

# MT MARION - HAMPTONS TENEMENT

## DETAILED FLORA & VEGETATION ASSESSMENT

PREPARED FOR: MINERAL RESOURCES LIMITED



**Spectrum**  
ECOLOGY & SPATIAL



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## EXECUTIVE SUMMARY

Mineral Resources Limited engaged Spectrum Ecology & Spatial to undertake a two-phased detailed flora and vegetation assessment covering the Hamptons Tenement in the Mt. Marion Lithium Project area (the Survey Area). The Survey Area is located approximately 60 km southwest of Kalgoorlie in the Goldfields region of Western Australia and covers 22,582.2 ha.

Phase 1 was undertaken from the 26 September to the 2 October 2023 (spring), and phase 2 was undertaken from the 3 April to the 15 April 2024 (autumn) for a total of 64 field person days. The field survey timing was conducted in accordance with EPA recommendations for the Interzone Botanical province of which the Coolgardie IBRA region is located. A total of 105 quadrats (47 phase 1, 58 phase 2), 24 relevés (16 phase 1, 8 phase 2), and 328.5 km of targeted traverses were sampled during the assessment.

A total of 313 taxa from 48 families and 147 genera were recorded within the Survey Area. Of the 313 taxa recorded, 23 were introduced flora species. One of the introduced flora species recorded, *Xanthium spinosum* is classified as a Declared Pest under the *Biosecurity and Agriculture Management Act 2007* and has a category 3 management requirement within the Coolgardie IBRA Bioregion. The remaining introduced flora are classified as permitted s11 weeds. None of the introduced flora were a dominant species in any of the VTs.

No Threatened flora were recorded or considered likely to occur within the Survey Area. Eight Priority Flora taxa, and seven range extensions were recorded:

- Priority 1 (P1): *Calandrinia lefroyensis*, *Eucalyptus websteriana* subsp. *norsemanica*, *Ricinocarpos digynus*, *Thryptomene planiflora*.
- Priority 2 (P2): *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156).
- Priority 3 (P3): *Eremophila acutifolia*, *Lepidium genistoides*, *Notisia intonsa*.
- Range Extensions: *Eragrostis eriopoda*, *Euphorbia multifaria*, *Euphorbia porcata*, *Lepidium genistoides* (P3), *Malacocera tricornis*, *Paspalidium basi cladum*, and *Thyridolepis mitchelliana*

Of the eight Priority Flora taxa recorded, two were assigned a high local significance (*Eucalyptus websteriana* subsp. *norsemanica* (P1) and *Lepidium genistoides* (P3)), and one was assigned a high local and regional significance (*Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2)).

All of the Priority Flora identified as having a 'High' likelihood of occurrence in the desktop assessment, that were not recorded in the Survey Area, have been reduced to a 'Medium' likelihood of occurrence post-survey, as suitable habitat was identified for these Priority taxa and survey timing was adequate for annual species to occur.

Vegetation mapping was undertaken for a larger project area that encompassed the Survey Area within. A total of 143 quadrats were used in the analysis which included 69 phase 1 quadrats and 74 phase 2 quadrats. Of these, 43 phase 1 and 49 phase 2 quadrats were within the Hamptons Survey Area.

A total of 25 vegetation types (VTs), were described from the combined Survey Areas, including 17 from floristic analysis of quadrat data, and eight additional structural groups. A total of 22 of the VTs were mapped at the Survey Area. The majority of the Survey Area was mapped as mixed *Eucalyptus* spp. mid open woodlands on clay or sandy plains, floodplains, and minor drainage areas (VT10, VT15, VT16, VT18, VT19, VT20, and VT21). This was followed by mixed *Eucalyptus* spp. low woodlands over mixed *Acacia* spp. and *Allocasuarina* spp. tall shrublands on gentle to moderately sloping basalt hills (VT08, VT09, VT12, VT13, VT14, and VT23), Chenopodiaceae (*Tecticornia*, *Cratystylis*, and *Atriplex* spp.) low shrublands on clay pans (VT03,

VT04, VT05, VT06, VT07, and VT25), and *Acacia* spp. and *Melaleuca* spp. tall shrublands on and in the vicinity of granite slopes and outcrops (VT22 and VT24). VT15 was the most widespread VT in the Survey Area, making up 27.8% of its total extent. None of the vegetation types recorded resembled any known Threatened or Priority Ecological Communities.

Four of the five significant vegetation from the literature review assigned 'Medium' likelihood of occurrence during the desktop assessment, were given a 'High' likelihood of occurrence post-survey, as the survey effort recorded similar VTs to those identified in the desktop assessment that supported Priority listed flora.

Based on the definitions of significant vegetation listed in section 2.4.4 (Environmental Protection Authority, 2016a) Ten vegetation types were considered significant:

- VT02 provides a role of refuge for the regionally significant Priority Flora taxon *Phebalium clavatum* (P2) (Spectrum, 2024).
- VT03 has a restricted extent in the Survey Area and the vegetation assemblage is dominated by *Tecticornia* a relatively unknown genus.
- VT06 has a restricted extent within the Survey Area and its landform, low rise of orange cracking clay with abundant granite/dactite stones, appears to be limited in the local area;
- VT07 provides a refuge for the locally significant Priority Flora taxon, *Lepidium genistoides* (P3) as well as another priority species, *Calandrinia lefroyensis* (P1).
- VT12 has a restricted extent within the Survey Area (appears on the upper hills of Mt Marion) and provides a role as refuge for the locally significant Priority Flora taxon *Eucalyptus websteriana* subsp. *norsemanica/websteriana* (P1?), and the locally and regionally significant Priority Flora taxon *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2). It also provides refuge to another Priority taxon *Ricinocarpos digynus* (P1).
- VT13 provides a role as refuge for the locally and regionally significant *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2) as well as another priority species, *Eremophila acutifolia* (P3).
- VT20 provides a role of refuge for the locally and regionally significant Priority Flora taxon *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2).
- VT22 has a restricted extent in the Survey with the vegetation assemblage appearing rare in the Survey Area.
- VT23 had a restricted extent (Mt Marion) in the Survey Area and provides refuge to the locally significant Priority Flora taxa, *Eucalyptus websteriana* subsp. *norsemanica* (P1) and the locally and regionally significant taxon, *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2).
- VT24 provides refuge to the locally significant Priority Flora taxon, *Lepidium genistoides* (P3) and the locally and regionally significant taxon, *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2).

Vegetation condition of the Survey Area ranged from 'Pristine' to 'Good' with the majority in 'Excellent' (48.7%) or 'Pristine' (33.5%) condition. The remaining area was in 'Very Good' (13.6%) or 'Good' (0.7%) condition where moderate to high weed abundance or grazing was present or changes in the native vegetation structure has occurred. The remaining 3.5% was mapped as 'Completely Degraded' in the areas that have been cleared for roads and infrastructure with no vegetation present.

No significant limitations and constraints impacted the collection of data or the outcome of the detailed flora and vegetation assessment.

# 1. INTRODUCTION

## 1.1. Project Background

Process Minerals International Pty Ltd (PMI) operates the Mt Marion Lithium Project (the Project) in the Goldfields region of Western Australia (WA; Map 1.1). PMI is a 100% subsidiary of Mineral Resources Limited (MinRes), who holds an exclusive Life of Mine (LOM) Mining Services Agreement (MSA) with Reed Industrial Minerals Pty Ltd (RIM), the holder of most of the Mt Marion tenements. Pursuant to this MSA, MinRes designed and built, and now operates, the Project through a joint venture agreement with PMI and Gangfeng Lithium Co. Ltd (Mineral Resources Limited).

In 2023 Spectrum Ecology & Spatial (Spectrum) was commissioned to undertake a detailed flora and vegetation survey of MinRes's Hamptons tenement operations, located approximately 60 km southwest of Kalgoorlie and covering 22,582.2 ha (the Survey Area; Map 1.1). Additionally, a desktop assessment of the wider Study Area (50 km buffer of the Survey Area) was to be completed prior to the commencement of the survey to identify potential significant flora and vegetation.

## 1.2. Project Scope & Objectives

The scope included a desktop assessment and two-phased detailed flora and vegetation survey to describe the flora and vegetation values across the Survey Area. The following tasks were undertaken:

- Complete a desktop assessment, including database searches, literature review and a likelihood of occurrence assessment for significant flora and vegetation at the Survey Area.
- Conduct a two-phase detailed flora and vegetation field survey of the Survey Area to develop a flora species list, describe and map the vegetation types and condition, and undertake targeted searches for conservation significant species.
- Prepare a detailed flora and vegetation report including defining significant flora and vegetation recorded to inform future environmental approvals.

This report documents the results from the two-phase flora and vegetation assessment undertaken in spring 2023 (primary season) and autumn 2024 (supplementary season).

## 1.3. Legislation & Guidelines

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

- *Biodiversity Conservation Act 2016* (BC Act);
- *Environmental Protection Act 1986* (EP Act); and
- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

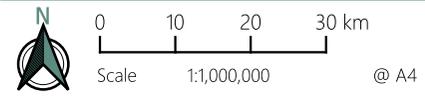
The survey was compliant with survey guidelines, as outlined in:

- Environmental Protection Authority (EPA) Environmental Factor Guideline: Flora and Vegetation (EPA, 2016a);
- EPA Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016b);
- Department of Biodiversity Conservation and Attraction (DBCA) Threatened and Priority Flora Report Form – Field Manual (DBCA, 2023); and
- National Vegetation Information System (NVIS) Australian Vegetation Attribute Manual (ESCAVI, 2003).



**Legend**

- Kalgoorlie
  - Hampton's Survey Area
  - Study Area (50km)
  - Priority Ecological Community
  - Environmental Sensitive Area
  - Significant Wetlands
- Conservation Estates**
- Burra
  - Dordie Rocks
  - Goldfields Woodlands
  - Kalgoorlie Arboretum
  - Kambalda
  - Kangaroo Hills Timber Reserve
  - Kurrawang
  - Lakeside Timber Reserve
  - Ngadju
  - Scahill Timber Reserve
  - Victoria Rock
  - Yallari Timber Reserve



Coordinate System: GDA 2020 MGA Zone 51  
 Projection: Universal Transverse Mercator  
 Units: Metre



Author: ZG Date: 12-09-2024

**Location of the Survey Area & Significant Lands**

Mt Marion - Hamptons Tenement - Detailed Flora & Vegetation Assessment

MAP

Prepared for  
 Mineral Resources Limited

1.1

## 1.4. Bioregion

The Interim Biogeographic Regionalisation for Australia (IBRA) classifies Australia into 89 biogeographic regions and 419 subregions based on the dominant landscape, climate, lithology, geology, landform, and vegetation (Thackway and Cresswell, 1995).

The Survey Area occurs within the Eastern Goldfield subregion of the Coolgardie bioregion, which is characterised by granite rocky outcrops, low greenstone hills, laterite uplands and broad plains. Numerous salt lakes also occur through the bioregion. The Coolgardie bioregion covers the interzone between mulga and spinifex country, and eucalypt environments. The major population centres are Kalgoorlie, Coolgardie, and Norseman (McKenzie, May and McKenna, 2003). The majority of the Study Area (99.3%) is located within the Eastern Goldfield subregion, with a small portion of the Survey Area (0.7%) in the Southern Cross subregion (Figure 1.1).



Figure 1.1: IBRA Classification

## 1.5. Land Use

The Eastern Goldfields subregion is mainly used for Unallocated Crown Land (UCL) and Crown reserves (66.7%) with lesser areas of grazing native pasture (17%), cultivation (2.3%) and UCL and Conservation reserves (11.5%; Cowan, 2001).

## 1.6. Surface Geology

The geology of Western Australia has been mapped at a scale of 1:50,000, 1:100,000, 1:250,000, and 1:500,000. The Survey Area occurs in the central west of the 1:500,000 scale geological mapping (Department of Mines, 2019).

Nine units were mapped within the Survey Area (Table 1.1; Map 1.2); with the exposed bedrock unit X-YPP comprising the largest extent (51.1%), followed by the alluvial/fluviol unit A-YPP (15.4%). None of the other geological units appear to be restricted in WA with Af-YPP having the lowest extent (336,578 ha).

**Table 1.1: Surface Geology**

Unit Code	Landform <sup>^</sup>	Description	Area in Survey Area (ha)	% of Survey Area	Total WA Extent (ha)	Total Coolgardie Extent (ha)	% of Coolgardie Extent Within Survey Area
A-YPP	Alluvial/fluviol unit	Clay, silt, sand, and gravel in channels and on floodplains	3,467.0	15.4	2,661,676	657,909.7	0.5
Af-YPP	Alluvial/fluviol unit	Clay, silt, and sand on floodplains	834.7	3.7	336,578	19,603	4.3
C-YPP	Colluvial unit	Colluvium derived from different rock types; includes gravel, sand, and silt	3,164.8	14.0	4,850,882	1,072,215	0.3
Lm-YPP	Lacustrine unit	Mixed dunes, evaporite, and alluvial deposits; typically, adjacent to playa lakes	31.3	0.1	3,152,534	675,494	<0.1
Rr-f-YPP	Residual or relict unit	Ferruginous duricrust, massive to rubbly; includes iron-cemented reworked products	705.1	3.1	4,351,864	521,307	0.1
Rs-g-YPP	Residual or relict unit	Quartzofeldspathic sand, commonly over granite	261.6	1.2	860,799	104,253	0.3
Rs-l-YPP	Residual or relict unit	Yellow sand with minor pisolitic laterite, ferruginized silcrete, silt, and clay; common on low plateaus associated with weathered granite	2.3	<0.1	8,153,527	2,861,687	<0.1
W-YPP	Sheetwash unit	Clay, silt, and sand in extensive fans; local ferruginous gravel	2,567.5	11.4	10,663,356	1,461,886	0.2
X-YPP	Exposed unit	Exposed bedrock	11,548.1	51.1	9,435,694	929,582	1.2

<sup>^</sup>All landforms are considered to be Youngest Post-Palaeozoic (YPP). It is a term used to describe geological units or formations that are the most recent in the geologic time scale, specifically referring to rocks and sediments that have formed since the end of the Palaeozoic era.

