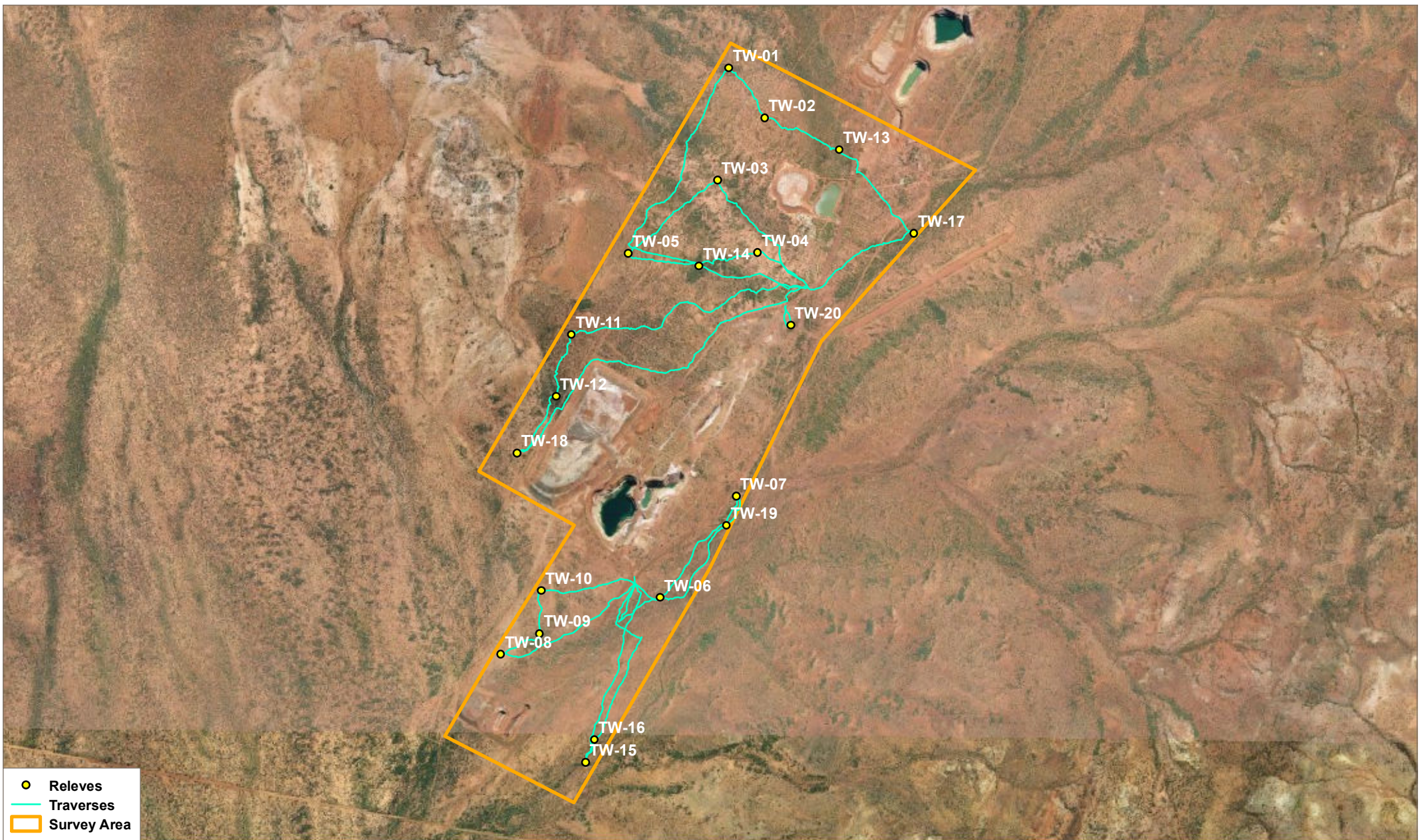
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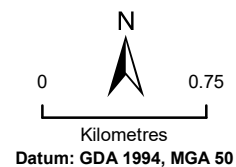
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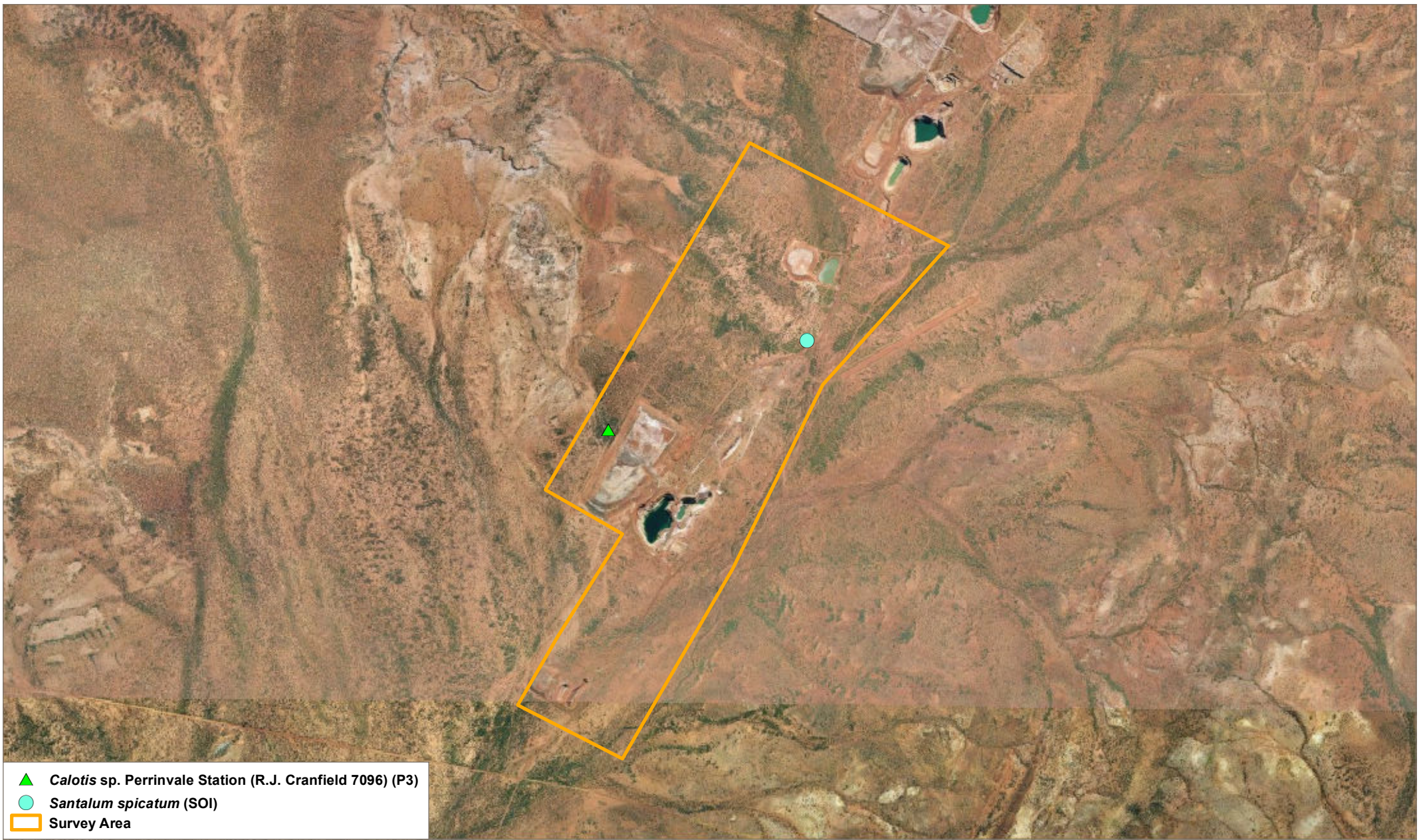
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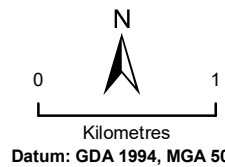
## Relevés and Traverses



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Prepared for: Westgold  
Drawn by: sH  
Date: 6/02/2020  
Version: 1 Size: A4



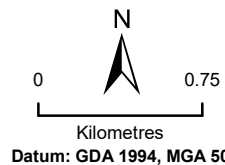
## Conservation Significant Flora (Survey Results)



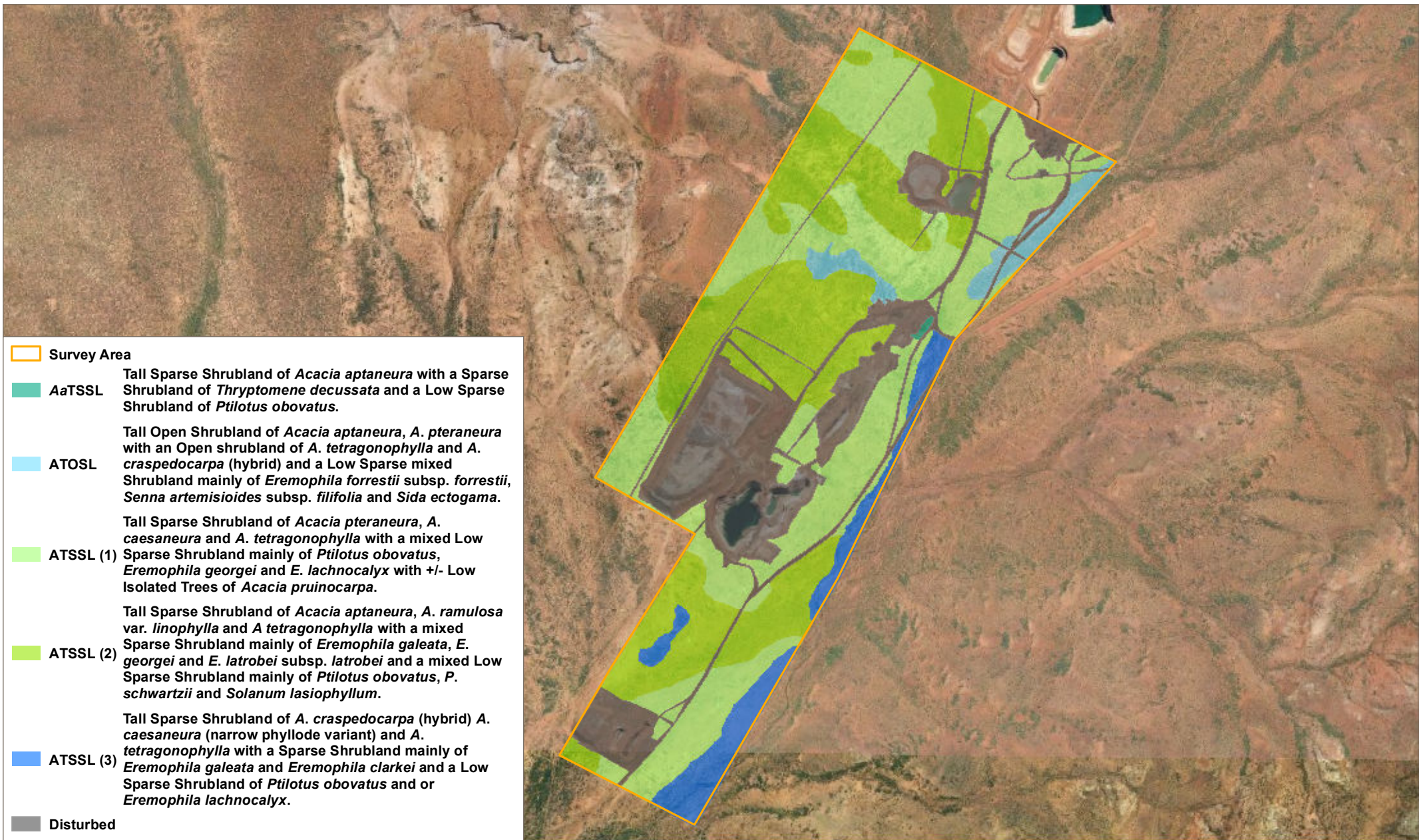
|                        |
|------------------------|
| Map: 8                 |
| Prepared for: Westgold |
| Drawn by: SH           |
| Date: 6/02/2020        |
| Version: 1    Size: A4 |



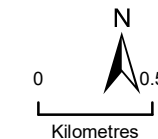
## Weeds (Survey Results)



**Map: 9**  
**Prepared for:** Westgold  
**Drawn by:** SH  
**Date:** 6/02/2020  
**Version: 1** **Size: A4**

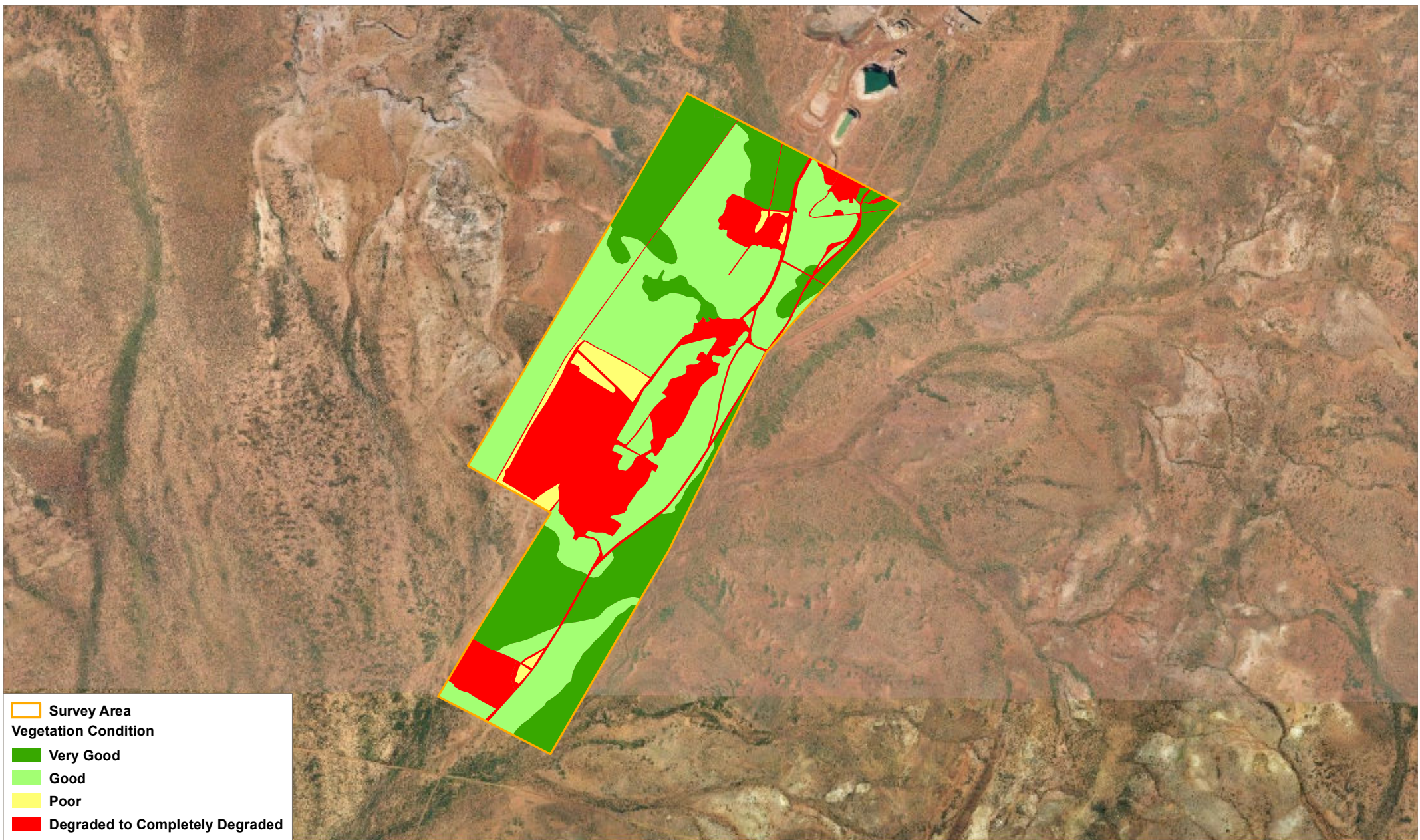


## Maia Vegetation Types

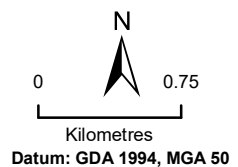


Datum: GDA 1994, MGA 50

**Map:** 10  
**Prepared for:** Westgold  
**Drawn by:** SH and RH  
**Date:** 09/02/2020  
**Version:** 1 **Size:** A4



### Vegetation Condition



**Map: 11**  
**Prepared for:** Westgold  
**Drawn by:** SH  
**Date:** 9/02/2020  
**Version:** 1 **Size:** A4

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## APPENDIX 1: DATABASE SEARCH RESULTS

Figure A1.1: EPBC Act Protected Matters Search Tool results (DotEE, 2020)



Australian Government  
Department of the Environment and Energy

### EPBC Act Protected Matters Report

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

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

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

Report created: 07/01/20 19:14:14

[Summary](#)

[Details](#)