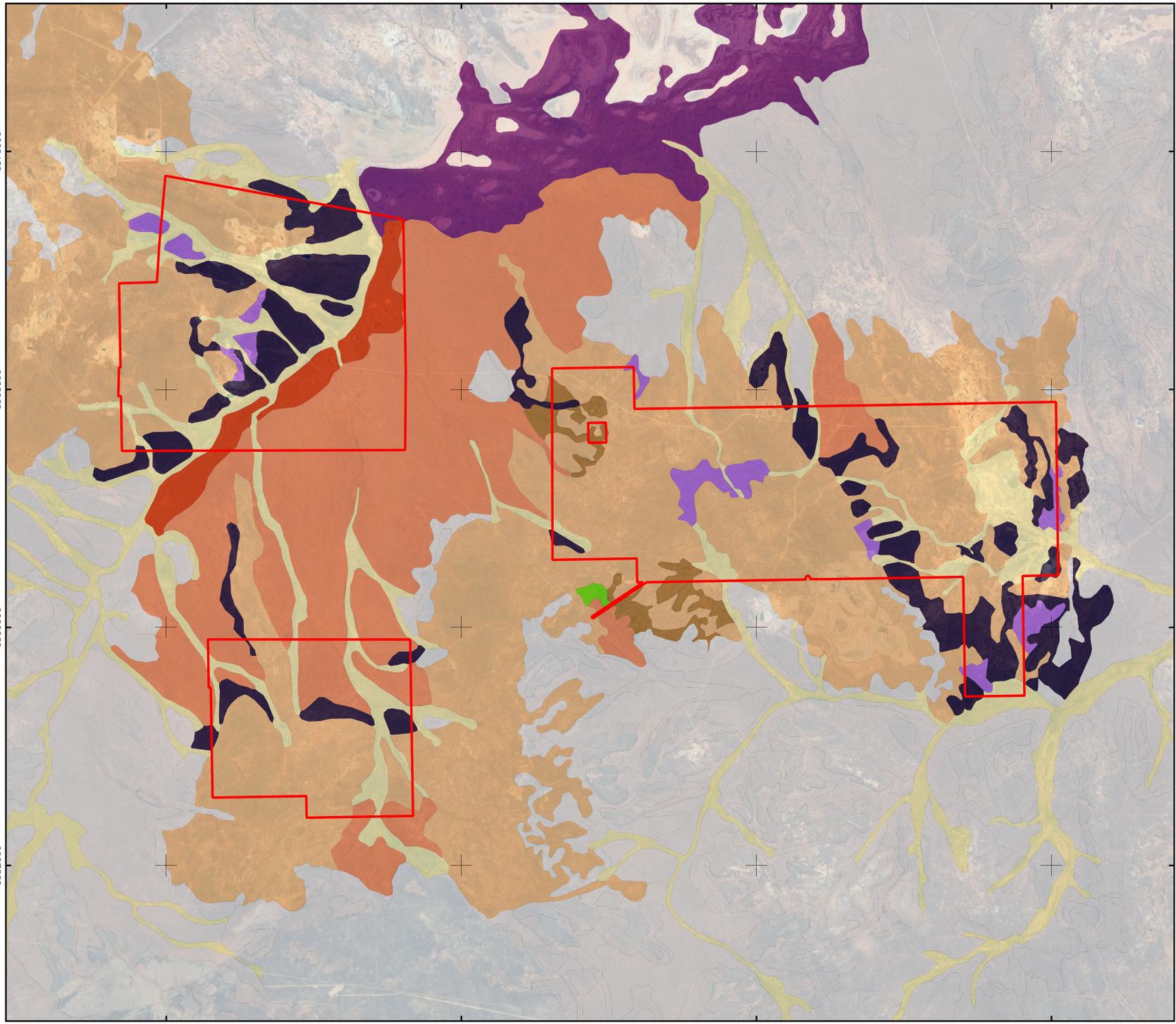
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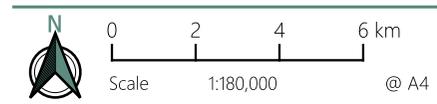
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### Legend

- Hamptons Survey Area
- Unit Code**
- A-YPP
- Af-YPP
- C-YPP
- Lm-YPP
- Rr-f-YPP
- Rs-g-YPP
- Rs-l-YPP
- W-YPP
- X-YPP
- Units not in SA



Coordinate System: GDA 2020 MGA Zone 51  
 Projection: Universal Transverse Mercator  
 Units: Metre



Author: ZG Date: 27-09-2024

## Surface Geology

Mt Marion - Hamptons Tenement -  
 Detailed Flora & Vegetation  
 Assessment

Prepared for  
 Mineral Resources Limited

MAP  
1.2

## 1.7. Beard Vegetation Association Mapping

Pre-European vegetation mapping was originally undertaken by Beard (1975) at various scales across the state and has since been updated to be consistent with the NVIS descriptions at a scale of 1:250,000 (Department of Primary Industries and Regional Development, 2019). State-wide vegetation statistics are available from 2018 for these associations which lists pre-European extent, current extent, area in DBCA managed lands. Pre-European mapping is a useful tool to determine if a vegetation association is rare or otherwise significant by comparing current extents with pre-European extents (DBCA 2019a).

Seven Beard Vegetation Associations (BVAs) occur within the Survey Area (Table 1.2; Map 1.3). The most common is BVA9, which comprises 63.8% of the Survey Area, followed by BVA936, which comprises 29.5% of the Survey Area. The remaining five BVAs covered less than 6.7% of the Survey Area, collectively. All BVAs, except for BVA125, 128, and 1413, are restricted to the Coolgardie bioregion and all have over 88.0% of the pre-European vegetation extent remaining. BVA123 may be restricted in WA with only a small extent mapped (8,902 ha). None of the other BVAs appear to be restricted in WA.

Table 1.2: Beard Vegetation Associations

BVA	NVIS Level V Description	Area in Survey Area (ha)	% of Survey Area	Pre-European Extent WA (ha)	Current Extent WA (ha)	Current Coolgardie Extent WA (ha)	% Pre-European Extent Remaining	% of Current WA Extent in Survey Area	% Current Coolgardie Extent in Survey Area
9	<i>Eucalyptus torquata</i> , <i>Eucalyptus lesouefii</i> , and <i>Eucalyptus clelandii</i> low woodland, over <i>Eremophila scoparia</i> , <i>Eremophila glabra</i> , and <i>Eremophila oldfieldii</i> tall sparse shrubland.	14,400.9	63.8	240,509	235,162	235,101	97.8	6.1	6.1
123	<i>Casuarina cristata</i> , <i>Myoporum platycarpum</i> , <i>Callitris columellaris</i> low woodland, over <i>Eremophila miniata</i> , and <i>Grevillea sarissa</i> tall shrubland, over <i>Atriplex hymenotheca</i> , <i>Maireana</i> spp., low chenopod shrubland	98.7	0.4	9,090	8,902	8,902	97.9	1.1	1.1
125	Bare areas; salt lakes	128.5	0.6	3,477,666	3,144,348	504,858	92.8	<0.1	<0.1
128	Bare areas; rock outcrops.	134.1	0.6	327,982	288,766	183,891	88.0	0.1	0.1
468	<i>Eucalyptus salmonophloia</i> and <i>Eucalyptus dundasii</i> mid woodland.	997.8	4.4	66,475	62,253	61,727	93.7	1.6	1.6
936	<i>Eucalyptus salmonophloia</i> , <i>Eucalyptus lesouefii</i> , and <i>Eucalyptus transcontinentalis</i> mid woodland, over <i>Atriplex</i> spp. open chenopod shrubland	6,670.9	29.5	57,830	57,459	57,459	99.4	11.6	11.6
1413	<i>Acacia</i> spp., <i>Allocasuarina campestris</i> , and <i>Melaleuca uncinata</i> tall shrubland.	151.3	0.7	1,679,916	1,286,855	1,042,554	98.2	1.8	1.8

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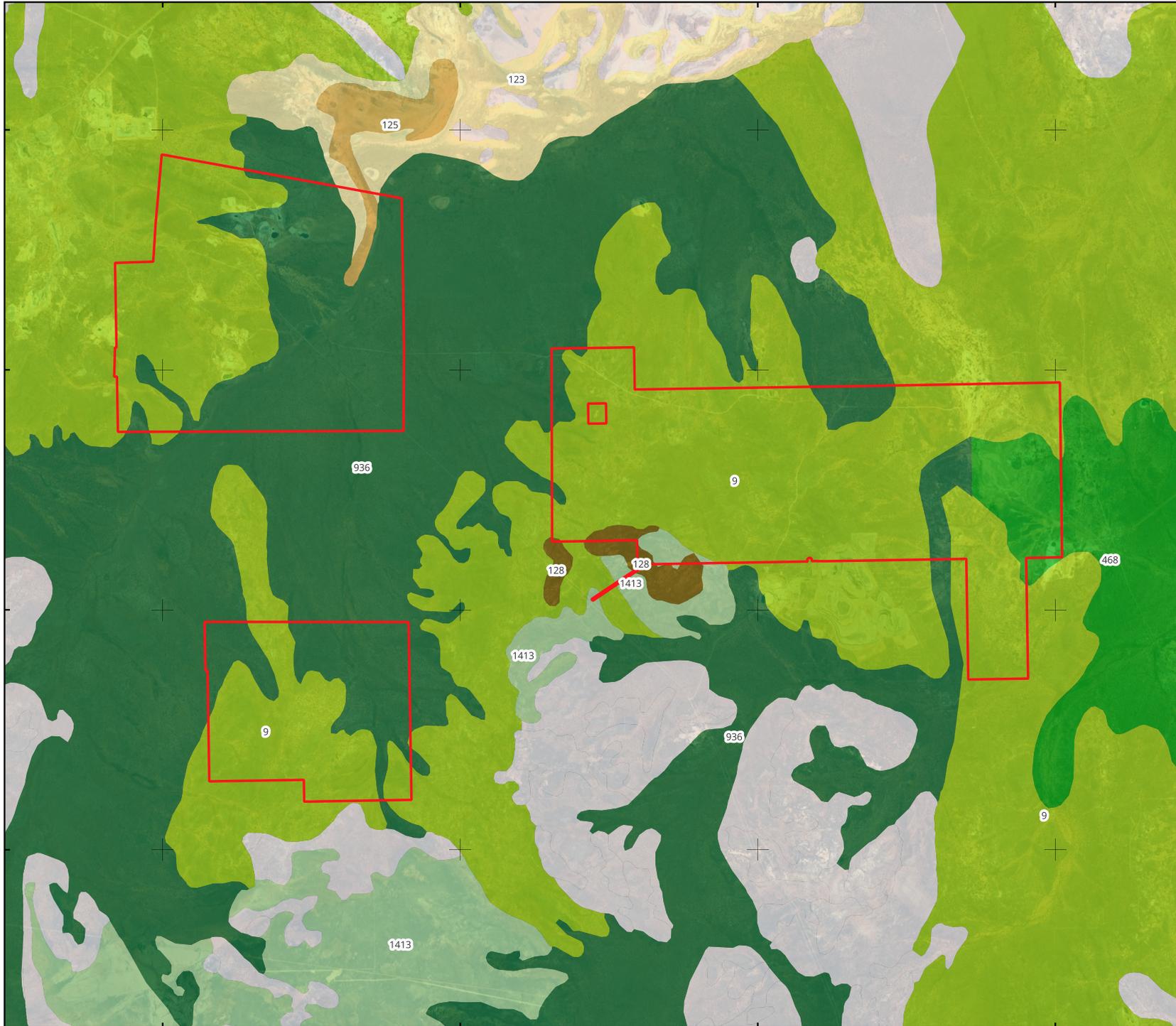
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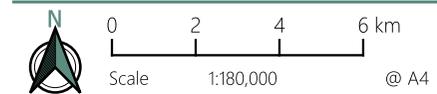


### Legend

Hamptons Survey Area

#### BVA

- 9
- 123
- 125
- 128
- 468
- 936
- 1413
- BVAs Not in SA



Coordinate System: GDA 2020 MGA Zone 51  
Projection: Universal Transverse Mercator  
Units: Metre



Author: ZG

Date: 12-09-2024

## Beard Vegetation Association

Mt Marion - Hamptons Tenement -  
Detailed Flora & Vegetation  
Assessment

Prepared for  
Mineral Resources

MAP

# 1.3

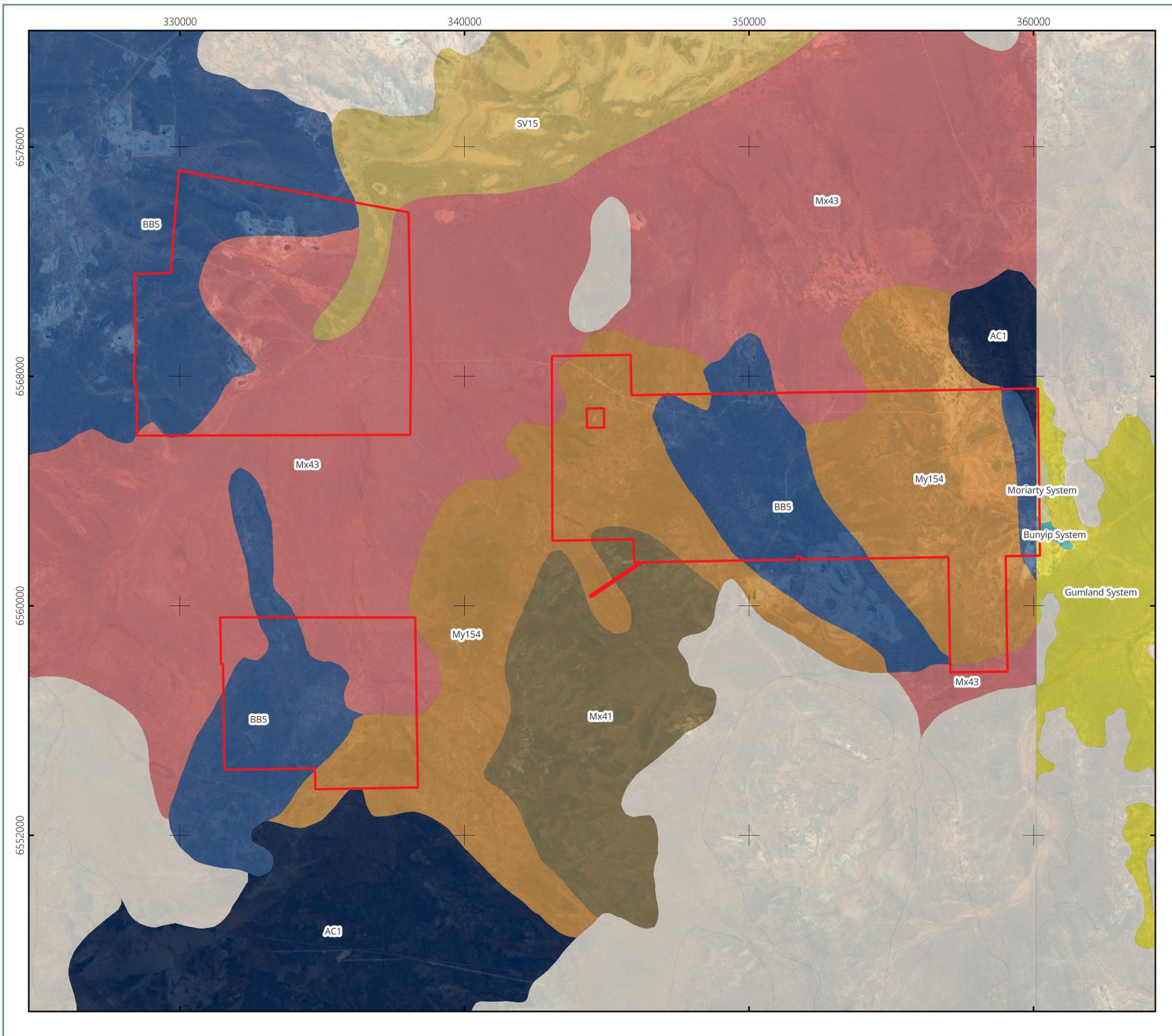
## 1.8. Land Systems

The Land Systems of Western Australia have been mapped at a scale of 1:250,000 (Department of Agriculture and Food Western Australia 2016). A total of nine Land Systems were mapped across the Survey Area (Table 1.3; Map 1.4), with the My154 and BB5 Land Systems being most dominant covering 34.7% and 34.5% of the Survey Area, respectively. The Mx43 Land System was the next dominant covering 26.9% of the Survey Area. The remaining Land Systems cover less than 3% of the Survey Area.

My154 has a large percentage of its total WA extent within the Survey Area (9.1%). All other Land Systems are well represented in the region, with the Survey Area containing less than 3.0% of each Land Systems extent in WA. None of the Land Systems appear to be restricted in WA with the Bunyip system having the lowest extent (26,384 ha).

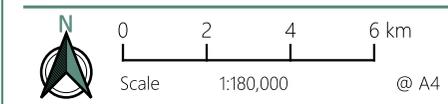
**Table 1.3: Land Systems**

Description	Area in Survey Area (ha)	% of Survey Area	Total WA Extent (ha)	% of Total Extent within Survey Area
<b>AC1:</b> Gently sloping to gently undulating plateau areas, or uplands, on granites, gneisses, and allied rocks, with long gentle slopes and, in places, abrupt erosional scarps	60.8	0.3	2,253,031	<0.1
<b>BB5:</b> Rocky ranges and hills of greenstones-basic igneous rocks.	7775.8	34.5	256,642	3.0
<b>Bunyip System:</b> Gilgaied drainage tract, draining greenstone hills supporting mixed halophytic shrublands occasionally with a black oak overstorey.	6.0	<0.1	26,384	<0.1
<b>Gumland System:</b> Extensive pedepains supporting eucalypt woodlands with halophytic and non-halophytic shrub understoreys.	22.0	0.1	228,800	<0.1
<b>Moriarty System:</b> Low greenstone rises and stony plains supporting chenopod shrublands with patchy eucalypt overstoreys.	22.5	0.1	99,584	<0.1
<b>Mx41:</b> Flat to undulating pediments marginal to unit AC1; granitic rock outcrop; some low escarpments.	186.9	0.8	175,256	0.1
<b>Mx43:</b> Gently undulating valley plains and pediments; some outcrop of basic rock.	6073.1	26.9	1,870,520	0.3
<b>My154:</b> Undulating country on acid volcanic rocks and sedimentary materials.	7843.7	34.7	85,931	9.1
<b>SV15:</b> Gently sloping to gently undulating plateau areas, or uplands, on granites, gneisses, and allied rocks, with long gentle slopes and, in places, abrupt erosional scarps.	591.5	2.6	118,249	0.5



### Legend

- Hamptons Survey Area
  
- Land System**
- AC1
- BB5
- Bunyip System
- Gumland System
- Moriarty System
- Mx41
- Mx43
- My154
- SV15
- Land Systems Not in SA



Coordinate System: GDA 2020 MGA Zone 51  
 Projection: Universal Transverse Mercator  
 Units: Metre



Author: ZG Date: 12-09-2024

## Land Systems

Mt Marion - Hamptons Tenement -  
 Detailed Flora & Vegetation  
 Assessment

## 1.9. Significant Lands

Fourteen significant lands are located in the desktop Study Area (within 50 km of the Survey Area). These are listed in Table 1.4 and displayed on Map 1.1 and are described in the following sections.

**Table 1.4: Environmentally Significant Areas within the Study Area**

Reserve Name (Protected Area ID)	Distance from Survey Area (km)
<b>Conservation Estate</b>	
Yallari Timber Reserve	0 km (adjacent to boundary)
Scahill Timber Reserve	0 km (adjacent to boundary)
Kambalda Nature Reserve	5.0 km southeast
Kangaroo Hills Timber Reserve	9.5 km east
Kurrawang Nature Reserve	13.0 km north
Lakeside Timber Reserve	18.5 km north
Burra Conservation Park	23.5 km south
Goldfields Woodlands Conservation Park	24.3 km southwest
Kalgoorlie Arboretum	27.6 km north
Victoria Rock Nature Reserve	35.9 km southwest
Goldfields Woodlands National Park	44.8 km west
Dordie Rocks Nature Reserve	45.1 km south
<b>TECs/PECs</b>	
0	-
<b>Environmentally Sensitive Areas</b>	
2	35.9 km southwest
<b>Wetlands</b>	
0	-

### 1.9.1. Conservation Estate

The Western Australian conservation estate includes land and waters vested in the Conservation and Parks Commission under the Conservation and Land Management Act (DBCA, 1984). The conservation estate is generally managed by the DBCA to protect Western Australia's biodiversity and includes National Parks, Nature Reserves, Conservation Reserves, and other areas managed primarily for biodiversity conservation (Department of Climate Change Energy the Environment and Water, 2022). A total of 12 Conservation Reserves occur within the desktop Study Area (Table 1.4; Map 1.1). None of these occur within the Survey Area, with the Yallari and Scahill Timber Reserves appearing adjacent to the boundary of the Survey Area.

### 1.9.2. Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESA) are defined by the Department of Water and Environmental Regulation (Department of Water and Environmental Regulation, 2019) as:

- A defined wetland and the area within 50 m of a wetland;
- The area covered by vegetation within 50 m of Threatened flora, to the extent to which the vegetation is continuous with the vegetation in which the Threatened flora is located;
- The area covered by a Threatened Ecological Community (TEC);
- A Bush Forever site;

- Areas covered by the Gngangara Mound Crown Land Policy and Western Swamp Tortoise Policy; and
- Areas covered by lakes, wetlands, and fringing vegetation of the Swan Coastal Plain Lakes Policy, including South-west Agricultural Zone Wetlands Policy and Swan and Canning Rivers Policy.

There are two ESAs located within the desktop Study Area (Table 1.4; Map 1.1).

### 1.9.3. Australian Wetlands Database

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

No nationally significant wetlands, including Ramsar wetlands, were mapped within the desktop Study Area. The closest wetland of national significance is the Rowles Lagoon System which is located 64.1 km to the northwest (Table 1.4; Map 1.1).

## 2. METHODS

### 2.1. Desktop Assessment

A desktop review of relevant and available biological data sources of the desktop Study Area was undertaken prior to the field survey, to assess the flora and vegetation likely to occur across the Survey Area. The desktop Study Area includes a buffer of approximately 50 km surrounding the Survey Area, or as listed in Table 2.1, and displayed on Map 1.1.

#### 2.1.1. Biological Database Searches

The following databases were searched and incorporated into the desktop assessment (Table 2.1).

**Table 2.1: Summary of Database Searches**

Data Source	Custodian	Details	Buffer
Commonwealth Protected Matters Search Tool (PMST)	Department of the Environment and Energy (DoEE)	Date: 10/08/2023	50 km
Dandjoo	Department of Parks and Wildlife / Western Australian Museum (WAM)	Date: 10/08/2023	50 km
DBCA Threatened & Priority Flora Databases (TPFL / WA Herbarium)	Department of Biodiversity Conservation and Attraction (DBCA)	Date: 9/08/2023 Reference: 17-0823FL	85 km
DBCA Communities Database	DBCA	Date: 11/08/2023 Reference: 09-0823EC	100 km
Index of Biodiversity Surveys and Assessments (IBSA) Database	Department of Water and Environmental Regulation (DWER)	Date: 10/08/2023	50 km
Previously conducted biological assessments	Various sources	Date: 10/08/2023	50 km

#### 2.1.2. Literature Review

Previously conducted assessments within the desktop Study Area were reviewed for significant flora and vegetation (Table 2.2). Reports were incorporated if they were provided by MinRes, or if they were publicly available.

**Table 2.2: Previously Conducted Biological Assessments**

Biological Assessment Name	Survey Level	Survey Timing	Distance to Survey Area
Reconnaissance Flora and Vegetation Survey for the Mt Marion Project Area (Native Vegetation Solutions, 2019)	Reconnaissance – flora.	May 2012 – Jul 2018	0 km
Mt Marion Project Reconnaissance Flora and Vegetation Assessment (ecologia, 2022)	Reconnaissance – flora.	Oct 2021	0 km
WestGold Location 53 East Flora and Fauna Assessment (GHD, 2018)	Detailed – flora; Detailed – fauna.	Mar 2018	0 km
Reconnaissance Flora and Vegetation Survey of the Spargos Project (Native Vegetation Solutions, 2020)	Reconnaissance – flora.	Oct 2020	7 km S

Biological Assessment Name	Survey Level	Survey Timing	Distance to Survey Area
Evolution Mining Targeted Flora Calandrinia Memo (Spectrum Ecology & Spatial, 2019)	Targeted – flora.	Nov 2019	20 km N
Flora and vegetation survey for Mungari Gold Operations Cutters Ridge Project (Phoenix Environmental Sciences, 2019)	Detailed – flora.	Jun & Oct 2018	20 km N

### 2.1.3. Likelihood of Occurrence of Significant Flora

The following information was collated for each significant flora taxon or TEC/PEC identified during the desktop assessment:

- Conservation status (EPBC Act, BC Act, DBCA listing);
- Description of species and flowering period;
- Description of habitat requirements;
- Description of previous records; and
- Distance of record to the Project.

A likelihood of occurrence assessment was then conducted using the criteria listed in Table 2.3. This included assessing the distance of the record from the Project (historical database records considered not accurate were excluded if required), presence of appropriate habitats within the Survey Area (using geology, vegetation mapping, and/or aerial imagery).