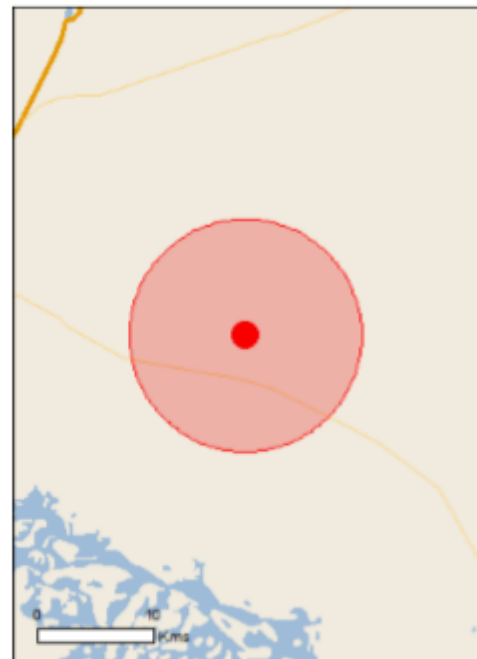
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



This map may contain data which are  
©Commonwealth of Australia  
(Geoscience Australia), ©PSMA 2010

[Coordinates](#)

Buffer: 10.0Km



## Summary

### Matters of National Environmental Significance

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

|                                                           |      |
|-----------------------------------------------------------|------|
| <a href="#">World Heritage Properties:</a>                | None |
| <a href="#">National Heritage Places:</a>                 | None |
| <a href="#">Wetlands of International Importance:</a>     | None |
| <a href="#">Great Barrier Reef Marine Park:</a>           | None |
| <a href="#">Commonwealth Marine Area:</a>                 | None |
| <a href="#">Listed Threatened Ecological Communities:</a> | None |
| <a href="#">Listed Threatened Species:</a>                | 3    |
| <a href="#">Listed Migratory Species:</a>                 | 6    |

### Other Matters Protected by the EPBC Act

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

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

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

|                                                    |      |
|----------------------------------------------------|------|
| <a href="#">Commonwealth Land:</a>                 | None |
| <a href="#">Commonwealth Heritage Places:</a>      | None |
| <a href="#">Listed Marine Species:</a>             | 9    |
| <a href="#">Whales and Other Cetaceans:</a>        | None |
| <a href="#">Critical Habitats:</a>                 | None |
| <a href="#">Commonwealth Reserves Terrestrial:</a> | None |
| <a href="#">Australian Marine Parks:</a>           | None |

### Extra Information

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

|                                                  |      |
|--------------------------------------------------|------|
| <a href="#">State and Territory Reserves:</a>    | None |
| <a href="#">Regional Forest Agreements:</a>      | None |
| <a href="#">Invasive Species:</a>                | 8    |
| <a href="#">Nationally Important Wetlands:</a>   | None |
| <a href="#">Key Ecological Features (Marine)</a> | None |

## Details

### Matters of National Environmental Significance

| Listed Threatened Species                                      |                       | [ Resource Information ]                               |
|----------------------------------------------------------------|-----------------------|--------------------------------------------------------|
| Name                                                           | Status                | Type of Presence                                       |
| <b>Birds</b>                                                   |                       |                                                        |
| <a href="#">Calidris ferruginea</a><br>Curlew Sandpiper [856]  | Critically Endangered | Species or species habitat may occur within area       |
| <a href="#">Leipos ocellata</a><br>Malleefowl [934]            | Vulnerable            | Species or species habitat likely to occur within area |
| <a href="#">Pezoporus occidentalis</a><br>Night Parrot [59350] | Endangered            | Species or species habitat may occur within area       |

| Listed Migratory Species                                                                         |                       | [ Resource Information ]                               |
|--------------------------------------------------------------------------------------------------|-----------------------|--------------------------------------------------------|
| * Species is listed under a different scientific name on the EPBC Act - Threatened Species list. |                       |                                                        |
| Name                                                                                             | Threatened            | Type of Presence                                       |
| <b>Migratory Marine Birds</b>                                                                    |                       |                                                        |
| <a href="#">Apus pacificus</a><br>Fork-tailed Swift [678]                                        |                       | Species or species habitat likely to occur within area |
| <b>Migratory Terrestrial Species</b>                                                             |                       |                                                        |
| <a href="#">Motacilla cinerea</a><br>Grey Wagtail [642]                                          |                       | Species or species habitat may occur within area       |
| <b>Migratory Wetlands Species</b>                                                                |                       |                                                        |
| <a href="#">Actitis hypoleucos</a><br>Common Sandpiper [59309]                                   |                       | Species or species habitat may occur within area       |
| <a href="#">Calidris acuminata</a><br>Sharp-tailed Sandpiper [874]                               |                       | Species or species habitat may occur within area       |
| <a href="#">Calidris ferruginea</a><br>Curlew Sandpiper [856]                                    | Critically Endangered | Species or species habitat may occur within area       |
| <a href="#">Calidris melanotos</a><br>Pectoral Sandpiper [858]                                   |                       | Species or species habitat may occur within area       |

### Other Matters Protected by the EPBC Act

| Listed Marine Species                                                                            |            | [ Resource Information ]                         |
|--------------------------------------------------------------------------------------------------|------------|--------------------------------------------------|
| * Species is listed under a different scientific name on the EPBC Act - Threatened Species list. |            |                                                  |
| Name                                                                                             | Threatened | Type of Presence                                 |
| <b>Birds</b>                                                                                     |            |                                                  |
| <a href="#">Actitis hypoleucos</a><br>Common Sandpiper [59309]                                   |            | Species or species habitat may occur within area |
| <a href="#">Apus pacificus</a><br>Fork-tailed Swift [678]                                        |            | Species or species habitat likely to occur       |

| Name                                                                      | Threatened            | Type of Presence                                                          |
|---------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------|
| <a href="#"><i>Ardea alba</i></a><br>Great Egret, White Egret [59541]     |                       | within area<br><br>Species or species habitat likely to occur within area |
| <a href="#"><i>Calidris acuminata</i></a><br>Sharp-tailed Sandpiper [874] |                       | Species or species habitat may occur within area                          |
| <a href="#"><i>Calidris ferruginea</i></a><br>Curlew Sandpiper [858]      | Critically Endangered | Species or species habitat may occur within area                          |
| <a href="#"><i>Calidris melanotos</i></a><br>Pectoral Sandpiper [858]     |                       | Species or species habitat may occur within area                          |
| <a href="#"><i>Chrysococcyx osculans</i></a><br>Black-eared Cuckoo [705]  |                       | Species or species habitat likely to occur within area                    |
| <a href="#"><i>Merops ornatus</i></a><br>Rainbow Bee-eater [870]          |                       | Species or species habitat may occur within area                          |
| <a href="#"><i>Motacilla cinerea</i></a><br>Grey Wagtail [842]            |                       | Species or species habitat may occur within area                          |

## Extra Information

### Invasive Species [ Resource Information ]

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

| Name                                                                  | Status | Type of Presence                                       |
|-----------------------------------------------------------------------|--------|--------------------------------------------------------|
| <b>Birds</b>                                                          |        |                                                        |
| <i>Columba livia</i><br>Rock Pigeon, Rock Dove, Domestic Pigeon [803] |        | Species or species habitat likely to occur within area |
| <b>Mammals</b>                                                        |        |                                                        |
| <i>Canis lupus familiaris</i><br>Domestic Dog [82654]                 |        | Species or species habitat likely to occur within area |
| <i>Capra hircus</i><br>Goat [2]                                       |        | Species or species habitat likely to occur within area |
| <i>Felis catus</i><br>Cat, House Cat, Domestic Cat [19]               |        | Species or species habitat likely to occur within area |
| <i>Oryctolagus cuniculus</i><br>Rabbit, European Rabbit [128]         |        | Species or species habitat likely to occur within area |
| <i>Vulpes vulpes</i><br>Red Fox, Fox [18]                             |        | Species or species habitat likely to occur within area |
| <b>Plants</b>                                                         |        |                                                        |

| Name                                                                 | Status | Type of Presence                                    |
|----------------------------------------------------------------------|--------|-----------------------------------------------------|
| <i>Carrichtera annua</i><br>Ward's Weed [9511]                       |        | Species or species habitat<br>may occur within area |
| <i>Cenchrus ciliaris</i><br>Buffel-grass, Black Buffel-grass [20213] |        | Species or species habitat<br>may occur within area |

## Caveat

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

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

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

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

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

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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

- migratory and
- marine

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

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

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

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

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

## Coordinates

-27.47889 118.12139

## Acknowledgements

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

- [Office of Environment and Heritage, New South Wales](#)
- [Department of Environment and Primary Industries, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment, Water and Natural Resources, South Australia](#)
- [Department of Land and Resource Management, Northern Territory](#)
- [Department of Environmental and Heritage Protection, Queensland](#)
- [Department of Parks and Wildlife, Western Australia](#)
- [Environment and Planning Directorate, ACT](#)
- [Birdlife Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Museum Victoria](#)
- [Australian Museum](#)
- [South Australian Museum](#)
- [Queensland Museum](#)
- [Online Zoological Collections of Australian Museums](#)
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Canberra](#)
- [University of New England](#)
- [Ocean Biogeographic Information System](#)
- [Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [Geoscience Australia](#)
- [CSIRO](#)
- [Australian Tropical Herbarium, Cairns](#)
- [eBird Australia](#)
- [Australian Government – Australian Antarctic Data Centre](#)
- [Museum and Art Gallery of the Northern Territory](#)
- [Australian Government National Environmental Science Program](#)
- [Australian Institute of Marine Science](#)
- [Reef Life Survey Australia](#)
- [American Museum of Natural History](#)
- [Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

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

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

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Figure A1.2: NatureMap search results (DBCA, 2007-)



# NM Spp Rpt Tucka 10km 2020

Created By Guest user on 07/01/2020

|                    |                               |
|--------------------|-------------------------------|
| Kingdom            | Plantae                       |
| Current Names Only | Yes                           |
| Core Datasets Only | Yes                           |
| Method             | 'By Circle'                   |
| Centre             | 118° 07' 17" E, 27° 28' 44" S |
| Buffer             | 10km                          |
| Group By           | Conservation Status           |

| Conservation Status    | Species   | Records   |
|------------------------|-----------|-----------|
| Non-conservation taxon | 46        | 54        |
| <b>TOTAL</b>           | <b>46</b> | <b>54</b> |

| Name ID                       | Species Name                                                                                 | Naturalised | Conservation Code | Endemic To Query Area |
|-------------------------------|----------------------------------------------------------------------------------------------|-------------|-------------------|-----------------------|
| <b>Non-conservation taxon</b> |                                                                                              |             |                   |                       |
| 1.                            | 37260 <i>Acacia aptaneura</i>                                                                |             |                   |                       |
| 2.                            | 3500 <i>Acacia pruinocarpa</i> (Gidgee)                                                      |             |                   |                       |
| 3.                            | 19483 <i>Acacia ramulosa</i> var. <i>linophylla</i>                                          |             |                   |                       |
| 4.                            | 2382 <i>Amyema nestor</i>                                                                    |             |                   |                       |
| 5.                            | 7903 <i>Calotis hispidula</i> (Bindy Eye)                                                    |             |                   |                       |
| 6.                            | 48838 <i>Citrullus amarus</i>                                                                | Y           |                   |                       |
| 7.                            | 11709 <i>Crassula colorata</i> var. <i>acuminata</i>                                         |             |                   |                       |
| 8.                            | 11202 <i>Dodonaea viscosa</i> subsp. <i>spatulata</i> (Sticky Hop-bush)                      |             |                   |                       |
| 9.                            | 3098 <i>Drosera glanduligera</i> (Pimpemel Sundew)                                           |             |                   |                       |
| 10.                           | 3106 <i>Drosera macrantha</i> (Bridal Rainbow)                                               |             |                   |                       |
| 11.                           | 7228 <i>Eremophila lachnocalyx</i> (Woolly-calyxed Eremophila)                               |             |                   |                       |
| 12.                           | 48949 <i>Eremophila platycalyx</i> subsp. <i>Granites</i> (D.J. Edinger & G. Marsh DJE 4782) |             |                   |                       |
| 13.                           | 5779 <i>Eucalyptus striaticalyx</i> (Cue York Gum)                                           |             |                   |                       |
| 14.                           | 3907 <i>Gastrolobium laytonii</i> (Breelya, Prilya)                                          |             |                   |                       |
| 15.                           | 8002 <i>Gnephosis tenuissima</i>                                                             |             |                   |                       |
| 16.                           | 8086 <i>Hypochoeris glabra</i> (Smooth Catsear)                                              | Y           |                   |                       |
| 17.                           | 14 <i>Isoetes muelleri</i>                                                                   |             |                   |                       |
| 18.                           | 911 <i>Isolepis congrua</i>                                                                  |             |                   |                       |
| 19.                           | 7397 <i>Isotoma petraea</i> (Rock Isotome, Tundiwan)                                         |             |                   |                       |
| 20.                           | 3033 <i>Lepidium oxytrichum</i>                                                              |             |                   |                       |
| 21.                           | 7670 <i>Levenhookia dubia</i> (Hairy Stylewort)                                              |             |                   |                       |
| 22.                           | 2398 <i>Lysiana murrayi</i> (Mistletoe, Parka-Parka)                                         |             |                   |                       |

|     |       |                                                                             |   |
|-----|-------|-----------------------------------------------------------------------------|---|
| 23. | 4097  | <i>Mirbelia ramulosa</i>                                                    |   |
| 24. | 17925 | <i>Myriocephalus oldfieldii</i>                                             |   |
| 25. | 14186 | <i>Myriocephalus pygmaeus</i>                                               |   |
| 26. | 40424 | <i>Pentameris airoides</i> subsp. <i>airoides</i>                           | Y |
| 27. | 5245  | <i>Pimelea forrestiana</i>                                                  |   |
| 28. | 19744 | <i>Pittosporum angustifolium</i>                                            |   |
| 29. | 8173  | <i>Podolepis capillaris</i> (Wiry Podolepis)                                |   |
| 30. | 16688 | <i>Prasophyllum gracile</i>                                                 |   |
| 31. | 12707 | <i>Prostanthera albiflora</i>                                               |   |
| 32. | 2708  | <i>Ptilotus chamaecladus</i>                                                |   |
| 33. | 13306 | <i>Rhodanthe battii</i>                                                     |   |
| 34. | 46434 | <i>Rumex hypogaeus</i>                                                      | Y |
| 35. | 2443  | <i>Rumex vesicarius</i> (Ruby Dock)                                         | Y |
| 36. | 17409 | <i>Schoenus varicellae</i>                                                  |   |
| 37. | 12279 | <i>Senna artemisioides</i> subsp. <i>helmsii</i>                            |   |
| 38. | 3089  | <i>Sisymbrium erysimoides</i> (Smooth Mustard)                              | Y |
| 39. | 11241 | <i>Solanum orbiculatum</i> subsp. <i>orbiculatum</i> (Round-leaved Solanum) |   |
| 40. | 29813 | <i>Stackhousia</i> sp. Mt Keith (G. Cockerton & G. O'Keefe 11017)           |   |
| 41. | 7740  | <i>Stylidium induratum</i> (Desert Triggerplant)                            |   |
| 42. | 4229  | <i>Swainsona gracilis</i>                                                   |   |
| 43. | 1338  | <i>Thysanotus manglesianus</i> (Fringed Lily)                               |   |
| 44. | 6279  | <i>Trachymene ornata</i> (Spongefruit)                                      |   |

NatureMap is a collaborative project of the Department of Biodiversity, Conservation and Attractions and the Western Australian Museum.