**Table 2.3: Likelihood of Occurrence Criteria**

Likelihood	Flora & Vegetation
<b>Recorded</b>	Species or vegetation community accurately recorded within the Survey Area during the literature review (includes TEC/PEC buffers that intersect).
<b>High</b>	Species or vegetation community recorded within 10 km near the Survey Area, and suitable habitat does, or is likely, to occur.
<b>Medium</b>	Species or vegetation community recorded outside the Survey Area but within 30 km and suitable habitat may occur.
<b>Low</b>	Species or vegetation community rarely or not recorded within 50 km of the Survey Area and suitable habitat is not likely to occur within the Survey Area.

## 2.2. Survey Timing

Phase 1 (primary season) was undertaken in spring from the 26 September to 2 October 2023 and Phase 2 (secondary season) of the survey was undertaken in autumn from the 3 April to the 15 April 2024. Rainfall data was extracted from the Scientific Information for Land Owners (SILO) database (Queensland Government, 2024) for the centre of the Mt Marion Study Area (-30.78, 121.45). SILO sources climatic data from the Bureau of Meteorology (BOM) and interpolates data between weather stations to provide a complete data set for any location. Figure 2 represents the total monthly rainfall for 2023 to 2024 with the monthly long-term median rainfall. The BOM reference climate normal period of January 1961 to December 1990 was used for calculating climate statistics and evaluating rainfall conditions recorded prior to the survey (Bureau of Meteorology, 2024a). Rainfall conditions were considered 'typical' if the total rainfall recorded over a period was between the 25<sup>th</sup> and 75<sup>th</sup> percentiles, for annual rainfall this range was 192.8 mm to 315 mm. Rainfall totals outside of the typical range were considered 'dry' or 'wet', and 'very dry' or 'very wet' if they were below the 10<sup>th</sup> or above the 90<sup>th</sup> percentiles, respectively (Bureau of Meteorology, 2024b). The following data was recorded:

### Phase 1 (26/09/2023):

In the year preceding the phase 1 survey, 191.5 mm of rainfall was recorded at the site, 83.9 mm lower than the median of the long term total annual rainfall (275.9 mm) for the same period.

A total of 75.4 mm of rainfall was recorded in the three months prior to the survey (26 June to 26 September 2023), 17.9 mm higher than the median of the long-term total rainfall (57.55 mm) for the same period.

The rainfall conditions were typical for the three months preceding the phase 1 survey and dry compared to the annual conditions of the climate reference period.

### Phase 2 (03/04/2024):

In the year preceding the phase 2 survey, 217.4 mm of rainfall was recorded at the site, 58.9 mm lower than the median of the long term total annual rainfall (275.9 mm) for the same period.

A total of 109 mm of rainfall was recorded in the three months prior to the survey (3 January to 3 April 2024), 61.4 mm higher than the median of the long-term total rainfall (47.6 mm) for the same period.

The rainfall conditions were seasonally wet for the three months preceding the phase 2 survey and typical compared to the annual conditions of the climate reference period and may have been more favorable for plant growth than usual.

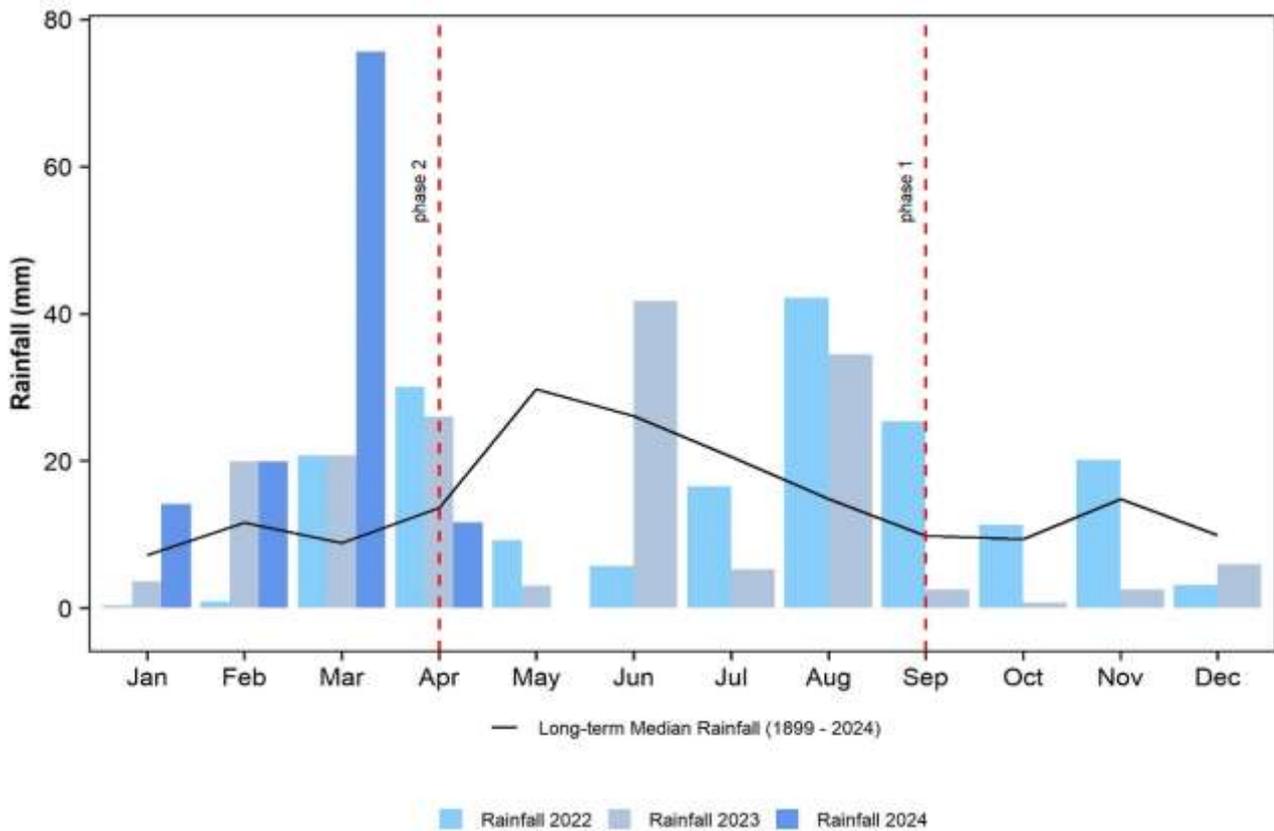


Figure 2.1. Rainfall Data at SILO Request Location (-30.78, 121.45)

The Coolgardie bioregion is considered part of the Southwestern Interzone Botanical province and recommendations are to conduct the primary flora and vegetation survey in spring from September to November and the secondary survey following rain in autumn from March to May (EPA 2016b). The field survey timing was therefore conducted in accordance with EPA recommendations.

## 2.3. Field Methods & Sampling Effort

A two-phased detailed flora and vegetation assessment was undertaken at the Survey Area. The survey was completed by six botanists across the two phases for a total of 64 field days (40 person-days in phase 1 and 24 person-days in phase 2).

There were a total of 105 quadrats (47 phase 1, 58 phase 2), 24 relevés (16 phase 1, 8 phase 2), and 328.5 km of targeted traverses sampled during the assessment (Map 2.1). This was considered appropriate for a detailed level survey as stipulated in the technical guidance (EPA 2016b) these techniques are described in Map 2.1. Comprehensive flora site data collection information is included in Appendix B.

**Table 2.4: Flora & Vegetation Survey Technique**

Technique	Application & Purpose
<b>Quadrats</b>	<p>Quadrats are comprehensive survey technique for gathering information for detailed flora and vegetation survey. Each vegetation unit must be represented by a minimum of three quadrats where possible and have at least one corner permanently marked. Information collected at each quadrat include:</p> <ul style="list-style-type: none"> <li>• Site code, date; GPS coordinates; botanist;</li> <li>• Size and shape of quadrat (quadrats are 20 x 20 m or 400 m<sup>2</sup> for Coolgardie IBRA region);</li> <li>• Photograph from north-west corner;</li> <li>• Landform, including; slope, aspect, soil description and rock type;</li> <li>• Time since fire (quadrats are not sampled if quadrats have a recent fire history);</li> <li>• Vegetation condition (quadrats are not installed if not in a 'Good' or better condition (section 0));</li> <li>• Description of disturbance types;</li> <li>• Vegetation description (NVIS Level V);</li> <li>• Comprehensive species list, canopy cover (%) and height (m).</li> </ul>
<b>Relevés</b>	<p>Relevés are a low intensity survey technique for gathering information where vegetation is in 'Degraded' or 'Completely Degraded' vegetation condition, recently burnt areas, or where it is too unsafe to survey using a quadrat (cliff faces etc.). Information collected at each relevé includes:</p> <ul style="list-style-type: none"> <li>• Site code, date, GPS coordinates, botanist;</li> <li>• A photograph;</li> <li>• Vegetation condition and disturbances (including fire);</li> <li>• Landform including; slope, soil, rock type, aspect;</li> <li>• Vegetation description (NVIS Level V);</li> <li>• Dominant species list, canopy cover (%) and height (m); and</li> <li>• Significant flora, weeds.</li> </ul>
<b>Traverses</b>	<p>A traverse is an unmarked route along which data is collected. Traverses are useful for identifying the boundaries and characteristics of vegetation types, selecting sites for detailed survey, and targeting significant flora or vegetation. Information recorded along a traverse is as for the relevé, with the addition of noting vegetation changes and relationships between vegetation and substrate.</p>
<b>Opportunistic Sampling</b>	<p>Flora and vegetation not recorded through other sampling methods is opportunistically sampled as encountered in the Survey Area.</p>

330000

340000

350000

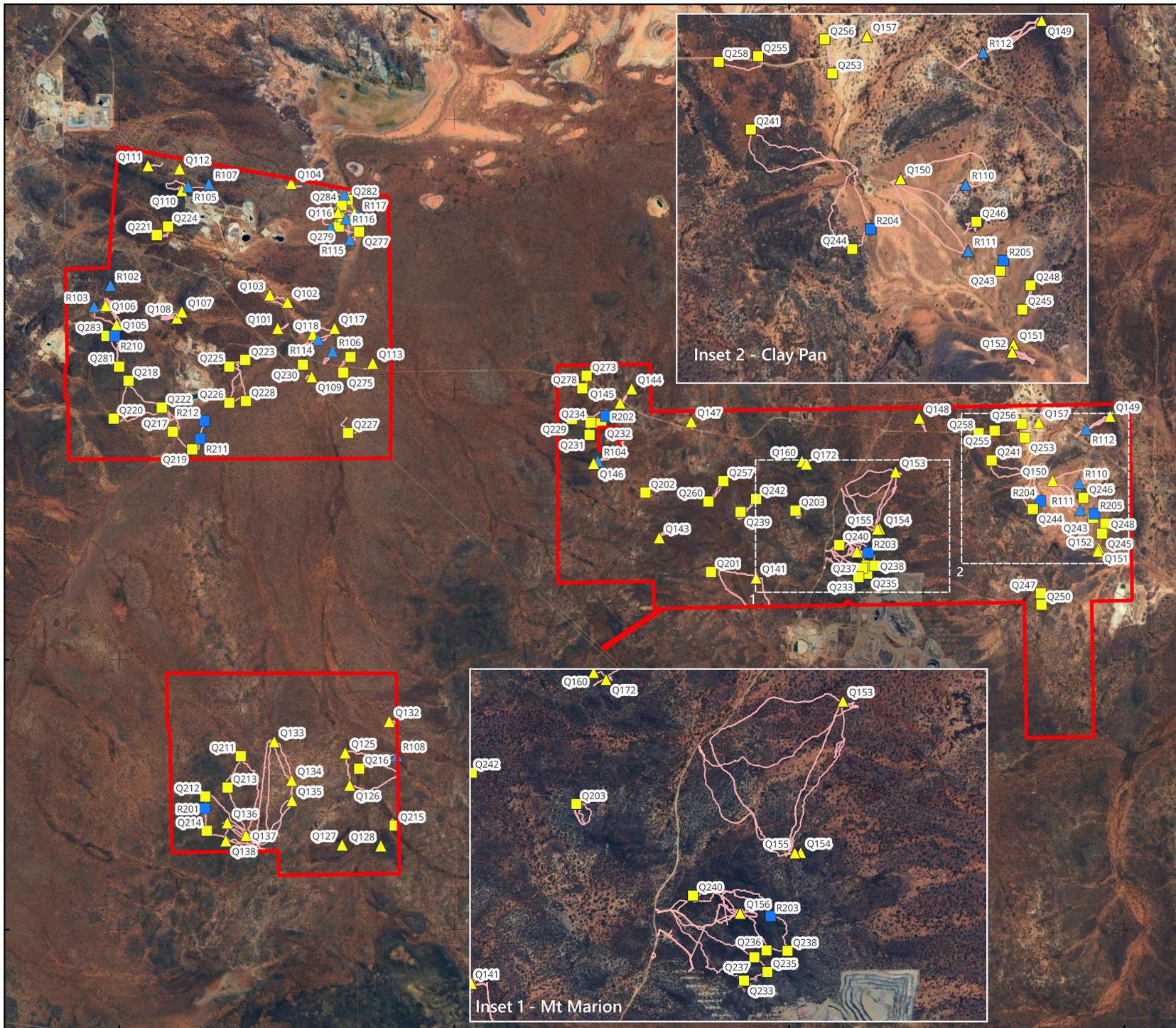
360000

6576000

6568000

6560000

6552000



### Legend

Hamptons Survey Area

#### Phase 1 Sample Sites

Quadrat

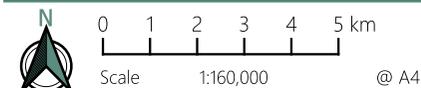
Releve

#### Phase 2 Sample Sites

Quadrat

Releve

Traverses



Coordinate System: GDA 2020 MGA Zone 51  
Projection: Universal Transverse Mercator  
Units: Metre



Author: ZG

Date: 19-09-2024

## Sampling Effort

Mt Marion - Hamptons Tenement -  
Detailed Flora & Vegetation  
Assessment

MAP

# 2.1

Prepared for  
Mineral Resources Limited

## 2.4. Reporting & Data Analysis

### 2.4.1. Flora Nomenclature, Taxonomy & Lodgement

Flora nomenclature used in this report is consistent with the Western Australian Herbarium's (WAH) plant census, provided on FloraBase (Western Australian Herbarium, 2024) and is current at the time of report preparation.

At least one specimen of each flora taxon was collected to confirm all species recorded during the assessment and to investigate any suspected flora of significance (Threatened and Priority Flora and novel taxa).

Specimens were identified using the appropriate taxonomic keys and relevant taxonomic experts at the WAH were consulted as required. Applicable specimens will be vouchered with the WAH as per guidance; including one per species of Threatened or Priority Flora, new occurrences of TECs or PECs, individuals that have atypical characteristics, or bioregional range extensions.

### 2.4.2. Vegetation Mapping

Vegetation mapping was undertaken for a larger project area that encompassed the Survey Area within. The data collected from quadrats, relevés, and traverses, as well as general field notes, observations and aerial photography from the larger project, were used to map the vegetation across the Survey Area. The vegetation was described to NVIS Level V – association (referred to as a 'vegetation types (VT)' for the local scale in this report). This level of description provides information on the dominant growth form, height, and cover for up to three species for each of the upper, mid, and ground strata (ESCAVI, 2003).

The VTs were defined floristically, where quadrats were statistically classified according to similarities in species composition. The statistical analysis was performed in R Core Team (R Core Team, 2019) using the "stats" and "vegan" (Oksanen *et al.*, 2022) packages. Dissimilarity indices were calculated using the vegdist function with the Jaccard index on a binary species matrix. Hierarchical clustering was performed using the hclust function using the 'average' or unweighted pair group with arithmetic mean (UPGMA) method. Figures of the hierarchical clustering were produced using the "dendextend" package (Galili, 2015).

Sites were excluded from the analysis if they were sampled on mosaic vegetation or had low perennial species diversity. A total of 143 quadrats were used in the analysis which included 69 phase 1 quadrats and 74 phase 2 quadrats. Of these, 43 phase 1 and 49 phase 2 quadrats were within the Hamptons Survey Area. The following data preparation steps were undertaken prior to the floristic analysis:

- Subspecies, varieties, and some species were combined where difficult to differentiate in the field;
- Annual taxa, herbs, short-lived perennials, and rhizomatous perennials were removed; and
- Only taxa with their taxonomy resolved to at least species level were included, unless they were the only species recorded in that genus.

The combined site by species matrix used for this analysis has been provided electronically.

Due to the size of the Survey Area, extrapolation of the vegetation types was required in areas where there was an absence of quadrats, relevés or field notes. In addition to this, area calculations for vegetation mapping and condition may vary (+/- 0.1%) compared to the Survey Area extent. This is because shapefiles do not contain an x,y tolerance and can impact the accuracy of shapefile vertices. This inefficiency is only noticeable when dealing with large numbers of features, as is the case for the size of the Survey Area.

### 2.4.3. Vegetation Condition

Vegetation condition was recorded at quadrats, relevés and while walking traverses where areas of different vegetation condition were observed. The vegetation condition was scored using the scale recommended for the Interzone Botanical Province as shown in Table 2.5 (EPA 2016b). Areas with no vegetation present (roads, tracks, infrastructure areas) have been mapped as ‘Completely Degraded’.

Table 2.5: Vegetation Condition Scale & Criteria

Condition	Disturbance Criteria – Southwestern Interzone Botanical Province
Pristine	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Excellent	Vegetation structure intact disturbance affecting individual species and weeds are no-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging, and grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it, Disturbance to vegetation caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback, and grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback, and grazing.
Completely Degraded	The structure of the vegetation is no longer intact, and the area is completely or almost completely without native species. These areas are often described as ‘parkland cleared’ with the flora comprising weed or crop species with isolated native trees and shrubs.

### 2.4.4. Significant Flora & Vegetation Definitions

As defined by the (EPA 2016b) Environmental Factor Guideline, flora and vegetation can be considered significant for a range of reasons (Table 2.6; Appendix A). In addition to these definitions, flora and vegetation that are susceptible to impacts are included and discussed as significant, i.e. Groundwater Dependant Ecosystems (GDE).

Table 2.6: Flora & Vegetation Significance Definitions

Significant Definitions (EPA 2016b)	
Flora	<ul style="list-style-type: none"> <li>• Being identified as Threatened (state listed WC Act and/or nationally listed EPBC Act).</li> <li>• Being identified as Priority species: Priority 1 to 4, (Department of Biodiversity Conservation and Attractions, 2019b).</li> <li>• Locally endemic or association with a restricted habitat type (e.g. surface water or groundwater dependant ecosystems).</li> <li>• New species or anomalous features that indicate a potential new species.</li> <li>• Representative of the range of a species (particularly, at the extremes of range recently discovered range extensions, or isolated outliers of the main range).</li> <li>• Unusual species, including restricted subspecies, varieties or naturally occurring hybrids;</li> <li>• Relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.</li> </ul>
Vegetation	<ul style="list-style-type: none"> <li>• Identified as TEC (state listed WC Act and/or nationally listed EPBC Act).</li> <li>• Identified as PEC (Department of Biodiversity Conservation and Attractions, 2023).</li> <li>• Restricted distribution.</li> <li>• Degree of historical impact from threatening processes.</li> <li>• A role as a refuge.</li> <li>• Providing an important function required to maintain ecological integrity of a significant ecosystem.</li> <li>• Vegetation that is highly disturbed can reduce the significance.</li> </ul>

#### 2.4.5. Local & Regional Context of Flora & Vegetation

Flora and vegetation recorded during the survey have been considered at a local and regional scale. The local area includes the Survey Area and near vicinity, and the regional area includes the IBRA region or subregion. Considerations used to determine the local and regional context of flora and vegetation recorded at the Survey Area are listed in Table 2.7.

**Table 2.7: Local & Regional Context Definitions**

Group	Local & Regional Context Considerations	
Flora	<b>Local</b>	
	Not locally significant	<ul style="list-style-type: none"> <li>Flora taxon well known from the local area.</li> <li>Landforms/habitat the flora taxon occurs on are widespread through the local area.</li> <li>Flora taxon may occur across multiple landforms and habitats.</li> </ul>
	Locally significant	<ul style="list-style-type: none"> <li>Flora taxon not well known from the local area.</li> <li>Landforms/habitat the flora taxon occurs are restricted through the local area.</li> <li>Flora taxon may occur on restricted habitat type.</li> </ul>
	<b>Regional</b>	
	Not regionally significant	<ul style="list-style-type: none"> <li>Flora taxon's known distribution extends over the region or sub-region.</li> <li>Flora taxon's known distribution may span over multiple IBRA regions.</li> </ul>
	Regionally significant	<ul style="list-style-type: none"> <li>Flora taxon's known distribution is only known from few locations across the IBRA region or sub-region.</li> <li>May be common in the local area, but only known from the Survey Area within the IBRA region or sub-region.</li> </ul>
Vegetation	<b>Local</b>	
	Not locally significant	<ul style="list-style-type: none"> <li>VTs mapped extent is widespread across the Survey Area or local area.</li> <li>Landforms/habitat the VT occurs on are widespread in the local area, despite a low mapped area in the Survey Area.</li> </ul>
	Locally significant	<ul style="list-style-type: none"> <li>VTs mapped extent is restricted in the Survey Area.</li> <li>Landforms/habitat the VT occurs on are restricted in the local area.</li> <li>VT provides habitat for locally significant flora taxa.</li> </ul>
	<b>Regional</b>	
	Not regionally significant	<ul style="list-style-type: none"> <li>Determined by comparing VTs to the best available data source. This can include state-wide vegetation mapping (Beard), region specific (if available), land system and/or geology mapping.</li> <li>VTs are matched with regional mapping units (listed above) that are widespread throughout the IBRA region or sub-region.</li> </ul>
	Regionally significant	<ul style="list-style-type: none"> <li>VTs are matched with regional mapping units (listed above) that are restricted throughout the IBRA region or sub-region.</li> <li>VT provides habitat for regionally significant flora taxa.</li> </ul>

#### 2.4.6. Introduced Flora, WoNS & Declared Plant Categories

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

There are 32 Weeds of National Significance (WoNS) listed for Australia that have been identified based on their invasive tendencies, impact, potential for spread, and socioeconomic and environmental impacts (Invasive Plants and Animals Committee, 2017). Each species has a national management strategy and manual available.

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

The EPA required that all biological surveys collecting data on biodiversity will submit the report and associated raw data to IBSA as an IBSA data package. All survey data collected at the Survey Area has been provided electronically to comply with IBSA and MinRes data standards.

## 2.6. Project Team & Licences

Spectrum personnel involved with this assessment are listed in Table 2.8, along with their role and years of experience.

Table 2.8: Project Team & Licences

Staff	Qualification	Role	Project Tasks	Years of Experience	Flora Licence
Melissa Hay	BSc (Hons)	Principal Botanist	Project management, field survey lead (Phase 1 and 2), data analysis, vegetation mapping, reporting, quality control	17	FB62000006-2
Scott Hitchcock	BSc	Principal Botanist	Project management, field survey (Phase 1), reporting, quality control	19	FB62000561
Susan Murrey	BSc, MSc	Senior Botanist	Field survey (Phase 1)	5	FB62000101-1b
Emily Crowther	BSc, MSc	Botanist	Field survey (Phase 1)	3	FB62000330
Zane Gates	BSc	Botanist	Field survey (Phase 1 and 2), data analysis, reporting	2	FB62000426-2
Chris Urbanek	BSc	Spatial Ecologist	Field survey (Phase 1)	5	FB62000420
Dr Udani Sirisena	PhD	Taxonomist	Plant identifications (Phase 1 and 2)	11	-
Raimond Orifici	BSc (Hons)	Taxonomist	Plant identifications (Phase 1 and 2)	22	-

## 2.7. Limitations & Constraints

Survey specific limitations and constraints for the flora assessment at the Survey Area are discussed in Table 2.9.

Table 2.9: Survey Limitations & Constraints

Limitation	Constraint	Comment
Availability of the contextual information at a regional and local scale.	No	There was no regional vegetation mapping available, however Beard vegetation, geology and land system mapping were used to determine regional significance of VTs. Database searches provided detailed information, adequate to guide field survey design and effort for the flora survey. There were multiple assessments conducted within and in the vicinity of the Survey Area and have been included in the desktop assessment.
Competency/experience of the consultant carrying out the survey including experience in bioregion surveyed.	No	Principal Botanist Melissa Hay (field team lead on both phases) and Scott Hitchcock have extensive knowledge and experience conducting botanical surveys in the Coolgardie IBRA region of WA. Additionally, the remainder of the team have suitable knowledge in conducting botanical surveys in WA with some experience in the Coolgardie IBRA region and were paired with more experienced personnel when necessary.

Limitation	Constraint	Comment
Timing/weather/season/cycle.	No	The field survey timing of both phases were considered appropriate for a flora and vegetation survey conducted in the Interzone Botanical province where the appropriate timing for a primary survey is spring (September to November) and for the secondary survey is following rain in autumn from March to May. There was slightly lower (5.4 mm) than median rainfall at the Survey Area in the three months prior to the Phase 1 survey, however conditions were favourable for flora species growth, with many annual species being recorded during the assessment. Rainfall was higher than the median rainfall in the preceding months of the Phase 2 survey, and the conditions were likely favourable for flora species growth.
Disturbances (e.g., fire, flood, accidental human intervention) which affected results of survey.	No	No disturbances were recorded at the Survey Area that have affected the results of the flora assessment.
Remoteness and/or access problems.	No	There were some sections of the Survey Area that were too far from tracks to walk, however vegetation was extrapolated confidentiality in these areas using aerial imagery. Heritage areas were avoided during the survey; however, this did not affect the results of the survey.
Flora Specific		
Survey effort and extent.	No	There were 162 quadrats (105 within Survey Area) and 36 relevés (24 within Survey Area) recorded from the combined survey effort with MinRes and M15/717 tenements and the Survey Area (Spectrum 2024). This was sufficient to map and classify the vegetation for a detailed level survey. All VTs were adequately sampled using a proportionally stratified approach. VTs with less than three quadrats sampled all had very low mapped extents (VT01: 36 ha, VT09: 71 ha, VT12: 9 ha) and were often additionally sampled with relevés to increase survey effort. There were 328.5 km of traverses undertaken searching for Threatened and Priority Flora within the Survey Area (with an additional 202.5 km in the MinRes and M15/717 Survey Area (Spectrum 2024). Previously recorded locations of significant flora were visited, where possible, and re-confirmed.
Proportion of flora recorded and/or collected, any identification issues.	No	At least one specimen of every flora species encountered was collected for confirmation. SAC analysis suggested that 76.6% of the taxa expected to be present were recorded within the combined quadrats from the MinRes and M15/717 Survey Area (Spectrum 2024) and the Survey Area. An additional 206 taxa were recorded in relevés and opportunistic sampling. Plants were identified by taxonomists Raimond Orifici and Udani Sirisena who have sufficient botanical and taxonomic experience throughout Western Australia and the Coolgardie bioregion. Phase 1 <i>Tecticornia</i> specimens were identified by Dr. Kelly Shepherd at the WAH and Phase 2 <i>Tecticornia</i> specimens were identified by Raimond Orifici due to Dr. Kelly Shepherd's absence. There were 16 specimens that were unable to be conclusively identified, which was attributed to insufficient material and plants being sterile.