Department of Biodiversity,  
Conservation and Attractions



Page 1



| Name ID | Species Name | Naturalised                     | Conservation Code | <sup>1</sup> Endemic To Query Area |
|---------|--------------|---------------------------------|-------------------|------------------------------------|
| 45.     | 48319        | <i>Tripogonella liliiformis</i> |                   |                                    |
| 46.     | 8253         | <i>Triptilodiscus pygmaeus</i>  |                   |                                    |

#### Conservation Codes

T - Rare or likely to become extinct  
X - Presumed extinct  
IA - Protected under international agreement  
S - Other specially protected fauna  
1 - Priority 1  
2 - Priority 2  
3 - Priority 3  
4 - Priority 4  
5 - Priority 5

<sup>1</sup> For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

**Table A1.1: Conservation significant flora listed in the database search results and literature**

| Species                                                                  | EPBC Act listing           | WA listing | Searches                                                     |
|--------------------------------------------------------------------------|----------------------------|------------|--------------------------------------------------------------|
| <i>Eremophila rostrata</i>                                               | Critically Endangered (CE) | T (CE)     | TPFL, WAHerb                                                 |
| <i>Minuria tridens</i>                                                   | Vulnerable                 | P1         | TPFL, WAHerb                                                 |
| <i>Angianthus uniflorus</i>                                              |                            | P1         | TPFL, WAHerb                                                 |
| <i>Dicrastylis</i> sp. Cue (A.A. Mitchell 764)                           |                            | P1         | WAHerb                                                       |
| <i>Drosera eremaea</i>                                                   |                            | P1         | WAHerb                                                       |
| <i>Eremophila glabra</i> subsp. Lake Austin (P.J. Curry & P. Hennig 367) |                            | P1         | WAHerb                                                       |
| <i>Jacksonia lanicarpa</i>                                               |                            | P1         | WAHerb                                                       |
| <i>Millotia depauperata</i>                                              |                            | P1         | WAHerb                                                       |
| <i>Angianthus microcephalus</i>                                          |                            | P2         | WAHerb                                                       |
| <i>Bergia auriculata</i>                                                 |                            | P2         | WAHerb                                                       |
| <i>Acacia burrowsiana</i>                                                |                            | P3         | WAHerb                                                       |
| <i>Atriplex lindleyi</i> subsp. <i>conduplicata</i>                      |                            | P3         | WAHerb                                                       |
| <i>Calytrix verruculosa</i>                                              |                            | P3         | WAHerb                                                       |
| <i>Calotis</i> sp. Perrinvale Station (R.J. Cranfield 7096)              |                            | P3         | WAHerb                                                       |
| <i>Drummondita miniata</i>                                               |                            | P3         | WAHerb, Maia (2019)                                          |
| <i>Hemigenia tysonii</i>                                                 |                            | P3         | WAHerb                                                       |
| <i>Hibiscus krichauffianus</i>                                           |                            | P3         | WAHerb, Coffey (2013a), Maia (2018)                          |
| <i>Maireana prosthocochaeta</i>                                          |                            | P3         | WAHerb                                                       |
| <i>Micromyrtus placoides</i>                                             |                            | P3         | WAHerb                                                       |
| <i>Petrophile pauciflora</i>                                             |                            | P3         | WAHerb                                                       |
| <i>Prostanthera ferricola</i>                                            |                            | P3         | Maia (2018 and 2019)                                         |
| <i>Prostanthera petrophila</i>                                           |                            | P3         | WAHerb                                                       |
| <i>Ptilotus beardii</i>                                                  |                            | P3         | MWH (2015), WAHerb, Maia (2018 and 2019)                     |
| <i>Ptilotus luteolus</i>                                                 |                            | P3         | Maia (2018 and 2019)                                         |
| <i>Rhodanthe collina</i>                                                 |                            | P3         | Coffey (2013a)                                               |
| <i>Sauropus</i> sp. Woolgorong (M. Officer s.n. 10/8/94)                 |                            | P3         | Maia (2018)                                                  |
| <i>Sida picklesiana</i>                                                  |                            | P3         | WAHerb, Maia (2019)                                          |
| <i>Tecticornia fimbriata</i>                                             |                            | P3         | WAHerb, Coffey (2013b)                                       |
| <i>Acacia speckii</i>                                                    |                            | P4         | WAHerb, Coffey (2012b), Coffey (2012c), Maia (2018 and 2019) |
| <i>Dodonaea amplisemina</i>                                              |                            | P4         | TPFL, WAHerb, Coffey (2012c), Maia (2018, 2019 and 2020)     |
| <i>Goodenia berringbinensis</i>                                          |                            | P4         | TPFL, WAHerb                                                 |
| <i>Grevillea inconspicua</i>                                             |                            | P4         | TPFL, WAHerb, Coffey (2013a), Maia (2018 and 2019)           |

Note: P1 – P4 = Priority 1 to Priority 4 species, T = Threatened, CE = Critically Endangered; EPBC = EPBC Act Protected Matters Search Tool (DotEE, 2020); WAHERB = DBCA's Western Australian Herbarium database (DBCA, 2019f; search reference 07-1219FL); TPFL = DBCA's Threatened and Priority Flora List (DBCA, 2019f; search reference 07-1219FL). Rows highlighted green indicate the 10 species located during transport corridor surveys (Maia, 2018 and 2019) and Mt Fingall project area (Maia, 2020).

Table A1.2: Weeds listed in the database search results and literature referenced

| Species                                                                           | Impact rating (DBCA, 2019I)        | Invasiveness rating (DBCA, 2019I)    | Searches                                                                 |
|-----------------------------------------------------------------------------------|------------------------------------|--------------------------------------|--------------------------------------------------------------------------|
| <i>Opuntia stricta</i> (WoNS, DPP - C3 Restricted, Whole of state (DPIRD, 2019a)) | Not rated                          | Not rated                            | NM, Outback Ecology (2012, recorded as a query), Maia (2018 and 2019)    |
| <i>Tamarix aphylla</i> (WoNS, DPP - Unassigned, Exempt (DPIRD, 2019a))            | Not rated                          | Not rated                            | Maia (2018)                                                              |
| <i>Argemone ?mexicana</i> (DPP - C1, Prohibited, Whole of state (DPIRD, 2019a))   | Not rated                          | Not rated                            | Maia (2020)                                                              |
| <i>Brassica tournefortii</i>                                                      | High                               | Rapid                                | Outback Ecology (2012), Maia (2020)                                      |
| <i>Carrichtera annua</i>                                                          | Not rated                          | Not rated                            | EPBC                                                                     |
| <i>Cenchrus ciliaris</i>                                                          | High                               | Rapid                                | EPBC, Outback Ecology (2012), Coffey (2013a), Maia (2018, 2019 and 2020) |
| <i>Centaurea melitensis</i>                                                       | High                               | Rapid                                | Outback Ecology (2005; 2012), Maia (2020)                                |
| <i>Citrullus amarus</i>                                                           | Low (listed as <i>C. lanatus</i> ) | Rapid (listed as <i>C. lanatus</i> ) | NM, Maia (2019)                                                          |
| <i>Cucumis myriocarpus</i>                                                        | Unknown                            | Rapid                                | MWH (2015), Outback Ecology (2012)                                       |
| <i>Cuscuta planiflora</i>                                                         | Unknown                            | Rapid                                | Maia (2019 and 2020)                                                     |
| <i>Cynodon dactylon</i>                                                           | High                               | Rapid                                | MWH (2015), Outback Ecology (2012), Maia (2020)                          |
| <i>Datura ferox</i>                                                               | Not rated                          | Not rated                            | Outback Ecology (2005)                                                   |
| <i>?Erodium cicutarium</i>                                                        | Low                                | Rapid                                | Coffey (2013b)                                                           |
| <i>Hypochaeris glabra</i>                                                         | Low                                | Rapid                                | NM                                                                       |
| <i>Lysimachia arvensis</i>                                                        | Low                                | Rapid                                | Outback Ecology (2012), Coffey (2013a), Maia (2019 and 2020)             |
| <i>Malvastrum americanum</i>                                                      | High                               | Rapid                                | Maia (2020)                                                              |
| <i>Medicago polymorpha</i>                                                        | Unknown                            | Rapid                                | Outback Ecology (2005), Maia (2020)                                      |
| <i>?Monoculus monstrosus</i>                                                      | Unknown                            | Rapid                                | Outback Ecology (2005)                                                   |
| <i>Pentameris airoides</i> subsp. <i>airoides</i>                                 | Unknown                            | Rapid                                | NM, Coffey (2013a)                                                       |
| <i>Rostraria pumila</i>                                                           | Unknown                            | Unknown                              | Maia (2019 and 2020)                                                     |
| <i>Rumex hypogaeus</i>                                                            | Low                                | Rapid                                | NM, Outback Ecology (2005)                                               |
| <i>Rumex vesicarius</i>                                                           | High                               | Rapid                                | NM, Outback Ecology (2012), Maia (2019 and 2020)                         |
| <i>Schinus molle</i>                                                              | Not rated                          | Not rated                            | Maia (2020)                                                              |
| <i>Solanum nigrum</i>                                                             | Unknown                            | Rapid                                | Outback Ecology (2012)                                                   |
| <i>Sonchus oleraceus</i>                                                          | Unknown                            | Rapid                                | Outback Ecology (2012), Coffey (2013a & b), MWH (2015), Maia (2018)      |
| <i>Sisymbrium erysimoides</i>                                                     | Unknown                            | Unknown                              | NM, Maia (2020)                                                          |
| <i>Sonchus oleraceus</i>                                                          | Unknown                            | Rapid                                | Maia (2020)                                                              |

Note: DPP = Declared Pest Plant, WoNS = Weed of National Significance; EPBC = EPBC Act Protected Matters Search Tool (DotEE, 2020); NM = NatureMap (DBCA, 2007-). Rows coloured green are species that were recorded in the alignment 1 and alignment 2 haul road corridors (Maia, 2018 and 2019) and Mt Fingall project area (Maia, 2020).

## APPENDIX 2: CONSERVATION SIGNIFICANCE - FLORA AND ECOLOGICAL COMMUNITIES

### Commonwealth *Environment Protection and Biodiversity Act 1999*

**Table A2.1: Categories and definitions for threatened species (DotEE, 2019a)**

| Criteria for listing species in the critically endangered, endangered or vulnerable categories                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                               |                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------------------------------------|
| Criterion                                                                                                                                                         | Critically Endangered                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Endangered                    | Vulnerable                         |
| 1. It has undergone, is suspected to have undergone or is likely to undergo in the immediate future:                                                              | a very severe reduction in numbers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | a severe reduction in numbers | a substantial reduction in numbers |
| 2. Its geographic distribution is precarious for the survival of the species and is:                                                                              | very restricted                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | restricted                    | limited                            |
| 3. The estimated total number of individuals is:                                                                                                                  | very low                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | low                           | limited                            |
| And either of (a) or (b) is true:                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                               |                                    |
| a) Evidence suggests that the number will continue to decline at:                                                                                                 | A very high rate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | A high rate                   | A substantial rate                 |
| b) The number is likely to continue to decline and its geographic distribution is:                                                                                | Precarious for its survival                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Precarious for its survival   | Precarious for its survival        |
| 4. The estimated total number of mature individuals is:                                                                                                           | extremely low                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | very low                      | low                                |
| 5. The probability of its extinction in the wild is at least:                                                                                                     | 50% in the immediate future                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 20% in the near future        | 10% in the medium-term future      |
| Eligibility for listing species in the extinct, extinct in the wild, or conservation dependent categories                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                               |                                    |
| 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:<br><br>a) it is only known to survive in cultivation, in captivity or as a naturalized population well outside its past range; or<br><br>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.                                                                                                                                                                                                                                                                                                                                                                                 |                               |                                    |
| Conservation dependent*                                                                                                                                           | A native species is eligible to be included in the conservation dependent category if, at that time:<br><br>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; <b>or</b><br><br>b) the following subparagraphs are satisfied;<br>I. the species is a species of fish;<br>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;<br>III. the plan of management is in force under a law of the Commonwealth or of a State or Territory;<br>IV. cessation of the plan of management would adversely affect the conservation status of the species. |                               |                                    |
| *Note: Species listed as ‘conservation dependent’ and ‘extinct’ are not matters of national environmental significance and therefore do not trigger the EPBC Act. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                               |                                    |

**Table A2.2: Criteria for listing threatened ecological communities (TECs) under the EPBC Act (Austlii, 2019)**

| Criteria for listing species in the critically endangered, endangered or vulnerable categories |                                                                                                                                                                                                                                                                                                                                                                                                     |                                                   |                                       |                                                   |
|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|---------------------------------------|---------------------------------------------------|
| Item                                                                                           | Criterion                                                                                                                                                                                                                                                                                                                                                                                           | Category                                          |                                       |                                                   |
|                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                     | Critically Endangered                             | Endangered                            | Vulnerable                                        |
| <b>1</b>                                                                                       | Its decline in geographic distribution is:                                                                                                                                                                                                                                                                                                                                                          | Very severe                                       | severe                                | substantial                                       |
| <b>2</b>                                                                                       | Its geographic distribution is:<br><br>and the nature of its distribution makes it likely that the action of a threatening process could cause it to be lost in:                                                                                                                                                                                                                                    | Very restricted<br><br>The immediate future       | Restricted<br><br>The near future     | Limited<br><br>The medium-term future             |
| <b>3</b>                                                                                       | For a population of a native species that is likely to play a major role in the community, there is a:<br><br>to the extent that restoration of the community is not likely to be possible in:                                                                                                                                                                                                      | Very severe decline<br><br>The immediate future   | Severe decline<br><br>The near future | Substantial decline<br><br>The medium-term future |
| <b>4</b>                                                                                       | The reduction in its integrity across most of its geographic distribution is:<br><br>As indicated by degradation of the community or its habitat, or disruption of important community processes that is:                                                                                                                                                                                           | Very severe<br><br>Very severe                    | Severe<br><br>severe                  | Substantial<br><br>substantial                    |
| <b>5</b>                                                                                       | Its rate of continuing detrimental change is:<br><br>As indicated by:<br>a) A rate of continuing decline in its geographic distribution, or a population of a native species that is believed to play a major role in the community, that is:<br><br>Or<br>b) Intensification, across most of its geographic distribution, in degradation, or disruption of important community processes, that is: | Very severe<br><br>Very severe<br><br>Very severe | Severe<br><br>Severe<br><br>Severe    | Substantial<br><br>Substantial<br><br>Serious     |
| <b>6</b>                                                                                       | A quantitative analysis shows that its probability of extinction, or extreme degradation over all of its geographic distribution is:                                                                                                                                                                                                                                                                | At least 50% in the immediate future              | At least 20% in the near future       | At least 10% in the medium-term future            |

## Western Australian *Biodiversity Conservation Act 2016* (GoWA, 2018a)

**Table A2.3: Conservation codes for Western Australian flora and fauna (DBCA, 2019h)**

| Codes and Descriptions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Threatened, Extinct and Specially Protected fauna or flora<sup>1</sup> are species<sup>2</sup> which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.</p> <p>The <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i> and the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> have been transitioned under regulations 170, 171 and 172 of the Biodiversity Conservation Regulations 2018 to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the Biodiversity Conservation Act 2016.</p> <p>Categories of Threatened, Extinct and Specially Protected fauna and flora are:</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <p><b><u>T - Threatened species</u></b></p> <p>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 <i>Biodiversity Conservation Act 2016</i> (BC Act).</p> <p>Threatened fauna is that subset of ‘Specially Protected Fauna’ listed under schedules 1 to 3 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i> for Threatened Fauna.</p> <p>Threatened flora is that subset of ‘Rare Flora’ listed under schedules 1 to 3 of the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> for Threatened Flora.</p>                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>CR</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <p><b>Critically endangered species</b></p> <p>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”.</p> <p>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 <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i> for critically endangered fauna or the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> for critically endangered flora.</p>                                                                                                    |
| <b>EN</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <p><b>Endangered species</b></p> <p>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”.</p> <p>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 <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i> for endangered fauna or the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> for endangered flora. VU – Schedule 3 - taxa that are extant and considered likely to become extinct or rare, as vulnerable flora, and therefore in need of special protection.</p> |
| <b>VU</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <p><b>Vulnerable species</b></p> <p>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”.</p> <p>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 <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i> for vulnerable fauna or the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> for vulnerable flora.</p>                                                                                                                                                         |

| Codes and Descriptions                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><u>Extinct species</u></b>                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>EX</b>                                                                                                                                                                                                                                                                                                          | <p><b>Extinct species</b></p> <p>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).</p> <p>Published as presumed extinct under schedule 4 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i> for extinct fauna or the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> for extinct flora.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>EW</b>                                                                                                                                                                                                                                                                                                          | <p><b>Extinct in the wild species</b></p> <p>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).</p> <p>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.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b><u>Specially protected species</u></b>                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 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.                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>MI</b>                                                                                                                                                                                                                                                                                                          | <p><b>Migratory species</b></p> <p>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).</p> <p>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 <i>Convention on the Conservation of Migratory Species of Wild Animals</i> (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.</p> <p>Published as migratory birds protected under an international agreement under schedule 5 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i>.</p> |
| <b>CD</b>                                                                                                                                                                                                                                                                                                          | <p><b>Species of special conservation interest (conservation dependent fauna)</b></p> <p>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).</p> <p>Published as conservation dependent fauna under schedule 6 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Codes and Descriptions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>OS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <p><b>Other specially protected species</b></p> <p>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).</p> <p>Published as other specially protected fauna under schedule 7 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i>.</p>                                                                                                                                                                                                                                                                                                                                                               |
| <p><b><u>P – Priority species</u></b></p> <p>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.</p> <p>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.</p> <p>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.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <p><b>Priority 1: Poorly-known species</b></p> <p>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.</p>                                         |
| <b>2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <p><b>Priority 2: Poorly-known species</b></p> <p>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.</p>                                                                                                                                                       |
| <b>3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <p><b>Priority 3: Poorly-known species</b></p> <p>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.</p>                                                                                                                                                           |
| <b>4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <p><b>Priority 4: Rare, Near Threatened and other species in need of monitoring</b></p> <p>((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.</p> <p>(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.</p> <p>(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p> |

## Codes and Descriptions

<sup>1</sup> The definition of flora includes algae, fungi and lichens

<sup>2</sup> 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).

**Table A2.4: Categories, definitions and criteria for threatened ecological communities (TECs) in WA (DEC, 2013)**

| Category                        | Definition and Criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Presumed Totally Destroyed (PD) | <p>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.</p> <p>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):</p> <p>A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats; or</p> <p>B) All occurrences recorded within the last 50 years have since been destroyed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Critically Endangered (CR)      | <p>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.</p> <p>An ecological community will be listed as <b>Critically Endangered</b> when it has been adequately surveyed and is 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 <b>any one or more</b> of the following criteria (A, B or C):</p> <p>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% <b>and either or both</b> of the following apply (i or ii):</p> <ul style="list-style-type: none"> <li>• (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);</li> <li>• (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.</li> </ul> <p>B) Current distribution is limited, <b>and one or more</b> of the following apply (i, ii or iii):</p> <ul style="list-style-type: none"> <li>• (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);</li> <li>• (ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes;</li> <li>• (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.</li> </ul> <p>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).</p> |

| Category        | Definition and Criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Endangered (EN) | <p>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.</p> <p>An ecological community will be listed as <b>Endangered</b> 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 <b>any one or more of</b> the following criteria (A, B, or C):</p> <p>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):</p> <ul style="list-style-type: none"> <li>• (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);</li> <li>• (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.</li> </ul> <p>B) Current distribution is limited, <b>and one or more</b> of the following apply (i, ii or iii):</p> <ul style="list-style-type: none"> <li>• (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);</li> <li>• (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;</li> <li>• (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.</li> </ul> <p>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).</p> |
| Vulnerable (VU) | <p>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.</p> <p>An ecological community will be listed as <b>Vulnerable</b> 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 to long-term future. This will be determined on the basis of the best available information by it meeting <b>any one or more of</b> the following criteria (A, B or C):</p> <p>A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated.</p> <p>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.</p> <p>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.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

**Table A2.5: Definitions and criteria for priority ecological communities (PECs) in WA (DEC, 2013)**

| Category                                            | Definition and Criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                     | 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 $\leq 5$ occurrences or a total area of $\leq 100\text{ha}$ ). 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 $\leq 10$ occurrences or a total area of $\leq 200\text{ha}$ ). At least some occurrences are not believed to be under immediate threat 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 | <p>(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:</p> <p>(ii) communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;</p> <p>(iii) Communities made up of large, and/or widespread occurrences, that may or 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, and inappropriate fire regimes.</p> <p>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.</p> |

| Category                                                                                                                                                                                                                                            | Definition and Criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Priority Four:<br/>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.</p> | <p>(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.</p> <p>(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.</p> <p>(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.</p> |
| <p>Priority Five:<br/>Conservation Dependent ecological communities</p>                                                                                                                                                                             | <p>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.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

### APPENDIX 3: DECLARED PESTS - CATEGORIES AND CONTROLS

Declared pests can be assigned to a C1, C2 or C3 control category under the Biosecurity and Agriculture Management Regulations 2013. The control categories are listed below. Some declared pests are unassigned and the description for these plants is also included below.

**Table A3.1: Control categories for Declared Pests (DPIRD, 2019d)**

| Category       | Description                                                                                                                                                                                                                  |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| C1 Exclusion   | Organisms which should be excluded from part or all of Western Australia                                                                                                                                                     |
| C2 Eradication | Organisms which should be eradicated from part or all of Western Australia                                                                                                                                                   |
| C3 Management  | Organisms that 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     | Unassigned: Declared pests 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. |

## APPENDIX 4: NATIONAL VEGETATION INFORMATION SYSTEM VEGETATION CLASSIFICATION

**Table A4.1: NVIS growth forms and descriptions**

| Growth Form    | Description                                                                                                                                                                                                                                                                                                        |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tree           | Woody plants, more than 2m tall with a single stem or branches well above the base.                                                                                                                                                                                                                                |
| Tree Mallee    | Woody perennial plant usually of the genus <i>Eucalyptus</i> . Multi-stemmed with fewer than 5 trunks of which at least 3 exceed 100 mm at breast height (1.3 m). Usually 8 m or more in height.                                                                                                                   |
| Shrub          | Woody plants multi-stemmed at the base (or within 200 mm from ground level) or if single stemmed, less than 2 m in height.                                                                                                                                                                                         |
| Mallee Shrub   | Commonly less than 8 m tall, usually with 5 or more trunks, of which at least 3 of the largest do not exceed 100 mm at breast height (1.3 m).                                                                                                                                                                      |
| Heath Shrub    | Shrub usually less than 2 m, with sclerophyllous leaves having high fibre: protein ratios and with an area of nanophyll or smaller (less than 225 sq. m.). Often a member of the following families: Epacridaceae, Myrtaceae, Fabaceae and Proteaceae. Commonly occur in nutrient-poor substrates.                 |
| Chenopod Shrub | Single or multi-stemmed, semi-succulent shrub of the family Chenopodiaceae exhibiting drought and salt tolerance.                                                                                                                                                                                                  |
| Samphire Shrub | Genera (of Tribe Salicornioideae, viz: <i>Halosarcia</i> , <i>Pachycornia</i> , <i>Sarcocornia</i> , <i>Sclerostegia</i> , <i>Tecticornia</i> and <i>Tegicornia</i> ) with articulate branches, fleshy stems and reduced flowers within the Chenopodiaceae family, succulent chenopods. Also genus <i>Suaeda</i> . |
| Tussock Grass  | Forms discrete but open tussocks usually with distinct individual shoots, or if not, then forming a hummock. These are common agricultural grasses.                                                                                                                                                                |
| Hummock Grass  | Coarse xeromorphic grass with a mound-like form often dead in the middle; genera are <i>Triodia</i> and <i>Plectrachne</i> .                                                                                                                                                                                       |
| Sedge          | Herbaceous, usually perennial erect plant generally with a tufted habit and of the families Cyperaceae (true sedges) or Restionaceae (node sedges).                                                                                                                                                                |
| Rush           | Herbaceous, usually perennial erect monocot that is neither a grass nor sedge. For the purposes of NVIS, rushes include the monocotyledon families Juncaceae, Typhaceae, Liliaceae, Iridaceae, Xyridaceae and the genus <i>Lomandra</i> (i.e. "graminoid" or grass-like genera).                                   |
| Forb           | Herbaceous or slightly woody, annual or sometimes perennial plant (usually a dicotyledon).                                                                                                                                                                                                                         |
| Grass-tree     | Australian grass trees. Members of the family Xanthorrhoeaceae.                                                                                                                                                                                                                                                    |
| Cycad          | Members of the families Cycadaceae and Zamiaceae.                                                                                                                                                                                                                                                                  |

**Table A4.2: Height classes defined for the NVIS**

| Height Classes | Height Range (m) | Tree | Shrub, Heath Shrub, Chenopod Shrub, Samphire Shrub, Cycad, Grass-tree | Tree Mallee, Mallee Shrub | Tussock Grasses, Sedges, Rushes and Forbs |
|----------------|------------------|------|-----------------------------------------------------------------------|---------------------------|-------------------------------------------|
| 8              | >30              | tall |                                                                       |                           |                                           |
| 7              | 10-30            | mid  |                                                                       | tall                      |                                           |
| 6              | <10              | low  |                                                                       | mid                       |                                           |
| 5              | <3               |      |                                                                       | low                       |                                           |

| Height Classes | Height Range (m) | Tree | Shrub, Heath Shrub, Chenopod Shrub, Samphire Shrub, Cycad, Grass-tree | Tree Mallee, Mallee Shrub | Tussock Grasses, Sedges, Rushes and Forbs |
|----------------|------------------|------|-----------------------------------------------------------------------|---------------------------|-------------------------------------------|
| 4              | >2               |      | tall                                                                  |                           | tall                                      |
| 3              | 1-2              |      | mid                                                                   |                           | tall                                      |
| 2              | 0.5-1            |      | low                                                                   |                           | mid                                       |
| 1              | <0.5             |      | low                                                                   |                           | low                                       |

Table A4.3: NVIS structural formation terminology

| Growth Form    | Height (m)     | Foliage Cover (%)         |                    |                         |                           |                          |                                    |
|----------------|----------------|---------------------------|--------------------|-------------------------|---------------------------|--------------------------|------------------------------------|
|                |                | >70                       | 30-70              | 10-30                   | 2-10                      | <2 (isolated)            | <2 (isolated clump)                |
| Tree           | <10,10-30, >30 | Closed Forest             | Open Forest        | Woodland                | Open Woodland             | Isolated Trees           | Isolated Clumps Of Trees           |
| Tree Mallee    | <3, <10, 10-30 | Closed Mallee Forest      | Open Mallee Forest | Mallee Woodland         | Open Mallee Woodland      | Isolated Mallee Trees    | Isolated Clumps Of Mallee Trees    |
| Shrub          | <1,1-2,>2      | Closed Shrubland          | Shrubland          | Open Shrubland          | Sparse Shrubland          | Isolated Shrubs          | Isolated Clumps Of Shrubs          |
| Mallee Shrub   | <3, <10, 10-30 | Closed Mallee Shrubland   | Mallee Shrubland   | Open Mallee Shrubland   | Sparse Mallee Shrubland   | Isolated Mallee Shrubs   | Isolated Clumps Of Mallee Shrubs   |
| Heath Shrub    | <1,1-2,>2      | Closed Heathland          | Heathland          | Open Heathland          | Sparse Heathland          | Isolated Heath Shrubs    | Isolated Clumps Of Heath Shrubs    |
| Chenopod Shrub | <1,1-2,>2      | Closed Chenopod Shrubland | Chenopod Shrubland | Open Chenopod Shrubland | Sparse Chenopod Shrubland | Isolated Chenopod Shrubs | Isolated Clumps Of Chenopod Shrubs |
| Samphire Shrub | <0.5,>0.5      | Closed Samphire Shrubland | Samphire Shrubland | Open Samphire Shrubland | Sparse Samphire Shrubland | Isolated Samphire Shrubs | Isolated Clumps Of Samphire Shrubs |
| Hummock Grass  | <2,>2          | Closed Hummock Grassland  | Hummock Grassland  | Open Hummock Grassland  | Sparse Hummock Grassland  | Isolated Hummock Grasses | Isolated Clumps Of Hummock Grasses |
| Tussock Grass  | <0.5,>0.5      | Closed Tussock Grassland  | Tussock Grassland  | Open Tussock Grassland  | Sparse Tussock Grassland  | Isolated Tussock Grasses | Isolated Clumps Of Tussock Grasses |
| Sedge          | <0.5,>0.5      | Closed Sedgeland          | Sedgeland          | Open Sedgeland          | Sparse Sedgeland          | Isolated Sedges          | Isolated Clumps Of Sedges          |
| Rush           | <0.5,>0.5      | Closed Rushland           | Rushland           | Open Rushland           | Sparse Rushland           | Isolated Rushes          | Isolated Clumps Of Rushes          |
| Forb           | <0.5,>0.5      | Closed Forbland           | Forbland           | Open Forbland           | Sparse Forbland           | Isolated Forbs           | Isolated Clumps Of Forbs           |

Source: Tables A4.1 to A4.3 from ESCAVI (2003).

## APPENDIX 5: RELEVÉ SITE INFORMATION

Table A5.1: Information collected at relevé sites

| Relevé                | TW-01 | Described by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Scott Hitchcock |    | Date:   | 27/09/2019 | Photo:                                                                              |
|-----------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----|---------|------------|-------------------------------------------------------------------------------------|
| Location (GDA94):     |       | MGA50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 611085          | mE | 6962168 |            |  |
| Habitat:              |       | Hardpan plain                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                 |    |         |            |                                                                                     |
| Soil:                 |       | Orange sandy-loam surface crust (60%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 |    |         |            |                                                                                     |
| Rocks:                |       | Quartz rocks (10%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 |    |         |            |                                                                                     |
| Mapped as:            |       | ATSSL (2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |    |         |            |                                                                                     |
| Vegetation Type:      |       | Open Tall Shrubland of <i>Acacia caesaneura</i> (narrow phyllode variant) and <i>Acacia craspedocarpa</i> with an Open Low Shrubland of <i>Eremophila glandulifera</i> and an Open Low Woodland of <i>Acacia caesaneura</i> (narrow phyllode variant)                                                                                                                                                                                                                                                                                                                                                                             |                 |    |         |            |                                                                                     |
| Vegetation Condition: |       | Excellent                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |    |         |            |                                                                                     |
| Disturbances:         |       | None evident                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                 |    |         |            |                                                                                     |
| Fire Age:             |       | None evident                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                 |    |         |            |                                                                                     |
| Species:              |       | <i>Acacia aptaneura</i> , <i>Acacia caesaneura</i> (narrow phyllode variant), <i>Acacia craspedocarpa</i> , <i>Acacia quadrimarginea</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>Acacia tetragonophylla</i> , <b><i>Anthobolus leptomerioides</i> RE</b> , <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <b><i>Dianella revoluta</i> RE</b> , <i>Eremophila longifolia</i> , <i>Eremophila punicea</i> , <b><i>Exocarpos sparteus</i> RE</b> , <i>Gnephosis brevifolia</i> , <i>Gunniopsis</i> sp., <i>Marsdenia australis</i> , <i>Myriocephalus rudallii</i> , <i>Olearia humilis</i> , <i>Rhagodia eremaea</i> |                 |    |         |            |                                                                                     |

| Relevé                | TW-02 | Described by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Scott Hitchcock | Date: | 27/09/2019 | Photo: |                                                                                      |
|-----------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------|------------|--------|--------------------------------------------------------------------------------------|
| Location (GDA94):     |       | MGA50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 611334          | mE    | 6961825    | mN     |   |
| Habitat:              |       | Stony plain                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 |       |            |        |                                                                                      |
| Soil:                 |       | Red-orange sandy-loam surface crust (20%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |       |            |        |                                                                                      |
| Rocks:                |       | Quartz stones (20%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 |       |            |        |                                                                                      |
| Mapped as:            |       | ATSSL (1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |       |            |        |                                                                                      |
| Vegetation Type:      |       | Sparse Tall Shrubland of <i>Acacia caesaneura</i> and <i>Acacia ramulosa</i> var. <i>linophylla</i> with Isolated Low Trees of <i>Acacia pruinocarpa</i> and Isolated Low Shrubs of <i>Ptilotus obovatus</i>                                                                                                                                                                                                                                                                                                                                                                      |                 |       |            |        |                                                                                      |
| Vegetation Condition: |       | Very good                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |       |            |        |                                                                                      |
| Disturbances:         |       | Grazing, mining activities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                 |       |            |        |                                                                                      |
| Fire Age:             |       | None evident                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                 |       |            |        |                                                                                      |
| Species:              |       | <i>Acacia aptaneura</i> , <i>Acacia caesaneura</i> , <i>Acacia incurvaneura</i> , <i>Acacia quadrimarginea</i> , <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <i>Erodium cygnorum</i> , <i>Gunniopsis</i> sp., <i>Hakea preissii</i> , <i>Ptilotus obovatus</i> , <i>Ptilotus schwartzii</i> , <i>Sida ectogama</i>                                                                                                                                                                                                                                                         |                 |       |            |        |                                                                                      |
| Relevé                | TW-03 | Described by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Christina Cox   | Date: | 27/09/2019 | Photo: |                                                                                      |
| Location (GDA94):     |       | MGA50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 611007          | mE    | 6961395    | mN     |  |
| Habitat:              |       | Sandplain                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |       |            |        |                                                                                      |
| Soil:                 |       | Red-orange sandy-clay loose soil (85%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                 |       |            |        |                                                                                      |
| Rocks:                |       | Granite gravel (5%), granite stones (5%), quartz gravel (5%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                 |       |            |        |                                                                                      |
| Mapped as:            |       | ATSSL (2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |       |            |        |                                                                                      |
| Vegetation Type:      |       | Low Shrubland of <i>Eremophila lachnocalyx</i> with Low Woodland of <i>Acacia craspedocarpa</i> , <i>Acacia craspedocarpa</i> (hybrid) and <i>Acacia pteraneura</i> with an Open Shrubland of <i>Acacia ramulosa</i> var. <i>linophylla</i> and <i>Eremophila lachnocalyx</i> and Isolated Tall Shrubs of <i>Acacia tetragonophylla</i>                                                                                                                                                                                                                                           |                 |       |            |        |                                                                                      |
| Vegetation Condition: |       | Good                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 |       |            |        |                                                                                      |
| Disturbances:         |       | Grazing, exploration activities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 |       |            |        |                                                                                      |
| Fire Age:             |       | None evident                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                 |       |            |        |                                                                                      |
| Species:              |       | <i>Acacia craspedocarpa</i> , <i>Acacia pruinocarpa</i> , <i>Acacia quadrimarginea</i> , <i>Acacia tetragonophylla</i> , <i>Actinobole oldfieldianum</i> , <i>Dysphania kalpari</i> , <i>Eremophila latrobei</i> subsp. <i>latrobei</i> , <i>Gunniopsis</i> sp., <i>Lepidium oxytrichum</i> , <i>Maireana suaedifolia</i> , <i>Maireana tomentosa</i> subsp. <i>tomentosa</i> , <i>Maireana villosa</i> , <i>Ptilotus obovatus</i> , <i>Ptilotus schwartzii</i> , <i>Rhagodia eremaea</i> , <b><i>Sida fibulifera</i> RE</b> , <i>Solanum lasiophyllum</i> , <i>Velleia rosea</i> |                 |       |            |        |                                                                                      |