### 3. RESULTS & DISCUSSION - FLORA

#### 3.1. Desktop Assessment

No Threatened flora species were reported from within the Survey Area during the desktop assessment. Two potential Threatened species were identified during the desktop assessment, with both assigned a 'Medium' likelihood of occurrence in the Survey Area (Table 3.1).

One Priority Flora taxon has previously been recorded in the Survey Area (Table 3.1; Map 3.1). A total of 66 further Priority Flora taxa were also identified, 12 of which are considered to have a 'High' likelihood (Table 3.1; Map 3.2 and 34 a 'Medium' likelihood of occurrence within the Survey Area (Table 3.1; Map 3.3). The remaining 19 taxa have been assigned a 'Low' likelihood of occurrence and are listed in Appendix C.

Table 3.1: Desktop Significant Flora – Recorded, High & Medium Likelihood of Occurrence

Pre-survey Likelihood	Status	Taxa
Recorded	Priority 3	<i>Eremophila acutifolia</i>
High	Priority 1	<i>Acacia websteri</i>
		<i>Dampiera plumosa</i>
		<i>Pterostylis xerampelina</i>
		<i>Thryptomene planiflora</i>
	Priority 2	<i>Austrostipa frankliniae</i> <i>Phebalium clavatum</i>
Priority 3	<i>Austrostipa turbinata</i>	
	<i>Eremophila veronica</i>	
	<i>Grevillea georgeana</i>	
Priority 4	<i>Notisia intonsa</i>	
	<i>Styphelia rectiloba</i>	
Medium	Priority 4	<i>Eremophila caerulea subsp. merrallii</i>
	Threatened	<i>Gastrolobium graniticum</i>
		<i>Tetratea spenceri</i>
	Priority 1	<i>Acacia coatesii</i>
		<i>Acacia sclerophylla</i> var. <i>teretiuscula</i>
		<i>Calandrinia lefroyensis</i>
		<i>Chamelaucium</i> sp. Parker Range (B.H. Smith 1255)
		<i>Cyathostemon divaricatus</i>
		<i>Eucalyptus websteriana</i> subsp. <i>norsemanica</i>
		<i>Lepidosperma lyonsii</i>
		<i>Lepidosperma</i> sp. Parker Range (N. Gibson & M. Lyons 2094)
		<i>Melichrus</i> sp. Coolgardie (K.R. Newbey 8698)
		<i>Phebalium appressum</i>
<i>Ptilotus procumbens</i>		
<i>Ricinocarpos digynus</i>		
Priority 2	<i>Acacia kerryana</i>	
	<i>Bossiaea laxa</i>	
	<i>Elachanthus pusillus</i>	
	<i>Eremophila praecox</i>	
	<i>Goodenia salina</i>	
	<i>Hakea rigida</i>	

Pre-survey Likelihood	Status	Taxa
		<i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) <i>Tecticornia flabelliformis</i>
	Priority 3	<i>Acacia crenulata</i> <i>Allocasuarina eriochlamys</i> subsp. <i>grossa</i> <i>Alyxia tetanifolia</i> <i>Bossiaea celata</i> <i>Chrysocephalum apiculatum</i> subsp. <i>norsemanense</i> <i>Cratystylis centralis</i> <i>Cryptandra crispula</i> <i>Eremophila microphylla</i> <i>Isolepis australiensis</i> <i>Melaleuca coccinea</i> <i>Stylidium choreanthum</i>
	Priority 4	<i>Eucalyptus jutsonii</i> subsp. <i>jutsonii</i> <i>Eucalyptus</i> x <i>brachyphylla</i> <i>Frankenia glomerata</i>

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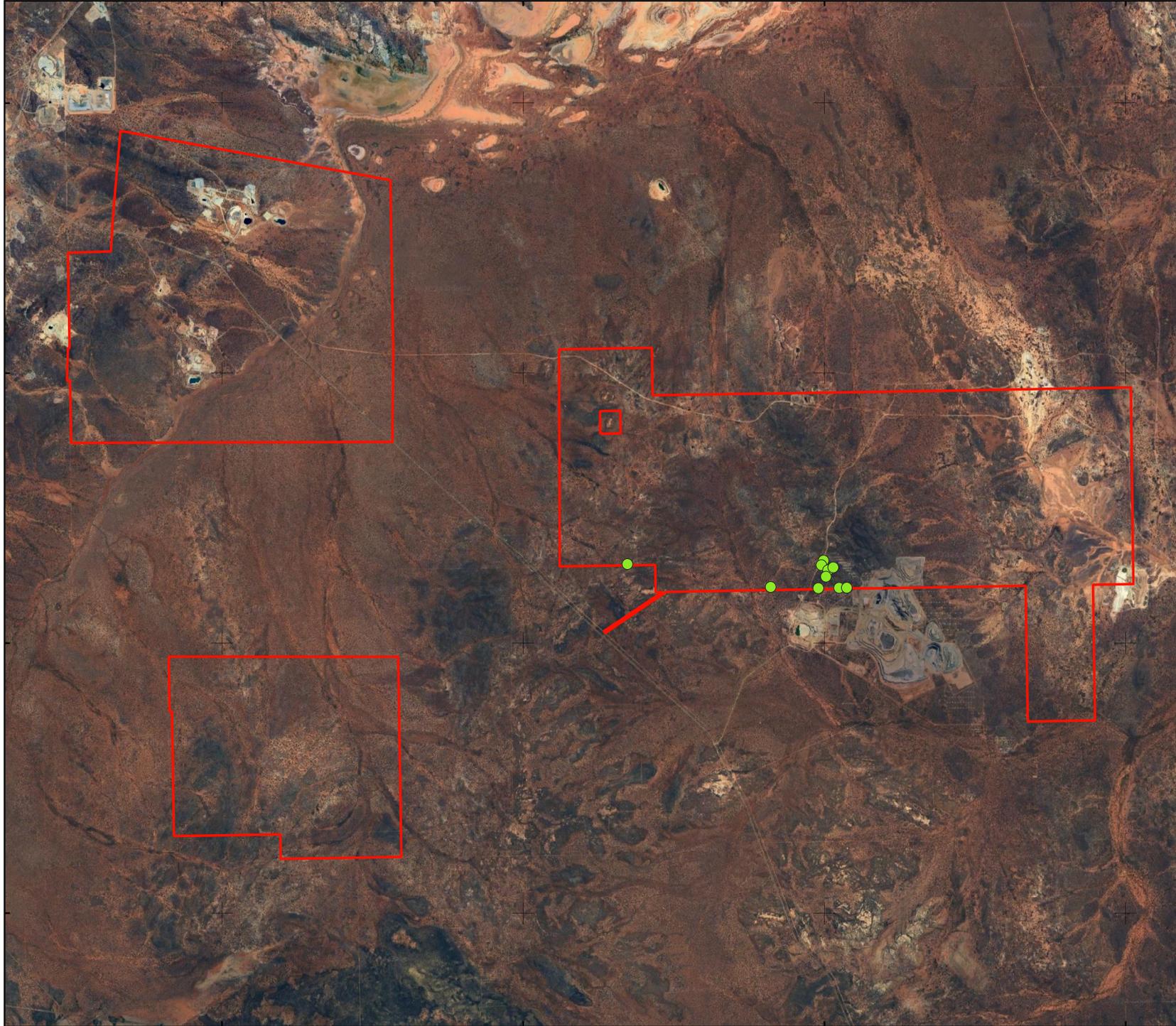
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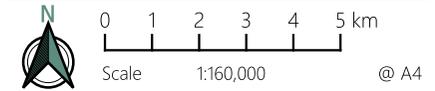
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### Legend

- Hamptons Survey Area
- Desktop Flora**
- P3-Eremophila acutifolia



Coordinate System: GDA 2020 MGA Zone 51  
 Projection: Universal Transverse Mercator  
 Units: Metre



Author: ZG

Date: 20-09-2024

## Desktop Flora - Recorded in Survey Area

### Mt Marion - Hamptons Tenement - Detailed Flora and Vegetation Assessment

MAP

Prepared for  
 Mineral Resources Limited

# 3.1

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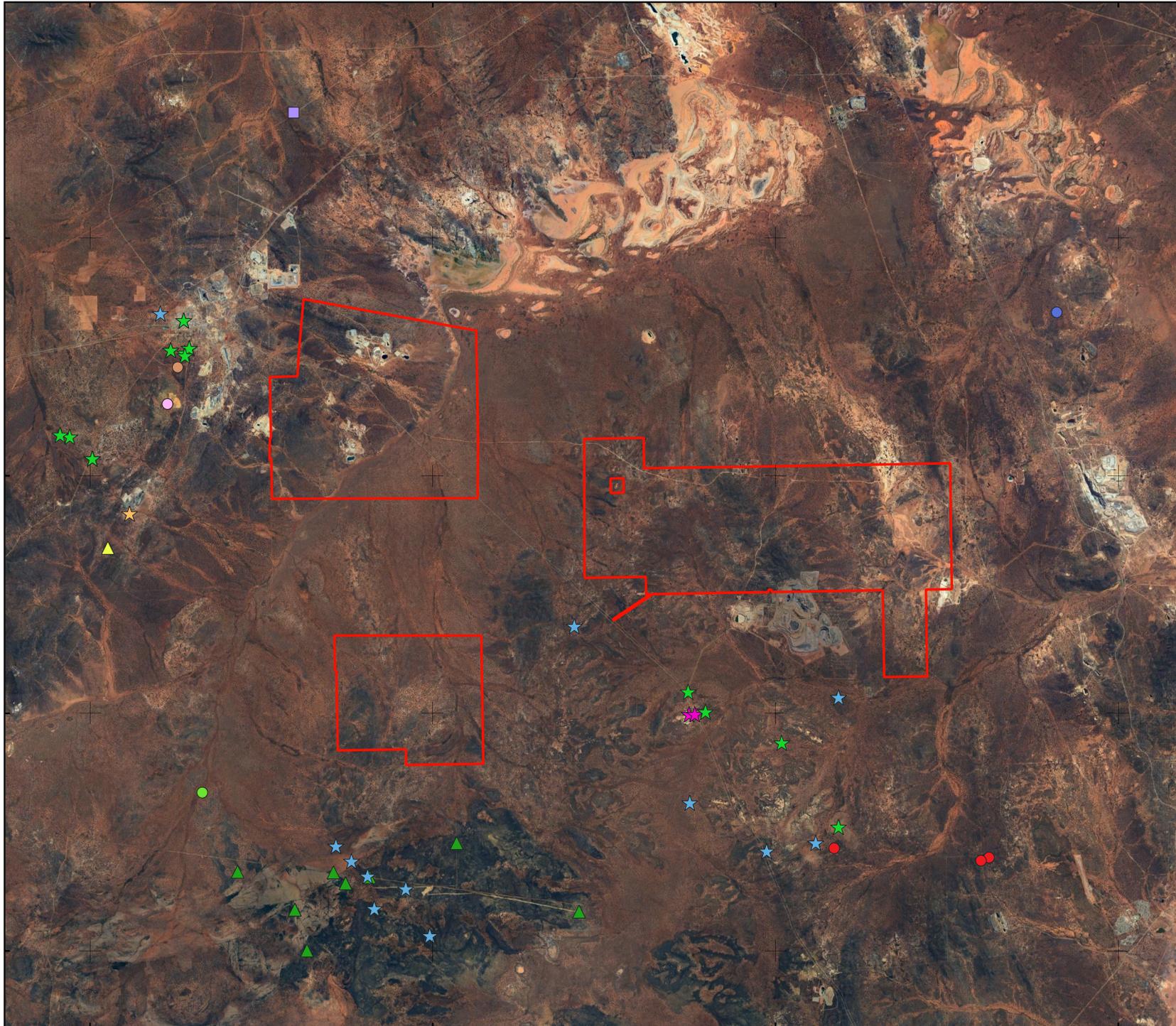
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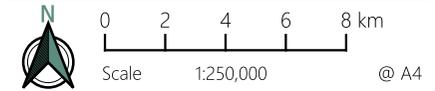
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### Legend

- Hamptons Survey Area
- ★ P1-Acacia websteri
- ★ P1-Dampiera plumosa
- ★ P1-Pterostylis xerampelina
- ★ P1-Thryptomene planiflora
- ▲ P2-Austrostipa frankliniae
- ▲ P2-Phebalium clavatum
- P3-Austrostipa turbinata
- P3-Eremophila veronica
- P3-Grevillea georgeana
- P3-Notisia intonsa
- P3-Styphelia rectiloba
- P4-Eremophila caerulea subsp. merrallii