| Relevé                | TW-04 | Described by:                                                                                                                                                                                                                                                                                                                                                                                             | Christina Cox |    | Date:   | 27/09/2019 | Photo:                                                                               |
|-----------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----|---------|------------|--------------------------------------------------------------------------------------|
| Location (GDA94):     |       | MGA50                                                                                                                                                                                                                                                                                                                                                                                                     | 611285        | mE | 6960897 | mN         |   |
| Habitat:              |       | Gravelly plain                                                                                                                                                                                                                                                                                                                                                                                            |               |    |         |            |                                                                                      |
| Soil:                 |       | Red-orange sandy-clay surface crust (30%)                                                                                                                                                                                                                                                                                                                                                                 |               |    |         |            |                                                                                      |
| Rocks:                |       | Quartz stones (5%), ironstone gravel (50%)                                                                                                                                                                                                                                                                                                                                                                |               |    |         |            |                                                                                      |
| Mapped as:            |       | ATSSL (1)                                                                                                                                                                                                                                                                                                                                                                                                 |               |    |         |            |                                                                                      |
| Vegetation Type:      |       | Sparse Tall Shrubland of <i>Acacia ayersiana</i> (hybrid) and <i>Acacia craspedocarpa</i> (hybrid) with a Sparse Low Shrubland of <i>Eremophila lachnocalyx</i> and <i>Ptilotus obovatus</i> and Isolated Shrubs of <i>Acacia craspedocarpa</i> (hybrid)                                                                                                                                                  |               |    |         |            |                                                                                      |
| Vegetation Condition: |       | Good                                                                                                                                                                                                                                                                                                                                                                                                      |               |    |         |            |                                                                                      |
| Disturbances:         |       | Grazing, exploration activities                                                                                                                                                                                                                                                                                                                                                                           |               |    |         |            |                                                                                      |
| Fire Age:             |       | None evident                                                                                                                                                                                                                                                                                                                                                                                              |               |    |         |            |                                                                                      |
| Species:              |       | <i>Acacia aptaneura</i> , <i>Acacia ayersiana</i> (hybrid), <i>Acacia craspedocarpa</i> , <i>Acacia incurvaneura</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>Actinobole oldfieldianum</i> , <i>Gunniopsis</i> sp., <i>Lepidium oxytrichum</i> , <i>Maireana suaedifolia</i> , <i>Ptilotus obovatus</i>                                                                                         |               |    |         |            |                                                                                      |
| Relevé                | TW-05 | Described by:                                                                                                                                                                                                                                                                                                                                                                                             | Christina Cox |    | Date:   | 27/09/2019 | Photo:                                                                               |
| Location (GDA94):     |       | MGA50                                                                                                                                                                                                                                                                                                                                                                                                     | 610392        | mE | 6960891 | mN         |  |
| Habitat:              |       | Gravelly plain                                                                                                                                                                                                                                                                                                                                                                                            |               |    |         |            |                                                                                      |
| Soil:                 |       | Red-orange clay-loam surface crust (10%)                                                                                                                                                                                                                                                                                                                                                                  |               |    |         |            |                                                                                      |
| Rocks:                |       | Ironstone gravel (80%), quartz stones (10%)                                                                                                                                                                                                                                                                                                                                                               |               |    |         |            |                                                                                      |
| Mapped as:            |       | ATSSL (1)                                                                                                                                                                                                                                                                                                                                                                                                 |               |    |         |            |                                                                                      |
| Vegetation Type:      |       | Sparse Tall Shrubland of <i>Acacia aptaneura</i> and <i>Acacia pteraneura</i> with Isolated Shrubs of <i>Acacia grasbyi</i> , <i>Acacia ramulosa</i> var. <i>linophylla</i> and <i>Eremophila forrestii</i> subsp. <i>forrestii</i> with Isolated Low Shrubs of <i>Eremophila forrestii</i> subsp. <i>forrestii</i> and <i>Eremophila georgei</i> and Isolated Tussock Grasses of <i>Eriachne helmsii</i> |               |    |         |            |                                                                                      |
| Vegetation Condition: |       | Very good                                                                                                                                                                                                                                                                                                                                                                                                 |               |    |         |            |                                                                                      |
| Disturbances:         |       | Grazing                                                                                                                                                                                                                                                                                                                                                                                                   |               |    |         |            |                                                                                      |
| Fire Age:             |       | None evident                                                                                                                                                                                                                                                                                                                                                                                              |               |    |         |            |                                                                                      |
| Species:              |       | <i>Acacia aptaneura</i> , <i>Acacia craspedocarpa</i> (hybrid), <i>Acacia pruinocarpa</i> , <i>Acacia quadrimarginea</i> , <i>Eremophila forrestii</i> subsp. <i>forrestii</i> , <i>Erodium cygnorum</i> , <i>Exocarpos aphyllus</i> , <i>Gunniopsis</i> sp., <i>Maireana suaedifolia</i> , <i>Psydrax latifolia</i> , <i>Ptilotus aervoides</i> , <i>Ptilotus obovatus</i> , <i>Ptilotus schwartzii</i>  |               |    |         |            |                                                                                      |

Westgold Resources Limited: Tuckabianna West Project Area Reconnaissance and Targeted Flora Survey, September 2019

| Relevé                | TW-06 | Described by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Scott Hitchcock |    | Date:   | 27/09/2019 | Photo:                                                                               |
|-----------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----|---------|------------|--------------------------------------------------------------------------------------|
| Location (GDA94):     |       | MGA50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 610612          | mE | 6958517 | mN         |   |
| Habitat:              |       | Gravelly plain                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |    |         |            |                                                                                      |
| Soil:                 |       | Red-orange sandy-loam loose soil (20%), surface crust (10%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                 |    |         |            |                                                                                      |
| Rocks:                |       | Ironstone fine gravel (60%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                 |    |         |            |                                                                                      |
| Mapped as:            |       | ATSSL (2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 |    |         |            |                                                                                      |
| Vegetation Type:      |       | Open Low Woodland of <i>Acacia aptaneura</i> with a Sparse Tall Shrubland of <i>Acacia aptaneura</i> with a Sparse Low Shrubland of <i>Eremophila punicea</i> and Isolated Shrubs of <i>Eremophila galeata</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |    |         |            |                                                                                      |
| Vegetation Condition: |       | Very good                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 |    |         |            |                                                                                      |
| Disturbances:         |       | Grazing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 |    |         |            |                                                                                      |
| Fire Age:             |       | None evident                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |    |         |            |                                                                                      |
| Species:              |       | <i>Acacia aptaneura</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <b><i>Dianella revoluta</i> RE</b> , <i>Enchylaena tomentosa</i> var. <i>tomentosa</i> , <b><i>Exocarpos sparteus</i> RE</b> , <i>Gunniopsis quadrifida</i> , <i>Gunniopsis</i> sp., <i>Hakea preissii</i> , <i>Maireana tomentosa</i> subsp. <i>tomentosa</i> , <i>Myriocephalus rudallii</i> , <i>Rhagodia eremaea</i>                                                                                                                                                                                                                                                                                                    |                 |    |         |            |                                                                                      |
| Relevé                | TW-07 | Described by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Scott Hitchcock |    | Date:   | 27/09/2019 | Photo:                                                                               |
| Location (GDA94):     |       | MGA50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 611137          | mE | 6959215 | mN         |  |
| Habitat:              |       | Minor depression                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 |    |         |            |                                                                                      |
| Soil:                 |       | Orange clay-loam surface crust (60%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 |    |         |            |                                                                                      |
| Rocks:                |       | Ironstone stones (10%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                 |    |         |            |                                                                                      |
| Mapped as:            |       | ATSSL (3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 |    |         |            |                                                                                      |
| Vegetation Type:      |       | Open Tall Shrubland of <i>Acacia aptaneura</i> , <i>Acacia caesaneura</i> (narrow phyllode variant) and <i>Acacia tetragonophylla</i> with an Open Low Woodland of <i>Acacia aptaneura</i> and a Sparse Low Shrubland of <i>Ptilotus obovatus</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                 |    |         |            |                                                                                      |
| Vegetation Condition: |       | Very good                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 |    |         |            |                                                                                      |
| Disturbances:         |       | Grazing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 |    |         |            |                                                                                      |
| Fire Age:             |       | None evident                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |    |         |            |                                                                                      |
| Species:              |       | <i>Acacia aptaneura</i> , <i>Acacia caesaneura</i> (narrow phyllode variant), <i>Acacia pruinocarpa</i> , <i>Acacia quadrimarginea</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>Actinobole oldfieldianum</i> , <i>Cephalipterum drummondii</i> , <b><i>Cuscuta planiflora</i>*</b> , <b><i>Dianella revoluta</i> RE</b> , <i>Eremophila forrestii</i> subsp. <i>forrestii</i> , <i>Eremophila lachnocalyx</i> , <i>Eremophila latrobei</i> subsp. <i>latrobei</i> , <i>Eremophila punicea</i> , <i>Gunniopsis quadrifida</i> , <i>Gunniopsis</i> sp., <i>Hakea preissii</i> , <i>Myriocephalus rudallii</i> , <i>Ptilotus obovatus</i> , <i>Rhagodia eremaea</i> , <i>Senna</i> sp. Billabong (J.D. Alonzo 721), <i>Solanum lasiophyllum</i> |                 |    |         |            |                                                                                      |

| Relevé                | TW-08 | Described by:                                                                                                                                                                                                                                                                                                                                                                | Michael Pezzaniti |    | Date:   | 27/09/2019 | Photo:                                                                              |
|-----------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|----|---------|------------|-------------------------------------------------------------------------------------|
| Location (GDA94):     |       | MGA50                                                                                                                                                                                                                                                                                                                                                                        | 609513            | mE | 6958125 | mN         |  |
| Habitat:              |       | Hardpan plain                                                                                                                                                                                                                                                                                                                                                                |                   |    |         |            |                                                                                     |
| Soil:                 |       | Orange-white sandy-clay surface crust (60%), loose soil (30%)                                                                                                                                                                                                                                                                                                                |                   |    |         |            |                                                                                     |
| Rocks:                |       | Ironstone gravel (10%)                                                                                                                                                                                                                                                                                                                                                       |                   |    |         |            |                                                                                     |
| Mapped as:            |       | ATSSL (2)                                                                                                                                                                                                                                                                                                                                                                    |                   |    |         |            |                                                                                     |
| Vegetation Type:      |       | Sparse Tall Shrubland of <i>Acacia caesaneura</i> (narrow phyllode variant) and <i>Acacia craspedocarpa</i>                                                                                                                                                                                                                                                                  |                   |    |         |            |                                                                                     |
| Vegetation Condition: |       | Good                                                                                                                                                                                                                                                                                                                                                                         |                   |    |         |            |                                                                                     |
| Disturbances:         |       | Exploration activities, grazing, off track driving                                                                                                                                                                                                                                                                                                                           |                   |    |         |            |                                                                                     |
| Fire Age:             |       | None evident                                                                                                                                                                                                                                                                                                                                                                 |                   |    |         |            |                                                                                     |
| Species:              |       | <i>Acacia caesaneura</i> (narrow phyllode variant), <i>Acacia craspedocarpa</i> , <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <i>Euphorbia boophthona</i> , <b><i>Exocarpos sparteus</i> RE</b> , <i>Gunniopsis quadrifida</i> , <i>Lepidium oxytrichum</i> , <i>Maireana carnosa</i> , <i>Maireana tomentosa</i> subsp. <i>tomentosa</i> , <i>Podolepis gardneri</i> |                   |    |         |            |                                                                                     |

| Relevé                | TW-09 | Described by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Michael Pezzaniti |    | Date:   | 27/09/2019 | Photo:                                                                               |
|-----------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|----|---------|------------|--------------------------------------------------------------------------------------|
| Location (GDA94):     |       | MGA50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 609781            | mE | 6958268 | mN         |  |
| Habitat:              |       | Hardpan plain                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   |    |         |            |                                                                                      |
| Soil:                 |       | Orange sandy-clay surface crust (55%), loose soil (35%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                   |    |         |            |                                                                                      |
| Rocks:                |       | Quartz gravel (3%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                   |    |         |            |                                                                                      |
| Mapped as:            |       | ATSSL (3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                   |    |         |            |                                                                                      |
| Vegetation Type:      |       | Tall Shrubland of <i>Acacia caesaneura</i> (narrow phyllode variant) and <i>Acacia craspedocarpa</i> with a Sparse Low Shrubland of <i>Ptilotus obovatus</i> and Isolated Chenopod Shrubs of <i>Enchylaena tomentosa</i> var. <i>tomentosa</i>                                                                                                                                                                                                                                                                                                            |                   |    |         |            |                                                                                      |
| Vegetation Condition: |       | Very good                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                   |    |         |            |                                                                                      |
| Disturbances:         |       | Grazing, exploration activities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                   |    |         |            |                                                                                      |
| Fire Age:             |       | None evident                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                   |    |         |            |                                                                                      |
| Species:              |       | <i>Acacia caesaneura</i> (narrow phyllode variant), <i>Acacia craspedocarpa</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>Actinobole oldfieldianum</i> , <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <i>Dysphania kalpari</i> , <i>Enchylaena tomentosa</i> var. <i>tomentosa</i> , <i>Eremophila macmillaniana</i> , <b><i>Exocarpos sparteus</i> RE</b> , <i>Gunniopsis quadrifida</i> , <i>Lepidium oxytrichum</i> , <i>Ptilotus obovatus</i> , <i>Rhodanthe battii</i> , <i>Roebuckiella ciliocarpa</i> , <i>Solanum lasiophyllum</i> |                   |    |         |            |                                                                                      |

| Relevé                | TW-10 | Described by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Michael Pezzaniti |    | Date:   | 27/09/2019 | Photo:                                                                               |
|-----------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|----|---------|------------|--------------------------------------------------------------------------------------|
| Location (GDA94):     |       | MGA50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 609792            | mE | 6958563 | mN         |   |
| Habitat:              |       | Hardpan plain                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   |    |         |            |                                                                                      |
| Soil:                 |       | Orange-white sandy-clay surface crust (45%), loose soil (30%)                                                                                                                                                                                                                                                                                                                                                                                                                             |                   |    |         |            |                                                                                      |
| Rocks:                |       | Quartz gravel (5%), ironstone gravel (10%)                                                                                                                                                                                                                                                                                                                                                                                                                                                |                   |    |         |            |                                                                                      |
| Mapped as:            |       | ATSSL (2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                   |    |         |            |                                                                                      |
| Vegetation Type:      |       | Sparse Tall Shrubland of <i>Acacia aneura</i> and <i>Acacia incurvaneura</i>                                                                                                                                                                                                                                                                                                                                                                                                              |                   |    |         |            |                                                                                      |
| Vegetation Condition: |       | Very good                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                   |    |         |            |                                                                                      |
| Disturbances:         |       | Animal tracks - trampled vegetation                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                   |    |         |            |                                                                                      |
| Fire Age:             |       | None evident                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                   |    |         |            |                                                                                      |
| Species:              |       | <i>Acacia aneura</i> , <i>Acacia grasbyi</i> , <i>Acacia quadrimarginea</i> , <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <i>Eremophila forrestii</i> subsp. <i>forrestii</i> , <i>Erodium cygnorum</i> , <b><i>Exocarpos sparteus</i> RE</b> , <i>Gunniopsis quadrifida</i> , <i>Maireana tomentosa</i> subsp. <i>tomentosa</i> , <i>Podolepis gardneri</i> , <i>Ptilotus obovatus</i> , <i>Ptilotus schwartzii</i> , <i>Solanum lasiophyllum</i> , <i>Teucrium teucriiflorum</i> |                   |    |         |            |                                                                                      |
| Relevé                | TW-11 | Described by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Michael Pezzaniti |    | Date:   | 27/09/2019 | Photo:                                                                               |
| Location (GDA94):     |       | MGA50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 610001            | mE | 6960329 | mN         |  |
| Habitat:              |       | Hardpan plain                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   |    |         |            |                                                                                      |
| Soil:                 |       | Red-orange sandy-clay surface crust (45%), loose soil (30%)                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |    |         |            |                                                                                      |
| Rocks:                |       | Ironstone gravel (5%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |    |         |            |                                                                                      |
| Mapped as:            |       | ATSSL (2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                   |    |         |            |                                                                                      |
| Vegetation Type:      |       | Open Tall Shrubland of <i>Acacia aptaneura</i> with Isolated Shrubs of <i>Acacia ramulosa</i> var. <i>linophylla</i> and Isolated Chenopod Shrubs of <i>Maireana georgei</i>                                                                                                                                                                                                                                                                                                              |                   |    |         |            |                                                                                      |
| Vegetation Condition: |       | Good                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                   |    |         |            |                                                                                      |
| Disturbances:         |       | Grazing, track, animal tracks - trampled vegetation                                                                                                                                                                                                                                                                                                                                                                                                                                       |                   |    |         |            |                                                                                      |
| Fire Age:             |       | None evident                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                   |    |         |            |                                                                                      |
| Species:              |       | <i>Acacia aptaneura</i> , <i>Acacia quadrimarginea</i> , <i>Erodium cygnorum</i> , <i>Gunniopsis</i> sp., <i>Maireana georgei</i> , <i>Podolepis gardneri</i> , <i>Ptilotus schwartzii</i> , <i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925), <i>Solanum lasiophyllum</i>                                                                                                                                                                                                          |                   |    |         |            |                                                                                      |

| Relevé                | TW-12 | Described by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Michael Pezzaniti |    | Date:   | 27/09/2019 | Photo:                                                                               |
|-----------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|----|---------|------------|--------------------------------------------------------------------------------------|
| Location (GDA94):     |       | MGA50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 609894            | mE | 6959904 | mN         |   |
| Habitat:              |       | Hardpan plain                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                   |    |         |            |                                                                                      |
| Soil:                 |       | Orange clay surface crust (100%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                   |    |         |            |                                                                                      |
| Rocks:                |       | No rocks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                   |    |         |            |                                                                                      |
| Mapped as:            |       | ATSSL (2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |    |         |            |                                                                                      |
| Vegetation Type:      |       | Tall Shrubland of <i>Acacia aptaneura</i> , <i>Acacia caesaneura</i> and <i>Acacia craspedocarpa</i> with an Open Low Shrubland of <i>Eremophila lachnocalyx</i> and <i>Ptilotus obovatus</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                   |    |         |            |                                                                                      |
| Vegetation Condition: |       | Good                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |    |         |            |                                                                                      |
| Disturbances:         |       | Grazing, animal tracks - trampled vegetation, off track driving                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                   |    |         |            |                                                                                      |
| Fire Age:             |       | None evident                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                   |    |         |            |                                                                                      |
| Species:              |       | <i>Acacia aptaneura</i> , <i>Acacia caesaneura</i> , <i>Acacia craspedocarpa</i> , <b><i>Calotis</i> sp. Perrinvale Station (R.J. Cranfield 7096) P3</b> , <i>Cephalipterum drummondii</i> , <i>Enchylaena tomentosa</i> var. <i>tomentosa</i> , <i>Eremophila punicea</i> , <i>Erodium cygnorum</i> , <i>Gunniopsis</i> sp., <i>Lepidium oxytrichum</i> , <i>Psydrax latifolia</i> , <i>Psydrax rigidula</i> , <i>Ptilotus aervoides</i> , <i>Ptilotus obovatus</i> , <i>Sida calyxhymenia</i> , <i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925), <i>Vincetoxicum lineare</i>                                                                                                                                              |                   |    |         |            |                                                                                      |
| Relevé                | TW-13 | Described by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Scott Hitchcock   |    | Date:   | 27/09/2019 | Photo:                                                                               |
| Location (GDA94):     |       | MGA50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 611848            | mE | 6961606 | mN         |  |
| Habitat:              |       | Gravelly plain                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |    |         |            |                                                                                      |
| Soil:                 |       | Orange clay-loam surface crust (10%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |    |         |            |                                                                                      |
| Rocks:                |       | Ironstone gravel (20%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   |    |         |            |                                                                                      |
| Mapped as:            |       | ATSSL (2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |    |         |            |                                                                                      |
| Vegetation Type:      |       | Open Low Woodland of <i>Acacia aptaneura</i> and <i>Acacia caesaneura</i> (narrow phyllode variant) with a Sparse Tall Shrubland of <i>Acacia aptaneura</i> and <i>Acacia ramulosa</i> var. <i>linophylla</i> and Isolated Low Shrubs of <i>Ptilotus obovatus</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                   |    |         |            |                                                                                      |
| Vegetation Condition: |       | Very good                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |    |         |            |                                                                                      |
| Disturbances:         |       | Mining activities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                   |    |         |            |                                                                                      |
| Fire Age:             |       | None evident                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                   |    |         |            |                                                                                      |
| Species:              |       | <i>Acacia aptaneura</i> , <i>Acacia caesaneura</i> (narrow phyllode variant), <i>Acacia quadrimarginea</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>Actinobole oldfieldianum</i> , <b><i>Anthobolus leptomerioides</i> RE</b> , <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <b><i>Dianella revoluta</i> RE</b> , <i>Enchylaena tomentosa</i> var. <i>tomentosa</i> , <b><i>Exocarpos sparteus</i> RE</b> , <i>Gunniopsis quadrifida</i> , <i>Gunniopsis</i> sp., <i>Hakea preissii</i> , <i>Maireana tomentosa</i> subsp. <i>tomentosa</i> , <i>Myriocephalus rudallii</i> , <i>Olearia humilis</i> , <i>Ptilotus aervoides</i> , <i>Ptilotus obovatus</i> , <i>Ptilotus schwartzii</i> , <i>Rhagodia eremaea</i> |                   |    |         |            |                                                                                      |

| Relevé                | TW-14 | Described by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Christina Cox |    | Date:   | 27/09/2019 | Photo:                                                                               |
|-----------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----|---------|------------|--------------------------------------------------------------------------------------|
| Location (GDA94):     |       | MGA50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 610880        | mE | 6960802 |            |   |
| Habitat:              |       | Sandplain                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |               |    |         |            |                                                                                      |
| Soil:                 |       | Red-orange sandy-clay surface crust (30%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |               |    |         |            |                                                                                      |
| Rocks:                |       | No rocks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |               |    |         |            |                                                                                      |
| Mapped as:            |       | ATOSL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |               |    |         |            |                                                                                      |
| Vegetation Type:      |       | Open Tall Shrubland of <i>Acacia craspedocarpa</i> , <i>Acacia craspedocarpa</i> (hybrid) and <i>Acacia pteraneura</i> with an Open Shrubland of <i>Eremophila forrestii</i> subsp. <i>forrestii</i> and <i>Eremophila georgei</i> with an Open Low Shrubland of <i>Eremophila georgei</i> , <i>Eremophila lachnocalyx</i> and <i>Ptilotus obovatus</i> with Isolated Low Trees of <i>Acacia pruinocarpa</i> and Isolated Forbs of <i>Cephalipterum drummondii</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |               |    |         |            |                                                                                      |
| Vegetation Condition: |       | Very good                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |               |    |         |            |                                                                                      |
| Disturbances:         |       | Grazing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |               |    |         |            |                                                                                      |
| Fire Age:             |       | None evident                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |               |    |         |            |                                                                                      |
| Species:              |       | <i>Acacia aptaneura</i> , <i>Acacia craspedocarpa</i> , <i>Acacia incurvaneura</i> , <i>Acacia pruinocarpa</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>Actinobole oldfieldianum</i> , <i>Calandrinia eremaea</i> , <i>Calotis hispidula</i> , <i>Dysphania kalpari</i> , <i>Eremophila forrestii</i> subsp. <i>forrestii</i> , <i>Eremophila lachnocalyx</i> , <i>Gunnipopsis</i> sp., <i>Maireana triptera</i> , <i>Maireana villosa</i> , <i>Myriocephalus rudallii</i> , <i>Psyrax latifolia</i> , <i>Ptilotus aervoides</i> , <i>Ptilotus obovatus</i> , <i>Rhodanthe battii</i> , <i>Roebuckiella ciliocarpa</i> , <b><i>Sida fibulifera</i> RE</b> , <i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925), <i>Thryptomene decussata</i> , <i>Velleia rosea</i> , <i>Vincetoxicum lineare</i>                                                                                                                                                                                                                    |               |    |         |            |                                                                                      |
| Relevé                | TW-15 | Described by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Christina Cox |    | Date:   | 27/09/2019 | Photo:                                                                               |
| Location (GDA94):     |       | MGA50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 610098        | mE | 6957381 |            |  |
| Habitat:              |       | Minor channel (bank)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |               |    |         |            |                                                                                      |
| Soil:                 |       | Orange sandy-loam loose soil (20%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |               |    |         |            |                                                                                      |
| Rocks:                |       | No rocks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |               |    |         |            |                                                                                      |
| Mapped as:            |       | ATSSL (3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |               |    |         |            |                                                                                      |
| Vegetation Type:      |       | Tall Shrubland of <i>Acacia aptaneura</i> , <i>Acacia craspedocarpa</i> (hybrid) and <i>Acacia tetragonophylla</i> with an Open Shrubland of <i>Eremophila clarkei</i> , <i>Eremophila lachnocalyx</i> and <i>Ptilotus obovatus</i> and a Sparse Low Shrubland of <i>Eremophila lachnocalyx</i> and <i>Ptilotus obovatus</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |               |    |         |            |                                                                                      |
| Vegetation Condition: |       | Very good                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |               |    |         |            |                                                                                      |
| Disturbances:         |       | Grazing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |               |    |         |            |                                                                                      |
| Fire Age:             |       | None evident                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |               |    |         |            |                                                                                      |
| Species:              |       | <i>Acacia ?sibilans</i> , <i>Acacia aptaneura</i> , <i>Acacia grasbyi</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>Actinobole oldfieldianum</i> , <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <b><i>Cuscuta planiflora</i>*</b> , <b><i>Dianella revoluta</i> RE</b> , <i>Duperreya commixta</i> , <i>Eremophila clarkei</i> , <i>Eremophila oldfieldii</i> , <i>Goodenia berardiana</i> , <i>Gunnipopsis</i> sp., <i>Lepidium oxytrichum</i> , <i>Maireana georgei</i> , <i>Myriocephalus rudallii</i> , <i>Pluchea dentex</i> , <i>Ptilotus aervoides</i> , <i>Ptilotus obovatus</i> , <i>Rhodanthe battii</i> , <i>Rhodanthe stricta</i> , <b><i>Rumex vesicarius</i>*</b> , <b><i>Santalum spicatum</i> SOI</b> , <b><i>Senna artemisioides</i> subsp. filifolia RE</b> , <i>Senna charlesiana</i> , <i>Senna glaucifolia</i> , <i>Sida ectogama</i> , <b><i>Sida fibulifera</i> RE</b> , <i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925), <i>Solanum lasiophyllum</i> , <i>Stenopetalum anfractum</i> |               |    |         |            |                                                                                      |

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| Relevé                | TW-16 | Described by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Christina Cox   |    | Date:   | 27/09/2019 | Photo:                                                                               |
|-----------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----|---------|------------|--------------------------------------------------------------------------------------|
| Location (GDA94):     |       | MGA50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 610158          | mE | 6957536 | mN         |   |
| Habitat:              |       | Minor channel (diffuse on gravelly plain)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                 |    |         |            |                                                                                      |
| Soil:                 |       | Red-orange sandy-loam loose soil (10%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                 |    |         |            |                                                                                      |
| Rocks:                |       | Ironstone gravel (75%), ironstone stones (5%), quartz stones (5%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 |    |         |            |                                                                                      |
| Mapped as:            |       | ATSSL (3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                 |    |         |            |                                                                                      |
| Vegetation Type:      |       | Sparse Tall Shrubland of <i>Acacia craspedocarpa</i> , <i>Acacia craspedocarpa</i> (hybrid) and <i>Acacia pteraneura</i> with a Sparse Shrubland of <i>Acacia tetragonophylla</i> and <i>Eremophila galeata</i> and Isolated Low Shrubs of <i>Ptilotus obovatus</i>                                                                                                                                                                                                                                                                                                           |                 |    |         |            |                                                                                      |
| Vegetation Condition: |       | Very good                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                 |    |         |            |                                                                                      |
| Disturbances:         |       | Grazing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 |    |         |            |                                                                                      |
| Fire Age:             |       | None evident                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |    |         |            |                                                                                      |
| Species:              |       | <i>Acacia craspedocarpa</i> , <i>Acacia pruinocarpa</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>Actinobole oldfieldianum</i> , <i>Gunniopsis quadrifida</i> , <i>Lepidium oxytrichum</i> , <i>Maireana suaedifolia</i> , <i>Maireana villosa</i> , <i>Ptilotus obovatus</i> , <i>Ptilotus schwartzii</i> , <i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925), <i>Sida</i> sp. <i>Golden calyces</i> glabrous (H.N. Foote 32), <i>Solanum lasiophyllum</i>                                                                                                     |                 |    |         |            |                                                                                      |
| Relevé                | TW-17 | Described by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Scott Hitchcock |    | Date:   | 27/09/2019 | Photo:                                                                               |
| Location (GDA94):     |       | MGA50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 612363          | mE | 6961029 | mN         |  |
| Habitat:              |       | Hardpan plain                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                 |    |         |            |                                                                                      |
| Soil:                 |       | Red-orange clay-loam surface crust (40%), loose soil (10%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                 |    |         |            |                                                                                      |
| Rocks:                |       | Ironstone gravel (20%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                 |    |         |            |                                                                                      |
| Mapped as:            |       | ATOSL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |    |         |            |                                                                                      |
| Vegetation Type:      |       | Open Low Forest of <i>Acacia caesaneura</i> (narrow phyllode variant) with an Open Tall Shrubland of <i>Acacia craspedocarpa</i> (hybrid) and <i>Acacia tetragonophylla</i> and Sparse Low Shrubland of <i>Eremophila punicea</i>                                                                                                                                                                                                                                                                                                                                             |                 |    |         |            |                                                                                      |
| Vegetation Condition: |       | Very good                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                 |    |         |            |                                                                                      |
| Disturbances:         |       | Grazing, mining activities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                 |    |         |            |                                                                                      |
| Fire Age:             |       | None evident                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |    |         |            |                                                                                      |
| Species:              |       | <i>Acacia ?sibilans</i> , <i>Acacia caesaneura</i> (narrow phyllode variant), <i>Acacia ramulosa</i> var. <i>linophylla</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>Actinobole oldfieldianum</i> , <b><i>Dianella revoluta</i> RE</b> , <i>Enchylaena tomentosa</i> var. <i>tomentosa</i> , <i>Eremophila punicea</i> , <i>Gunniopsis quadrifida</i> , <i>Gunniopsis</i> sp., <i>Hakea preissii</i> , <i>Myriocephalus rudallii</i> , <i>Ptilotus obovatus</i> , <i>Rhaqodia eremaea</i> , <b><i>Sclerolaena fusiformis</i> RE</b> , <i>Teucrium teucriiflorum</i> |                 |    |         |            |                                                                                      |

| Relevé                | TW-18 | Described by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Michael Pezzaniti |    | Date:   | 27/09/2019 | Photo:                                                                               |
|-----------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|----|---------|------------|--------------------------------------------------------------------------------------|
| Location (GDA94):     |       | MGA50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 609625            | mE | 6959513 | mN         |   |
| Habitat:              |       | Sandplain                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   |    |         |            |                                                                                      |
| Soil:                 |       | Orange sandy-clay surface crust (60%), loose soil (30%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |    |         |            |                                                                                      |
| Rocks:                |       | Quartz gravel (5%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                   |    |         |            |                                                                                      |
| Mapped as:            |       | ATSSL (1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   |    |         |            |                                                                                      |
| Vegetation Type:      |       | Sparse Tall Shrubland of <i>Acacia caesaneura</i> and <i>Acacia craspedocarpa</i> with Isolated Low Shrubs of <i>Eremophila lachnocalyx</i> and Isolated Chenopod Shrubs of <i>Maireana suaedifolia</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |    |         |            |                                                                                      |
| Vegetation Condition: |       | Good                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                   |    |         |            |                                                                                      |
| Disturbances:         |       | Animal tracks - trampled vegetation, off track driving                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                   |    |         |            |                                                                                      |
| Fire Age:             |       | None evident                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |    |         |            |                                                                                      |
| Species:              |       | <i>Acacia caesaneura</i> , <i>Acacia craspedocarpa</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>Eremophila forrestii</i> subsp. <i>forrestii</i> , <i>Lepidium oxytrichum</i> , <i>Maireana suaedifolia</i> , <i>Marsdenia australis</i> , <i>Ptilotus obovatus</i> , <i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                   |    |         |            |                                                                                      |
| Relevé                | TW-19 | Described by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Scott Hitchcock   |    | Date:   | 27/09/2019 | Photo:                                                                               |
| Location (GDA94):     |       | MGA50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 611071            | mE | 6959014 | mN         |  |
| Habitat:              |       | Minor channel (bank)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                   |    |         |            |                                                                                      |
| Soil:                 |       | Red-orange fine sand loose soil (20%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                   |    |         |            |                                                                                      |
| Rocks:                |       | Ironstone fine gravel (10%), granite surface plates (60%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   |    |         |            |                                                                                      |
| Mapped as:            |       | ATSSL (3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   |    |         |            |                                                                                      |
| Vegetation Type:      |       | Sparse Tall Shrubland of <i>Acacia quadrimarginea</i> , <i>Acacia ?sibilans</i> and <i>Acacia tetragonophylla</i> with a Sparse Low Shrubland of <i>Calytrix ?amethystina</i> and <i>Grevillea deflexa</i> and Isolated Low Trees of <i>Acacia pteraneura</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                   |    |         |            |                                                                                      |
| Vegetation Condition: |       | Good                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                   |    |         |            |                                                                                      |
| Disturbances:         |       | Grazing, mining activities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                   |    |         |            |                                                                                      |
| Fire Age:             |       | None evident                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |    |         |            |                                                                                      |
| Species:              |       | <i>Abutilon cryptopetalum</i> , <i>Acacia ?sibilans</i> , <i>Acacia burkittii</i> , <i>Acacia caesaneura</i> (narrow phyllode variant), <i>Acacia pruinocarpa</i> , <i>Acacia pteraneura</i> , <i>Acacia quadrimarginea</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>Actinobole oldfieldianum</i> , <b><i>Anthobolus leptomerioides</i> RE</b> , <i>Calytrix ?amethystina</i> , <i>Centipeda thespidioides</i> , <i>Cephalopterum drummondii</i> , <b><i>Cuscuta planiflora</i>*</b> , <b><i>Dianella revoluta</i> RE</b> , <i>Eremophila forrestii</i> subsp. <i>forrestii</i> , <i>Eremophila lachnocalyx</i> , <b><i>Eremophila latrobei</i> subsp. filiformis</b> RE, <i>Eremophila latrobei</i> subsp. <i>latrobei</i> , <i>Eremophila oldfieldii</i> , <i>Eremophila punicea</i> , <i>Grevillea deflexa</i> , <i>Gunniopsis quadrifida</i> , <i>Gunniopsis</i> sp., <i>Hakea preissii</i> , <b><i>Lysimachia arvensis</i>*</b> , <i>Myriocephalus rudallii</i> , <i>Nicotiana</i> sp., <i>Poaceae</i> sp., <i>Podolepis kendallii</i> , <i>Ptilotus obovatus</i> , <i>Rhagodia eremaea</i> , <i>Senna</i> sp. Billabong (J.D. Alonzo 721), <i>Solanum lasiophyllum</i> , <i>Thryptomene decussata</i> |                   |    |         |            |                                                                                      |

| Relevé                | TW-20 | Described by:                                                                                                                                                                                                                                                                                                                                                                                    |        | Date: |         | 27/09/2019 | Photo:                                                                              |
|-----------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------|---------|------------|-------------------------------------------------------------------------------------|
| Location (GDA94):     |       | MGA50                                                                                                                                                                                                                                                                                                                                                                                            | 611512 | mE    | 6960395 | mN         |  |
| Habitat:              |       | Outcrop gentle                                                                                                                                                                                                                                                                                                                                                                                   |        |       |         |            |                                                                                     |
| Soil:                 |       | Red-orange clay-loam loose soil (5%)                                                                                                                                                                                                                                                                                                                                                             |        |       |         |            |                                                                                     |
| Rocks:                |       | BIF boulders (80%)                                                                                                                                                                                                                                                                                                                                                                               |        |       |         |            |                                                                                     |
| Mapped as:            |       | AaTSSL                                                                                                                                                                                                                                                                                                                                                                                           |        |       |         |            |                                                                                     |
| Vegetation Type:      |       | Open Tall Shrubland of <i>Acacia aptaneura</i> and <i>Thryptomene decussata</i> with an Open Shrubland of <i>Eremophila exilifolia</i> and a Sparse Low Shrubland of <i>Ptilotus obovatus</i>                                                                                                                                                                                                    |        |       |         |            |                                                                                     |
| Vegetation Condition: |       | Very good                                                                                                                                                                                                                                                                                                                                                                                        |        |       |         |            |                                                                                     |
| Disturbances:         |       | Grazing                                                                                                                                                                                                                                                                                                                                                                                          |        |       |         |            |                                                                                     |
| Fire Age:             |       | None evident                                                                                                                                                                                                                                                                                                                                                                                     |        |       |         |            |                                                                                     |
| Species:              |       | Acacia aptaneura, Calandrinia creethiae, Calytrix ?amethystina, Eremophila exilifolia, Eremophila galeata, Erodium cygnorum, Myriocephalus rudallii, Psydrax suaveolens, Ptilotus helipteroides, Ptilotus obovatus, Ptilotus schwartzii, Senna charlesiana, Sida sp. dark green fruits (S. van Leeuwen 2260), Sida sp. Excedentifolia (J.L. Egan 1925), Thryptomene decussata, Trachymene ornata |        |       |         |            |                                                                                     |