Coordinate System: GDA 2020 MGA Zone 51  
 Projection: Universal Transverse Mercator  
 Units: Metre



Author: ZG

Date: 20-09-2024

## Desktop Flora - 'High' Likelihood

Mt Marion - Hamptons Tenement -  
Detailed Flora and Vegetation  
Assessment

Prepared for  
Mineral Resources Limited

MAP

# 3.2

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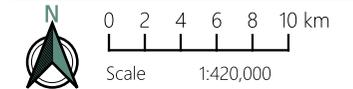
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### Legend

- Hamptons Survey Area
- Hamptons Medium Desktop**
- ✱ T-Gastrolobium graniticum
- ✱ T-Tetralochea spenceri
- ★ P1-Acacia coatesii
- ★ P1-Acacia sclerophylla var. teretiuscula
- ★ P1-Calandrinia lefroyensis
- ★ P1-Chamaelucium sp. Parker Range (B.H. Smith 1255)
- ★ P1-Cyathostemon divaricatus
- ★ P1-Eucalyptus websteriana subsp. norsemanica
- ★ P1-Lepidosperma lyonsii
- ★ P1-Lepidosperma sp. Parker Range (N. Gibson & M. Lyons 2094)
- ★ P1-Melichrus sp. Coolgardie (K.R. Newbey 8698)
- ★ P1-Phebalium appressum
- ★ P1-Ptilotus procumbens
- ★ P1-Ricinocarpus digynus
- ▲ P2-Acacia kerryana
- ▲ P2-Bossiaea laxa
- ▲ P2-Elachanthus pusillus
- ▲ P2-Eremophila praecox
- ▲ P2-Goodenia salina
- ▲ P2-Hakea rigida
- ▲ P2-Lepidosperma sp. Kambalda (A.A. Mitchell 5156)
- ▲ P2-Tecticornia flabelliformis
- P3-Acacia crenulata
- P3-Allocasuarina eriochlamys subsp. grossa
- P3-Alyxia tetanifolia
- P3-Bossiaea celata
- P3-Chrysocephalum apiculatum subsp. norsemanense
- P3-Cratystylis centralis
- P3-Cryptandra crispula
- P3-Eremophila microphylla
- P3-Isoplepis australiensis
- P3-Melaleuca coccinea
- P3-Stylidium choreanthum
- P4-Eucalyptus jutsonii subsp. jutsonii
- P4-Eucalyptus x brachyphylla
- P4-Frankenia glomerata



Coordinate System: GDA 2020 MGA Zone 51  
 Projection: Universal Transverse Mercator  
 Units: Metre



Author: ZG

Date: 20-09-2024

## Desktop Flora - 'Medium' Likelihood

Mt Marion - Hamptons Tenement -  
Detailed Flora and Vegetation  
Assessment

MAP

Prepared for  
Mineral Resources Limited

# 3.3

### 3.2. Flora

A total of 313 taxa from 48 families and 147 genera were recorded within the Survey Area and are listed in Appendix D. The most species rich family was Chenopodiaceae, with 44 species, followed by Asteraceae and Fabaceae with 38, and 37 species respectively. The most species rich genera was *Acacia* with 25 species, followed by *Eremophila* with 20 species. Of the 313 taxa recorded, 23 were introduced flora species and 14 were significant flora taxa (eight Priority Flora and seven range extensions – one of which was also a Priority Flora taxon; Table 3.2).

Table 3.2: Number of Flora Taxa Recorded

Total Taxa	Native	Introduced	Total Families	Most Common Families	Total Genera	Most Common Genera	Most Common Taxa Based on % of Quadrats
313	290	23	48	Chenopodiaceae - 44 Asteraceae - 38 Fabaceae - 37 Myrtaceae - 30	147	<i>Acacia</i> - 25 <i>Eremophila</i> - 20 <i>Eucalyptus</i> - 19 <i>Maireana</i> - 13	<i>Scaevola spinescens</i> - 53.3% <i>Exocarpos aphyllus</i> - 45.7% <i>Olearia muelleri</i> - 43.8% <i>Eremophila scoparia</i> - 40.0%

#### 3.2.1. Species Accumulation Curve

Species accumulation curves show the relationship between sampling effort and the number of species recorded and can therefore be used to discuss sampling adequacy. As sampling effort (quadrats) increases, the rate at which new species are recorded is reduced, and this is used to predict the number of species that are likely to be present within the Survey Area.

A species accumulation curve is presented in Figure 3.1, which was plotted using the *specaccum* function in the *vegan* package in R v.4 (Oksanen *et al.*, 2022). The improved Chao 2 non-parametric species richness estimator (Chiu *et al.*, 2014) was determined at 448 species (95% CI [406, 517]), suggesting that 76.6% of flora species were recorded during the survey, based on the 343 recorded taxa within the combined 162 quadrats from the MinRes and M15/717 tenement surveys (Spectrum 2024) and the Survey Area. Should the additional taxa recorded during opportunistic collections and relevés be included in the total, it is suggested that 87.9% of the flora taxa were collected during the assessment.

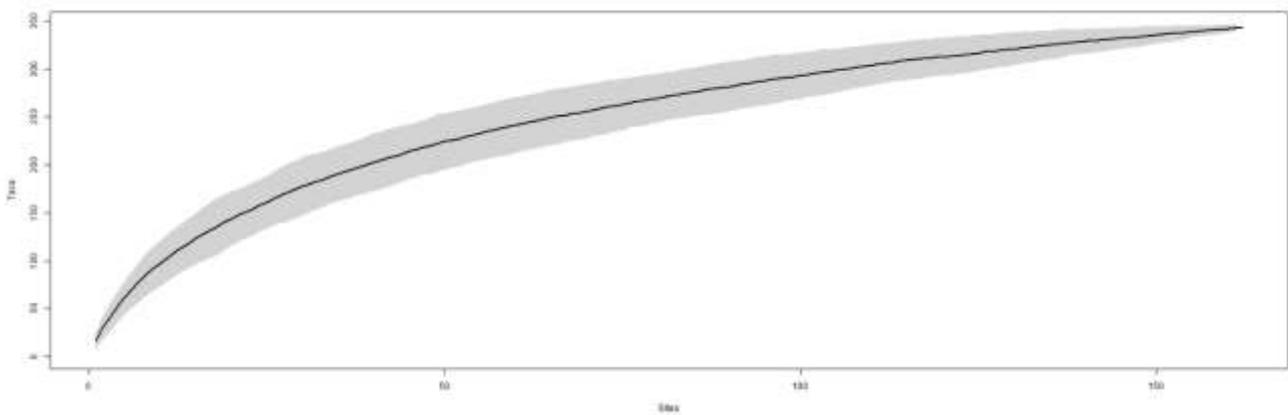


Figure 3.1: SAC – Flora

### 3.3. Significant Flora

No Threatened flora taxa were recorded during the assessment or are considered likely to occur in the Survey. Eight Priority and three queried Priority Flora taxa were recorded within the Survey Area (Table 3.3; Map 3.4):

- Priority 1 (P1): *Calandrinia lefroyensis*, *Eucalyptus websteriana* subsp. *norsemanica*, *Ricinocarpos digynus*, *Thryptomene planiflora*.
- Priority 2 (P2): *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156).
- Priority 3 (P3): *Eremophila acutifolia*, *Lepidium genistoides*, *Notisia intonsa*.

Some records of *Eucalyptus websteriana* encountered in the field were assigned a name of *Eucalyptus websteriana* subsp. *?norsemanica/websteriana* as they did not have adequate material to confidentially differentiate between the Priority subspecies, from the non-Priority subspecies. These have been included in the Priority Flora counts and should precautionarily be considered the Priority Flora species. Some records of *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2) were also assigned a query, due to current inquiries into the *Lepidosperma* genus and also included in all Priority Flora counts. Some records of *Thryptomene planiflora* were also assigned a query due to a lack of adequate material to confidently identify the species.

Seven range extensions were recorded (section 2.4.4) in the Survey Area during the assessment: *Eragrostis eriopoda*, *Euphorbia multifaria*, *Euphorbia porcata*, *Lepidium genistoides* (P3), *Malacocera tricornis*, *Paspalidium basicladum*, and *Thyridolepis mitchelliana*. None of these taxa have previously been recorded within 100 km of the Survey Area.

Multiple Sandalwood (*Santalum spicatum*) populations were recorded from 19 locations in the Survey Area. Sandalwood 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) unless an exemption applies (DBCA, 2016).

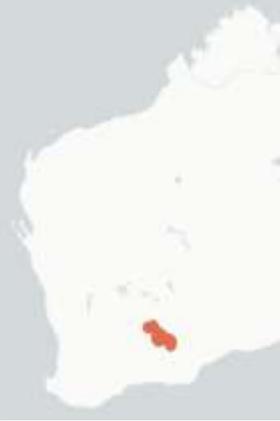
No other significant flora taxa, as listed in section 2.4.4, were recorded within the Survey Area during the assessment. Coordinates of all significant flora taxa have been provided electronically with this report.

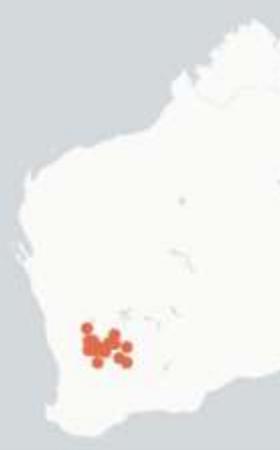
Table 3.3: Significant Flora

Status & Taxon		Description of Species in Survey Area	Description of Habitat in Survey Area	# of Individuals & VTs In Survey Area (% of Individuals in combined Survey Area)*	Map^	Known Local & Regional Distribution	Photograph
P1	<i>Calandrinia lefroyensis</i>	Erect perennial herb 14-25 cm high. Flowering pink	Clay and salt pans with orange sandy clay.	<b>Total:</b> 108 <b>VTs:</b> VT04: 91 (84.3%) VT05: 15 (13.9%) VT07: 2 (1.9%)		<b>Local:</b> Known from multiple locations in the local area.  <b>Regional:</b> Known only from the Coolgardie IBRA bioregion of WA.	No images available.

Status & Taxon		Description of Species in Survey Area	Description of Habitat in Survey Area	# of Individuals & VTs In Survey Area (% of Individuals in combined Survey Area)*	Map^	Known Local & Regional Distribution	Photograph
P1	<i>Eucalyptus websteriana</i> subsp. <i>norsemanica</i>	Spreading mallee, to 3 m high, bark 'Minni-ritchi'; flowering white.  Distinctly heart-shaped leaves. Pruinose stems.	Recorded on hills and hillslopes associated with higher slopes of Mt. Marion with orange clay loam with continuous basalt stones.	<b>Total:</b> 8 <b>VTs:</b> VT23: 8 (100%)		<b>Local:</b> Known from multiple locations in the local area.  <b>Regional:</b> Known only to occur in the Coolgardie IBRA bioregion of WA.	  
	<i>Eucalyptus websteriana</i> subsp. ? <i>norsemanica</i> / <i>websteriana</i>	Non-priority <i>Eucalyptus websteriana</i> subsp. <i>websteriana</i> has non-pruinose stems.		<b>Total:</b> 178 <b>VTs:</b> VT12: 11 (6.2%) VT23: 167 (93.8%)			

Status & Taxon		Description of Species in Survey Area	Description of Habitat in Survey Area	# of Individuals & VTs In Survey Area (% of Individuals in combined Survey Area)*	Map^	Known Local & Regional Distribution	Photograph
P1	<i>Ricinocarpos digynus</i>	Erect, open shrub 1.5 m high.	Drainage line on lower slope with red-orange, brown clayey sand.	<b>Total:</b> 20 <b>VTs:</b> VT12: 20 (100%)		<b>Local:</b> Known from ten locations in the local area.  <b>Regional:</b> Known to occur in the Coolgardie and Murchison IBRA bioregion of WA.	
P1	<i>Thryptomene planiflora</i>	Shrub to 0.5-2 m high, broadly, or very broadly obovate leaves with no obvious apical point. Flowering white/pink.	Recorded on sandy slopes and plains, with yellow or brown to red sandy soils, in shrublands that are often dominated by <i>Acacia</i> species.	<b>Total:</b> 610 <b>VTs:</b> VT02: 610 (99.7%)		<b>Local:</b> Known from multiple locations in the local area.  <b>Regional:</b> Known only from the Coolgardie IBRA bioregion of WA.	