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**Table A5.2: Relevé site coordinates (northwest corner coordinates) (GDA94, MGA50)**

| Site  | Easting (mE) | Northing (mN) |
|-------|--------------|---------------|
| TW-01 | 611085       | 6962168       |
| TW-02 | 611334       | 6961825       |
| TW-03 | 611007       | 6961395       |
| TW-04 | 611284       | 6960896       |
| TW-05 | 610391       | 6960890       |
| TW-06 | 610612       | 6958517       |
| TW-07 | 611137       | 6959215       |
| TW-08 | 609513       | 6958125       |
| TW-09 | 609781       | 6958268       |
| TW-10 | 609792       | 6958563       |
| TW-11 | 610001       | 6960329       |
| TW-12 | 609894       | 6959904       |
| TW-13 | 611848       | 6961606       |
| TW-14 | 610879       | 6960802       |
| TW-15 | 610098       | 6957380       |
| TW-16 | 610158       | 6957536       |
| TW-17 | 612363       | 6961029       |
| TW-18 | 609625       | 6959513       |
| TW-19 | 611071       | 6959014       |
| TW-20 | 611512       | 6960395       |

Note: mE = metres east / easting, mN = metres north / northing; TW = Tuckabianna West.

## APPENDIX 6: VASCULAR FLORA LIST

Table A6.1: Vascular flora list

| Family         | Taxa                                                                  | Relevés | OppColl | FIFr |
|----------------|-----------------------------------------------------------------------|---------|---------|------|
| Aizoaceae      | <i>Gunniopsis quadrifida</i>                                          | •       |         | FIFr |
| Aizoaceae      | <i>Gunniopsis</i> sp.                                                 | •       |         |      |
| Amaranthaceae  | <i>Ptilotus aervoides</i>                                             | •       |         | FIFr |
| Amaranthaceae  | <i>Ptilotus eremita</i>                                               |         | •       | FI   |
| Amaranthaceae  | <i>Ptilotus helipteroides</i>                                         | •       |         | FIFr |
| Amaranthaceae  | <i>Ptilotus obovatus</i>                                              | •       | •       | FI   |
| Amaranthaceae  | <i>Ptilotus schwartzii</i>                                            | •       |         | FI   |
| Apocynaceae    | <i>Marsdenia australis</i>                                            | •       |         |      |
| Apocynaceae    | <i>Vincetoxicum lineare</i>                                           | •       |         |      |
| Araliaceae     | <i>Trachymene ornata</i>                                              | •       |         | Fr   |
| Asteraceae     | <i>Actinobole oldfieldianum</i>                                       | •       |         | Fr   |
| Asteraceae     | <i>Calotis hispidula</i>                                              | •       |         | FIFr |
| Asteraceae     | <b><i>Calotis</i> sp. Perrinvale Station (R.J. Cranfield 7096) P3</b> | •       |         | Fr   |
| Asteraceae     | <i>Centipeda thespidioides</i>                                        | •       |         |      |
| Asteraceae     | <i>Cephalopterum drummondii</i>                                       | •       |         | FI   |
| Asteraceae     | <i>Gnephosis brevifolia</i>                                           | •       |         | FIFr |
| Asteraceae     | <i>Myriocephalus rudallii</i>                                         | •       |         | FI   |
| Asteraceae     | <i>Olearia humilis</i>                                                | •       |         | Fr   |
| Asteraceae     | <i>Pluchea dentex</i>                                                 | •       |         |      |
| Asteraceae     | <i>Podolepis gardneri</i>                                             | •       |         | FIFr |
| Asteraceae     | <i>Podolepis kendallii</i>                                            | •       |         | FI   |
| Asteraceae     | <i>Rhodanthe battii</i>                                               | •       |         | FI   |
| Asteraceae     | <i>Rhodanthe stricta</i>                                              | •       |         | FIFr |
| Asteraceae     | <i>Roebuckiella ciliocarpa</i>                                        | •       |         | FIFr |
| Brassicaceae   | <i>Lepidium oxytrichum</i>                                            | •       |         | Fr   |
| Brassicaceae   | <i>Stenopetalum anfractum</i>                                         | •       |         | FIFr |
| Chenopodiaceae | <i>Dysphania kalpari</i>                                              | •       |         |      |
| Chenopodiaceae | <i>Enchylaena tomentosa</i> var. <i>tomentosa</i>                     | •       |         | Fr   |
| Chenopodiaceae | <i>Maireana carnosa</i>                                               | •       |         | Fr   |
| Chenopodiaceae | <i>Maireana georgei</i>                                               | •       | •       | Fr   |
| Chenopodiaceae | <i>Maireana suaedifolia</i>                                           | •       |         | Fr   |
| Chenopodiaceae | <i>Maireana tomentosa</i> subsp. <i>tomentosa</i>                     | •       | •       | Fr   |
| Chenopodiaceae | <i>Maireana triptera</i>                                              | •       |         | Fr   |
| Chenopodiaceae | <i>Maireana villosa</i>                                               | •       |         | Fr   |
| Chenopodiaceae | <i>Rhagodia eremaea</i>                                               | •       | •       | FIFr |
| Chenopodiaceae | <b><i>Sclerolaena fusiformis</i> RE</b>                               | •       |         | Fr   |
| Convolvulaceae | <b><i>Cuscuta planiflora</i>*</b>                                     | •       |         | FIFr |
| Convolvulaceae | <i>Duperreya commixta</i>                                             | •       |         | FI   |
| Euphorbiaceae  | <i>Euphorbia boophthona</i>                                           | •       |         | FIFr |
| Fabaceae       | <i>Acacia ?sibilans</i>                                               | •       |         |      |
| Fabaceae       | <i>Acacia aneura</i>                                                  | •       | •       | Fr   |
| Fabaceae       | <i>Acacia aptaneura</i>                                               | •       | •       | Fr   |
| Fabaceae       | <i>Acacia ayersiana</i>                                               |         | •       |      |

| Family            | Taxa                                                         | Relevés | OppColl | FIFr |
|-------------------|--------------------------------------------------------------|---------|---------|------|
| Fabaceae          | <i>Acacia ayersiana</i> (hybrid)                             | •       |         |      |
| Fabaceae          | <i>Acacia burkittii</i>                                      | •       |         | Fr   |
| Fabaceae          | <i>Acacia caesaneura</i>                                     | •       |         | Fr   |
| Fabaceae          | <i>Acacia caesaneura</i> (narrow phyllode variant)           | •       |         | Fr   |
| Fabaceae          | <i>Acacia craspedocarpa</i>                                  | •       |         | Fr   |
| Fabaceae          | <i>Acacia craspedocarpa</i> (hybrid)                         | •       | •       | Fr   |
| Fabaceae          | <i>Acacia grasbyi</i>                                        | •       |         | Fr   |
| Fabaceae          | <i>Acacia incurvaneura</i>                                   | •       |         | Fr   |
| Fabaceae          | <i>Acacia pruinocarpa</i>                                    | •       | •       |      |
| Fabaceae          | <i>Acacia pteraneura</i>                                     | •       | •       | Fr   |
| Fabaceae          | <i>Acacia quadrimarginea</i>                                 | •       |         | Fr   |
| Fabaceae          | <i>Acacia ramulosa</i> var. <i>linophylla</i>                | •       | •       | Fr   |
| Fabaceae          | <i>Acacia ramulosa</i> var. <i>ramulosa</i>                  | •       |         |      |
| Fabaceae          | <i>Acacia tetragonophylla</i>                                | •       |         | Fr   |
| Fabaceae          | <b><i>Senna artemisioides</i> subsp. <i>filifolia</i> RE</b> | •       |         | Fr   |
| Fabaceae          | <i>Senna charlesiana</i>                                     | •       |         |      |
| Fabaceae          | <i>Senna glaucifolia</i>                                     | •       |         | Fr   |
| Fabaceae          | <i>Senna</i> sp. Billabong (J.D. Alonzo 721)                 | •       |         |      |
| Geraniaceae       | <i>Erodium cygnorum</i>                                      | •       |         | FIFr |
| Goodeniaceae      | <i>Brunonia australis</i>                                    | •       |         | Fl   |
| Goodeniaceae      | <i>Goodenia berardiana</i>                                   | •       |         | FIFr |
| Goodeniaceae      | <i>Velleia rosea</i>                                         | •       |         | Fr   |
| Hemerocallidaceae | <b><i>Dianella revoluta</i> RE</b>                           | •       |         | Fr   |
| Lamiaceae         | <i>Teucrium teucriiflorum</i>                                | •       |         | Fr   |
| Malvaceae         | <i>Abutilon cryptopetalum</i>                                | •       | •       | Fr   |
| Malvaceae         | <i>Sida calyxhymenia</i>                                     | •       |         |      |
| Malvaceae         | <i>Sida ectogama</i>                                         | •       |         | Fr   |
| Malvaceae         | <b><i>Sida fibulifera</i> RE</b>                             | •       |         | Fr   |
| Malvaceae         | <i>Sida</i> sp. dark green fruits (S. van Leeuwen 2260)      | •       |         | Fr   |
| Malvaceae         | <i>Sida</i> sp. Excedentifolia (J.L. Egan 1925)              | •       |         | Fr   |
| Malvaceae         | <i>Sida</i> sp. Golden calyces glabrous (H.N. Foote 32)      | •       |         | Fr   |
| Myrtaceae         | <i>Calytrix ?amethystina</i>                                 | •       |         | Fl   |
| Myrtaceae         | <i>Thryptomene decussata</i>                                 | •       | •       | Fl   |
| Poaceae           | <i>Eriachne helmsii</i>                                      | •       |         |      |
| Poaceae           | <i>Poaceae</i> sp.                                           | •       |         |      |
| Polygonaceae      | <b><i>Rumex vesicarius</i>*</b>                              |         | •       | FIFr |
| Portulacaceae     | <i>Calandrinia creethiae</i>                                 | •       |         | Fr   |
| Portulacaceae     | <i>Calandrinia eremaea</i>                                   | •       | •       | FIFr |
| Primulaceae       | <b><i>Lysimachia arvensis</i>*</b>                           | •       |         | FIFr |
| Proteaceae        | <i>Grevillea deflexa</i>                                     | •       | •       | Fl   |
| Proteaceae        | <i>Hakea preissii</i>                                        | •       | •       | Fr   |
| Pteridaceae       | <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>             | •       |         |      |
| Rubiaceae         | <i>Psyrax latifolia</i>                                      | •       |         |      |
| Rubiaceae         | <i>Psyrax rigidula</i>                                       | •       | •       |      |
| Rubiaceae         | <i>Psyrax suaveolens</i>                                     | •       |         |      |
| Santalaceae       | <b><i>Anthobolus leptomerioides</i> RE</b>                   |         | •       |      |

| Family           | Taxa                                                          | Relevés | OppColl | FIFr |
|------------------|---------------------------------------------------------------|---------|---------|------|
| Santalaceae      | <i>Exocarpos aphyllus</i>                                     |         | •       | FI   |
| Santalaceae      | <b><i>Exocarpos sparteus</i> RE</b>                           |         | •       |      |
| Santalaceae      | <i>Santalum acuminatum</i>                                    | •       | •       | FI   |
| Santalaceae      | <b><i>Santalum spicatum</i> SOI</b>                           |         | •       | O    |
| Scrophulariaceae | <i>Eremophila clarkei</i>                                     | •       |         | Fr   |
| Scrophulariaceae | <i>Eremophila exilifolia</i>                                  | •       |         | FIFr |
| Scrophulariaceae | <i>Eremophila foliosissima</i>                                |         | •       | FI   |
| Scrophulariaceae | <i>Eremophila forrestii</i> subsp. <i>forrestii</i>           | •       |         | FI   |
| Scrophulariaceae | <i>Eremophila galeata</i>                                     | •       | •       | FIFr |
| Scrophulariaceae | <i>Eremophila georgei</i>                                     | •       |         | FIFr |
| Scrophulariaceae | <i>Eremophila glandulifera</i>                                | •       |         | FI   |
| Scrophulariaceae | <i>Eremophila lachnocalyx</i>                                 | •       |         | FIFr |
| Scrophulariaceae | <b><i>Eremophila latrobei</i> subsp. <i>filiformis</i> RE</b> | •       |         |      |
| Scrophulariaceae | <i>Eremophila latrobei</i> subsp. <i>latrobei</i>             | •       |         | Fr   |
| Scrophulariaceae | <i>Eremophila longifolia</i>                                  | •       |         | FIFr |
| Scrophulariaceae | <i>Eremophila macmillaniana</i>                               |         | •       | FIFr |
| Scrophulariaceae | <i>Eremophila oldfieldii</i>                                  | •       |         |      |
| Scrophulariaceae | <i>Eremophila punicea</i>                                     | •       |         | FI   |
| Solanaceae       | <i>Nicotiana</i> sp.                                          | •       |         |      |
| Solanaceae       | <i>Solanum lasiophyllum</i>                                   | •       |         | Fr   |
| Zygophyllaceae   | <b><i>Roepera similis</i> RE</b>                              | •       |         | FI   |

Note: P3 = Priority 3 species, \* = environmental weed, SOI= species of interest, RE = range extension, FI = flowering material, Fr = fruiting material, subsp. = subspecies, var. = variety, sp. = species, ? = queried species, OppColl = opportunistic collection. Nomenclature based on current WA Herbarium terminology and confirmed on FloraBase (WAH, 1998-).

Table A6.2: Vascular flora by vegetation type

|                |                                                                       | TW-20  | TW-14 | TW-17 | TW-02     | TW-04     | TW-05     | TW-18     | TW-01     | TW-03     | TW-06     | TW-08     | TW-10     | TW-11     | TW-12     | TW-13     | TW-07     | TW-09     | TW-15     | TW-16     | TW-19     |
|----------------|-----------------------------------------------------------------------|--------|-------|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Family         | Taxa                                                                  | AaTSSL | ATOSL | ATOSL | ATSSL (1) | ATSSL (1) | ATSSL (1) | ATSSL (1) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (3) | ATSSL (3) | ATSSL (3) | ATSSL (3) | ATSSL (3) |
| Aizoaceae      | <i>Gunniopsis quadrifida</i>                                          | 0      | 0     | 1     | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 1         | 8         | 0         | 0         | 8         | 1         | 1         | 0         | 2         | 1         |
| Aizoaceae      | <i>Gunniopsis</i> sp.                                                 | 0      | 2     | 1     | 8         | 1         | 2         | 0         | 1         | 1         | 1         | 0         | 0         | 8         | 1         | 1         | 8         | 0         | 1         | 0         | 8         |
| Amaranthaceae  | <i>Ptilotus aervoides</i>                                             | 0      | 1     | 0     | 0         | 0         | 1         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 8         | 8         | 0         | 0         | 1         | 0         | 0         |
| Amaranthaceae  | <i>Ptilotus eremita</i>                                               | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Amaranthaceae  | <i>Ptilotus helipteroides</i>                                         | 8      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Amaranthaceae  | <i>Ptilotus obovatus</i>                                              | 2      | 2     | 1     | 1         | 2         | 1         | 8         | 0         | 1         | 0         | 0         | 8         | 0         | 2         | 1         | 1         | 1         | 2         | 1         | 1         |
| Amaranthaceae  | <i>Ptilotus schwartzii</i>                                            | 8      | 0     | 0     | 8         | 0         | 1         | 0         | 0         | 1         | 0         | 0         | 1         | 1         | 0         | 8         | 0         | 0         | 0         | 1         | 0         |
| Apocynaceae    | <i>Marsdenia australis</i>                                            | 0      | 0     | 0     | 0         | 0         | 0         | 8         | 8         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Apocynaceae    | <i>Vincetoxicum lineare</i>                                           | 0      | 1     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 8         | 0         | 0         | 0         | 0         | 0         | 0         |
| Araliaceae     | <i>Trachymene ornata</i>                                              | 2      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Asteraceae     | <i>Actinobole oldfieldianum</i>                                       | 0      | 2     | 1     | 0         | 2         | 0         | 0         | 0         | 2         | 0         | 0         | 0         | 0         | 0         | 8         | 1         | 2         | 2         | 2         | 1         |
| Asteraceae     | <i>Calotis hispidula</i>                                              | 0      | 1     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Asteraceae     | <b><i>Calotis</i> sp. Perrinvale Station (R.J. Cranfield 7096) P3</b> | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         | 0         | 0         | 0         | 0         |
| Asteraceae     | <i>Centipeda thespidioides</i>                                        | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         |
| Asteraceae     | <i>Cephalopterum drummondii</i>                                       | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 8         | 0         | 0         | 0         | 8         |
| Asteraceae     | <i>Gnephosis brevifolia</i>                                           | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 2         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Asteraceae     | <i>Myriocephalus rudallii</i>                                         | 8      | 8     | 1     | 0         | 0         | 0         | 0         | 1         | 0         | 1         | 0         | 0         | 0         | 0         | 1         | 1         | 0         | 8         | 0         | 1         |
| Asteraceae     | <i>Olearia humilis</i>                                                | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 1         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         | 0         | 0         | 0         |
| Asteraceae     | <i>Pluchea dentex</i>                                                 | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         |
| Asteraceae     | <i>Podolepis gardneri</i>                                             | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 8         | 8         | 8         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Asteraceae     | <i>Podolepis kendallii</i>                                            | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         |
| Asteraceae     | <i>Rhodanthe battii</i>                                               | 0      | 1     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 8         | 1         | 0         | 0         |
| Asteraceae     | <i>Rhodanthe stricta</i>                                              | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         |
| Asteraceae     | <i>Roebuckiella ciliocarpa</i>                                        | 0      | 1     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 8         | 0         | 0         | 0         |
| Brassicaceae   | <i>Lepidium oxytrichum</i>                                            | 0      | 0     | 0     | 0         | 2         | 0         | 2         | 0         | 2         | 0         | 8         | 0         | 0         | 2         | 0         | 0         | 8         | 2         | 1         | 0         |
| Brassicaceae   | <i>Stenopetalum anfractum</i>                                         | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 8         | 0         | 0         | 0         |
| Chenopodiaceae | <i>Dysphania kalpari</i>                                              | 0      | 1     | 0     | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 8         | 0         | 0         | 0         |
| Chenopodiaceae | <i>Enchylaena tomentosa</i> var. <i>tomentosa</i>                     | 0      | 0     | 1     | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         | 0         | 1         | 1         | 0         | 1         | 0         | 0         | 0         |
| Chenopodiaceae | <i>Maireana carnosa</i>                                               | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 8         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Chenopodiaceae | <i>Maireana georgei</i>                                               | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         | 0         | 0         | 1         | 0         | 0         |
| Chenopodiaceae | <i>Maireana suaedifolia</i>                                           | 0      | 0     | 0     | 0         | 1         | 1         | 1         | 0         | 1         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         |

|                |                                                              | TW-20  | TW-14 | TW-17 | TW-02     | TW-04     | TW-05     | TW-18     | TW-01     | TW-03     | TW-06     | TW-08     | TW-10     | TW-11     | TW-12     | TW-13     | TW-07     | TW-09     | TW-15     | TW-16     | TW-19     |
|----------------|--------------------------------------------------------------|--------|-------|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Family         | Taxa                                                         | AaTSSL | ATOSL | ATOSL | ATSSL (1) | ATSSL (1) | ATSSL (1) | ATSSL (1) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (3) | ATSSL (3) | ATSSL (3) | ATSSL (3) | ATSSL (3) |
| Chenopodiaceae | <i>Maireana tomentosa</i> subsp. <i>tomentosa</i>            | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 1         | 8         | 8         | 8         | 0         | 0         | 8         | 0         | 0         | 0         | 0         | 0         |
| Chenopodiaceae | <i>Maireana triptera</i>                                     | 0      | 1     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Chenopodiaceae | <i>Maireana villosa</i>                                      | 0      | 1     | 0     | 0         | 0         | 0         | 0         | 0         | 8         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         |
| Chenopodiaceae | <i>Rhagodia eremaea</i>                                      | 0      | 0     | 2     | 0         | 0         | 0         | 0         | 2         | 1         | 2         | 0         | 0         | 0         | 0         | 2         | 2         | 0         | 0         | 0         | 2         |
| Chenopodiaceae | <b><i>Sclerolaena fusiformis</i> RE</b>                      | 0      | 0     | 1     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Convolvulaceae | <b><i>Cuscuta planiflora</i>*</b>                            | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 1         | 0         | 1         |
| Convolvulaceae | <i>Duperreya commixta</i>                                    | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 8         | 0         | 0         |
| Euphorbiaceae  | <i>Euphorbia boophthona</i>                                  | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 8         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Fabaceae       | <i>Acacia ?sibilans</i>                                      | 0      | 0     | 1     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 8         |
| Fabaceae       | <i>Acacia aneura</i>                                         | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 2         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Fabaceae       | <i>Acacia aptaneura</i>                                      | 2      | 1     | 0     | 1         | 2         | 2         | 0         | 1         | 0         | 2         | 0         | 0         | 2         | 2         | 1         | 2         | 0         | 2         | 0         | 0         |
| Fabaceae       | <i>Acacia ayersiana</i>                                      | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Fabaceae       | <i>Acacia ayersiana</i> (hybrid)                             | 0      | 0     | 0     | 0         | 2         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Fabaceae       | <i>Acacia burkittii</i>                                      | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         |
| Fabaceae       | <i>Acacia caesaneura</i>                                     | 0      | 0     | 0     | 2         | 0         | 0         | 2         | 0         | 0         | 0         | 0         | 0         | 0         | 2         | 0         | 0         | 0         | 0         | 0         | 0         |
| Fabaceae       | <i>Acacia caesaneura</i> (narrow phyllode variant)           | 0      | 0     | 2     | 0         | 0         | 0         | 2         | 0         | 0         | 1         | 0         | 0         | 0         | 2         | 2         | 2         | 0         | 0         | 2         | 2         |
| Fabaceae       | <i>Acacia craspedocarpa</i>                                  | 0      | 2     | 0     | 0         | 1         | 0         | 1         | 1         | 2         | 0         | 1         | 0         | 0         | 2         | 0         | 0         | 1         | 0         | 2         | 0         |
| Fabaceae       | <i>Acacia craspedocarpa</i> (hybrid)                         | 0      | 0     | 0     | 0         | 0         | 1         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Fabaceae       | <i>Acacia grasbyi</i>                                        | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         | 0         | 0         | 0         | 2         | 0         | 0         |
| Fabaceae       | <i>Acacia incurvaneura</i>                                   | 0      | 1     | 0     | 1         | 1         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Fabaceae       | <i>Acacia pruinocarpa</i>                                    | 0      | 2     | 0     | 0         | 0         | 2         | 0         | 0         | 2         | 0         | 0         | 0         | 0         | 0         | 0         | 2         | 0         | 0         | 1         | 2         |
| Fabaceae       | <i>Acacia pteraneura</i>                                     | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         |
| Fabaceae       | <i>Acacia quadrimarginea</i>                                 | 0      | 0     | 0     | 1         | 0         | 1         | 0         | 1         | 1         | 0         | 0         | 8         | 1         | 0         | 1         | 1         | 0         | 0         | 0         | 1         |
| Fabaceae       | <i>Acacia ramulosa</i> var. <i>linophylla</i>                | 0      | 0     | 1     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Fabaceae       | <i>Acacia ramulosa</i> var. <i>ramulosa</i>                  | 0      | 1     | 1     | 0         | 1         | 0         | 8         | 1         | 0         | 1         | 0         | 0         | 0         | 0         | 1         | 2         | 1         | 2         | 2         | 2         |
| Fabaceae       | <i>Acacia tetragonophylla</i>                                | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 8         | 1         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Fabaceae       | <b><i>Senna artemisioides</i> subsp. <i>filifolia</i> RE</b> | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         |
| Fabaceae       | <i>Senna charlesiana</i>                                     | 8      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         |
| Fabaceae       | <i>Senna glaucifolia</i>                                     | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         |
| Fabaceae       | <i>Senna</i> sp. Billabong (J.D. Alonzo 721)                 | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 8         | 0         | 0         | 0         | 8         |
| Geraniaceae    | <i>Erodium cygnorum</i>                                      | 1      | 0     | 0     | 8         | 0         | 1         | 0         | 0         | 0         | 0         | 0         | 8         | 8         | 8         | 0         | 0         | 0         | 0         | 0         | 0         |
| Goodeniaceae   | <i>Brunonia australis</i>                                    | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |

|                   |                                                         | TW-20  | TW-14 | TW-17 | TW-02     | TW-04     | TW-05     | TW-18     | TW-01     | TW-03     | TW-06     | TW-08     | TW-10     | TW-11     | TW-12     | TW-13     | TW-07     | TW-09     | TW-15     | TW-16     | TW-19     |
|-------------------|---------------------------------------------------------|--------|-------|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Family            | Taxa                                                    | AaTSSL | ATOSL | ATOSL | ATSSL (1) | ATSSL (1) | ATSSL (1) | ATSSL (1) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (3) | ATSSL (3) | ATSSL (3) | ATSSL (3) | ATSSL (3) |
| Goodeniaceae      | <i>Goodenia berardiana</i>                              | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         |
| Goodeniaceae      | <i>Velleia rosea</i>                                    | 0      | 1     | 0     | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Hemerocallidaceae | <b><i>Dianella revoluta</i> RE</b>                      | 0      | 0     | 1     | 0         | 0         | 0         | 0         | 1         | 0         | 1         | 0         | 0         | 0         | 0         | 1         | 1         | 0         | 1         | 0         | 1         |
| Lamiaceae         | <i>Teucrium teucriiflorum</i>                           | 0      | 0     | 1     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 8         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Malvaceae         | <i>Abutilon cryptopetalum</i>                           | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 2         |
| Malvaceae         | <i>Sida calyxhymenia</i>                                | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         | 0         | 0         | 0         | 0         |
| Malvaceae         | <i>Sida ectogama</i>                                    | 0      | 0     | 0     | 8         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         |
| Malvaceae         | <b><i>Sida fibulifera</i> RE</b>                        | 0      | 2     | 0     | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         |
| Malvaceae         | <i>Sida</i> sp. dark green fruits (S. van Leeuwen 2260) | 8      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Malvaceae         | <i>Sida</i> sp. Excedentifolia (J.L. Egan 1925)         | 1      | 1     | 0     | 0         | 0         | 0         | 8         | 0         | 0         | 0         | 0         | 0         | 8         | 8         | 0         | 0         | 0         | 1         | 1         | 0         |
| Malvaceae         | <i>Sida</i> sp. Golden calyces glabrous (H.N. Foote 32) | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         |
| Myrtaceae         | <i>Calytrix ?amethystina</i>                            | 1      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 8         |
| Myrtaceae         | <i>Thryptomene decussata</i>                            | 1      | 1     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 8         |
| Poaceae           | <i>Eriachne helmsii</i>                                 | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Poaceae           | <i>Poaceae</i> sp.                                      | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         |
| Polygonaceae      | <b><i>Rumex vesicarius</i>*</b>                         | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 8         | 0         | 0         |
| Portulacaceae     | <i>Calandrinia creethiae</i>                            | 8      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Portulacaceae     | <i>Calandrinia eremaea</i>                              | 0      | 1     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Primulaceae       | <b><i>Lysimachia arvensis</i>*</b>                      | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         |
| Proteaceae        | <i>Grevillea deflexa</i>                                | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         |
| Proteaceae        | <i>Hakea preissii</i>                                   | 0      | 0     | 2     | 8         | 0         | 0         | 0         | 0         | 0         | 2         | 0         | 0         | 0         | 0         | 2         | 2         | 0         | 0         | 0         | 2         |
| Pteridaceae       | <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>        | 0      | 0     | 0     | 8         | 0         | 0         | 0         | 8         | 0         | 8         | 8         | 8         | 0         | 0         | 8         | 0         | 2         | 1         | 0         | 0         |
| Rubiaceae         | <i>Psydrax latifolia</i>                                | 0      | 8     | 0     | 0         | 0         | 8         | 0         | 0         | 0         | 0         | 0         | 0         | 8         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Rubiaceae         | <i>Psydrax rigidula</i>                                 | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 8         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Rubiaceae         | <i>Psydrax suaveolens</i>                               | 1      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Santalaceae       | <b><i>Anthobolus leptomerioides</i> RE</b>              | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 8         | 0         | 0         | 0         | 0         | 0         | 8         | 0         | 0         | 0         | 0         | 0         | 8         |
| Santalaceae       | <i>Exocarpos aphyllus</i>                               | 0      | 0     | 0     | 0         | 0         | 1         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Santalaceae       | <b><i>Exocarpos sparteus</i> RE</b>                     | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 8         | 0         | 8         | 1         | 8         | 0         | 0         | 8         | 0         | 1         | 0         | 0         | 0         |
| Santalaceae       | <i>Santalum acuminatum</i>                              | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Santalaceae       | <b><i>Santalum spicatum</i> SOI</b>                     | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         |
| Scrophulariaceae  | <i>Eremophila clarkei</i>                               | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 2         | 0         | 0         |
| Scrophulariaceae  | <i>Eremophila exilifolia</i>                            | 2      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |

|                  |                                                               | TW-20  | TW-14 | TW-17 | TW-02     | TW-04     | TW-05     | TW-18     | TW-01     | TW-03     | TW-06     | TW-08     | TW-10     | TW-11     | TW-12     | TW-13     | TW-07     | TW-09     | TW-15     | TW-16     | TW-19     |
|------------------|---------------------------------------------------------------|--------|-------|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Family           | Taxa                                                          | AaTSSL | ATOSL | ATOSL | ATSSL (1) | ATSSL (1) | ATSSL (1) | ATSSL (1) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (2) | ATSSL (3) | ATSSL (3) | ATSSL (3) | ATSSL (3) | ATSSL (3) |
| Scrophulariaceae | <i>Eremophila foliosissima</i>                                | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Scrophulariaceae | <i>Eremophila forrestii</i> subsp. <i>forrestii</i>           | 0      | 2     | 0     | 0         | 0         | 2         | 1         | 0         | 0         | 0         | 0         | 8         | 0         | 0         | 0         | 8         | 0         | 0         | 0         | 8         |
| Scrophulariaceae | <i>Eremophila galeata</i>                                     | 8      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Scrophulariaceae | <i>Eremophila georgei</i>                                     | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Scrophulariaceae | <i>Eremophila glandulifera</i>                                | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Scrophulariaceae | <i>Eremophila lachnocalyx</i>                                 | 0      | 1     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         | 0         | 1         |
| Scrophulariaceae | <b><i>Eremophila latrobei</i> subsp. <i>filiformis</i> RE</b> | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 8         |
| Scrophulariaceae | <i>Eremophila latrobei</i> subsp. <i>latrobei</i>             | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         | 0         | 0         | 0         | 0         | 8         | 0         | 0         | 0         | 8         |
| Scrophulariaceae | <i>Eremophila longifolia</i>                                  | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 1         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Scrophulariaceae | <i>Eremophila macmillaniana</i>                               | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 0         | 0         |
| Scrophulariaceae | <i>Eremophila oldfieldii</i>                                  | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 8         |
| Scrophulariaceae | <i>Eremophila punicea</i>                                     | 0      | 0     | 8     | 0         | 0         | 0         | 0         | 8         | 0         | 0         | 0         | 0         | 0         | 1         | 0         | 8         | 0         | 0         | 0         | 8         |
| Solanaceae       | <i>Nicotiana</i> sp.                                          | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 8         |
| Solanaceae       | <i>Solanum lasiophyllum</i>                                   | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 2         | 0         | 0         | 8         | 8         | 0         | 0         | 8         | 8         | 1         | 1         | 8         |
| Zygophyllaceae   | <b><i>Roepera similis</i> RE</b>                              | 0      | 0     | 0     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |

Note: Number in species rows = cover (0 = species not present). P3 = Priority 3 species, \* = environmental weed, SOI= species of interest, RE = range extension, FI = flowering material, Fr = fruiting material, subsp. = subspecies, var. = variety, sp. = species, ? = queried species, OppColl = opportunistic collection. Nomenclature based on current WA Herbarium terminology and confirmed on FloraBase (WAH, 1998-).