Status & Taxon		Description of Species in Survey Area	Description of Habitat in Survey Area	# of Individuals & VTs In Survey Area (% of Individuals in combined Survey Area)*	Map^	Known Local & Regional Distribution	Photograph
P2	<i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156)	Tussock-like sedge with shiny flowering stems and serrated leaf margins, growing approximately 0.3 m tall.	Hill crests and slopes associated with Mt Marion. With red, orange, brown, sandy clay loam with basalt, granite, quartz.	<b>Total:</b> 3 <b>VTs:</b> VT24: 3 (1.4%)		<b>Local:</b> Known from two locations in the local area.  <b>Regional:</b> Known only from the Coolgardie IBRA bioregion of WA.	
	<i>Lepidosperma</i> ?sp. Kambalda (A.A. Mitchell 5156)		Drainage lines with red, orange clay loam with or without ironstone gravel.	<b>Total:</b> 217 <b>VTs:</b> VT12: 30 (13.6%) VT13: 144 (65.5%) VT20: 1 (0.5%) VT23: 42 (19.1%)			
P3	<i>Eremophila acutifolia</i>	Low spreading shrub up to 0.4 m high. Flowering pink/white.	Drainage/ depression or flat plains with red-orange sandy clay.	<b>Total:</b> 1,500 <b>VTs:</b> VT13: 1,000 (1.6%) VT19: 500 (0.8%)		<b>Local:</b> Known from multiple locations in the local area.  <b>Regional:</b> Known only from the Coolgardie IBRA bioregion of WA.	

Status & Taxon		Description of Species in Survey Area	Description of Habitat in Survey Area	# of Individuals & VTs In Survey Area (% of Individuals in combined Survey Area)*	Map^	Known Local & Regional Distribution	Photograph
P3	<i>Lepidium genistoides</i>	Spreading, dense shrub, 0.3-0.5 m high.	Dune slope surrounding salt lakes with light brown sandy loam and common quartz and ironstone fine gravel.  Slopes simple, gentle. Red orange/cream clay loam. Continuous granite stones and boulders.	<b>Total:</b> 7 <b>VTs:</b> VT07: 1 (14.3%) VT24: 6 (85.7%)		<b>Local:</b> Not previously known to occur in the local area.  <b>Regional:</b> Known from the Avon Wheatbelt and Coolgardie IBRA bioregions of WA.	No images available.
P3	<i>Notisia intonsa</i>	Prostrate clumping annual herb with dense grey hairs, approximately 3 cm height.	Flat plain of dark red, orange clay loam with common medium ironstone and quartz gravel.	<b>Total:</b> 1 <b>VTs:</b> VT19: 1 (100%)		<b>Local:</b> Known from multiple locations in the local area.  <b>Regional:</b> Known from multiple scattered locations throughout Western Australia: Avon Wheatbelt, Coolgardie, Esperance Plains, Mallee, Murchison.	

\*Percentages calculated using the combined Survey Areas (Spectrum, 2024); ^ (Council of Heads of Australian Herbaria, 2024)

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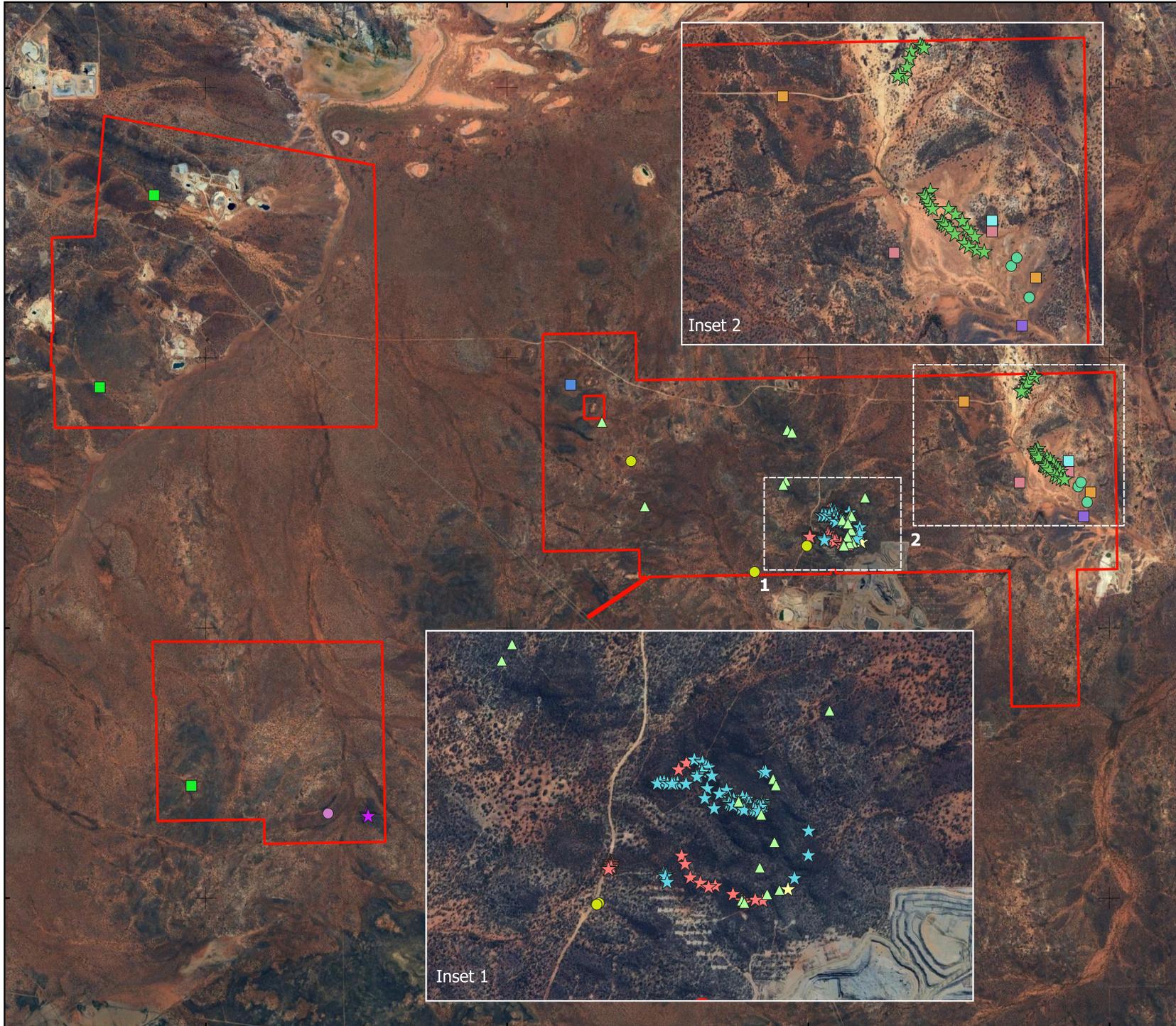
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### Legend

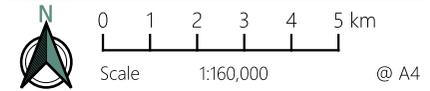
Hamptons Survey Area

#### Priority Flora

- P1-Calandrinia lefroyensis
- P1-Eucalyptus websteriana subsp. norsemanica
- P1?-Eucalyptus websteriana subsp. ?norsemanica/websteriana
- P1-Ricinocarpos digynus
- P1-Thryptomene planiflora
- P2-Lepidosperma sp. Kambalda (A.A. Mitchell 5156)
- P3-Eremophila acutifolia
- P3-Lepidium genistoides (Range Extension)
- P3-Notisia intonsa

#### Range Extensions

- Eragrostis eriopoda
- Euphorbia multifaria
- Euphorbia porcata
- Malacocera tricornis
- Paspalidium basicladum
- Thyridolepis mitchelliana



Coordinate System: GDA 2020 MGA Zone 51  
Projection: Universal Transverse Mercator  
Units: Metre



Author: ZG

Date: 19-09-2024

## Significant Flora

Mt Marion - Hamptons Tenement -  
Detailed Flora & Vegetation  
Assessment

MAP

Prepared for  
Mineral Resources Limited

# 3.4

### 3.3.1. Local & Regional Context of Significant Flora

*Calandrinia lefroyensis* (P1) was recorded on open clay and salt pans, with 108 individuals recorded from 33 locations. *Calandrinia lefroyensis* (P1) is previously known from multiple locations in the local area and is common regionally within the Coolgardie IBRA Bioregion. Therefore, records of *Calandrinia lefroyensis* (P1) in the Survey Area are not considered locally or regionally significant.

*Eucalyptus websteriana* subsp. *norsemanica* (P1) and *Eucalyptus websteriana* subsp. ?*norsemanica*/*websteriana* were recorded on the hillslopes of Mt Marion, with eight and 178 individuals recorded, respectively, from a total of 102 locations. *Eucalyptus websteriana* subsp. *norsemanica* (P1) is previously known from just two locations in the local area but has 15 records regionally within the Coolgardie IBRA Bioregion. Therefore, records of *Eucalyptus websteriana* subsp. *norsemanica* (P1) in the Survey Area are considered locally significant but is not regionally significant.

*Ricinocarpos digynus* (P1) was recorded on a drainage line on a lower slope of Mt. Marion with 20 individuals recorded from one location. *Ricinocarpos digynus* (P1) is previously known from 10 locations in the local area, mostly to the north of the Survey Area. This species is also known to occur in both the Coolgardie and Murchison IBRA bioregions and therefore, records of *Ricinocarpos digynus* (P1) in the Survey Area are not considered locally or regionally significant.

*Thryptomene planiflora* (P1) was recorded on sandy slopes and plains, with 610 individuals recorded from four locations. *Thryptomene planiflora* (P1) is previously known from multiple locations in the local area and is common within the Coolgardie IBRA Bioregion. Therefore, records of *Thryptomene planiflora* (P1) in the Survey Area are not considered locally or regionally significant.

*Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2)/ *Lepidosperma* sp. ?Kambalda (A.A. Mitchell 5156) (P2?) was recorded on hill crests and slopes of Mt. Marion and surroundings with 220 individuals recorded from 17 locations. *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2) is previously known from just two locations in the local area and the species is known only to occur in the Coolgardie IBRA Bioregion and therefore, the records in the Survey Area may be considered locally and regionally significant.

*Eremophila acutifolia* (P3) was recorded in drainage, depression areas and plains, with 1,500 individuals recorded from two locations. *Eremophila acutifolia* (P3) is previously known from multiple locations in the local area including records within the Survey Area and is common regionally within the Coolgardie Bioregion. Therefore, records of *Eremophila acutifolia* (P3) in the Survey Area are not considered locally or regionally significant.

*Lepidium genistoides* (P3) was recorded on dune slopes surrounding salt lakes, with seven individuals recorded from three locations. *Lepidium genistoides* (P3) is not previously known from the local area and is a range extension, with the closest record of the species more than 100 km from the Survey Area. Therefore, records of *Lepidium genistoides* (P3) in the Survey Area should be considered locally significant. However, the priority species has been recorded in both the Avon Wheatbelt and Coolgardie IBRA Bioregions and as such these records are not considered regionally significant.

*Notisia intonsa* (P3) was recorded on a clay plain, with one individual record from one location. *Notisia intonsa* (P3) is previously known from multiple locations in the local area and is known to occur in the Avon Wheatbelt, Coolgardie, Esperance Plains, Mallee, and Murchison IBRA Bioregions and as such the records are not locally or regionally significant.

### 3.3.2. Post-Survey Review of Desktop Assessment Flora Taxa

Of the two Threatened flora previously recorded in the Study Area (Table 3.1), one, *Gastrolobium graniticum* (T), retained its pre-survey likelihood of 'Low', as suitable habitat of margins of rock outcrops, along drainage lines with sand/sandy loam, granite, was identified in the Survey Area associated with the granite areas of the Survey Area, though it was not recorded. The other Threatened flora, *Tetratheca spenceri* (T), was reduced from a 'Medium' likelihood to a 'Low' likelihood as suitable habitat (breakaway system, lateritic soil with tantalite) was not identified in the Survey Area.

Of the 12 Priority Flora taxa that were assigned a 'High' likelihood of occurrence prior to the surveys, two were recorded during the current assessment (*Thryptomene planiflora* (P1) and *Notisia intonsa* (P3)). The remaining 10 Priority Flora have been assigned to a "Medium' likelihood of occurrence post-survey as suitable habitat was identified in the assessment, but they were not recorded.

Four taxa that were assigned a 'Medium' likelihood of occurrence prior to the survey ((*Calandrinia lefroyensis* (P1), *Eucalyptus websteriana* subsp. *norsemanica* (P1), *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2), and *Ricinocarpos digynus* (P1)) were recorded during the current assessment, and two (*Isolepis australiensis* (P3) and *Ptilotus procumbens* (P1)), are still considered to have a 'Medium' likelihood of occurrence post survey. *Isolepis australiensis* (P3) is an annual species that may not have been present at the Survey Area during phase 1 of the assessment, and due to the lower than median rainfall received, there may have not been ideal conditions for growth of the taxa. *Ptilotus procumbens* (P1) was recorded in the MinRes and M15/717 Survey Area (Spectrum 2024) in the common plains/floodplains (VT15), and as such retains its 'Medium' likelihood of occurrence post survey. The remainder have been assigned a post-survey likelihood of 'Low'.

One Priority Flora, *Eremophila acutifolia* (P3), was previously recorded in the Survey Area during the desktop assessment (Table 3.1). Some of the previous records of the Priority species were visited and confirmed, and further records were observed during the survey (Map 3.4). All significant flora post-survey likelihood are detailed in Appendix C.

### 3.4. Introduced Flora

There were 23 introduced flora species recorded at the Survey Area of which one is a Declared Pest. No Weeds of National Significance (WoNS) were recorded in the Survey Area.

The declared pest, *\*Xanthium spinosum* was recorded from one location in the Survey Area at an estimated abundance of five individuals. This species has a category 3 management requirement in the Coolgardie IBRA bioregion (DPIRD, 2020).

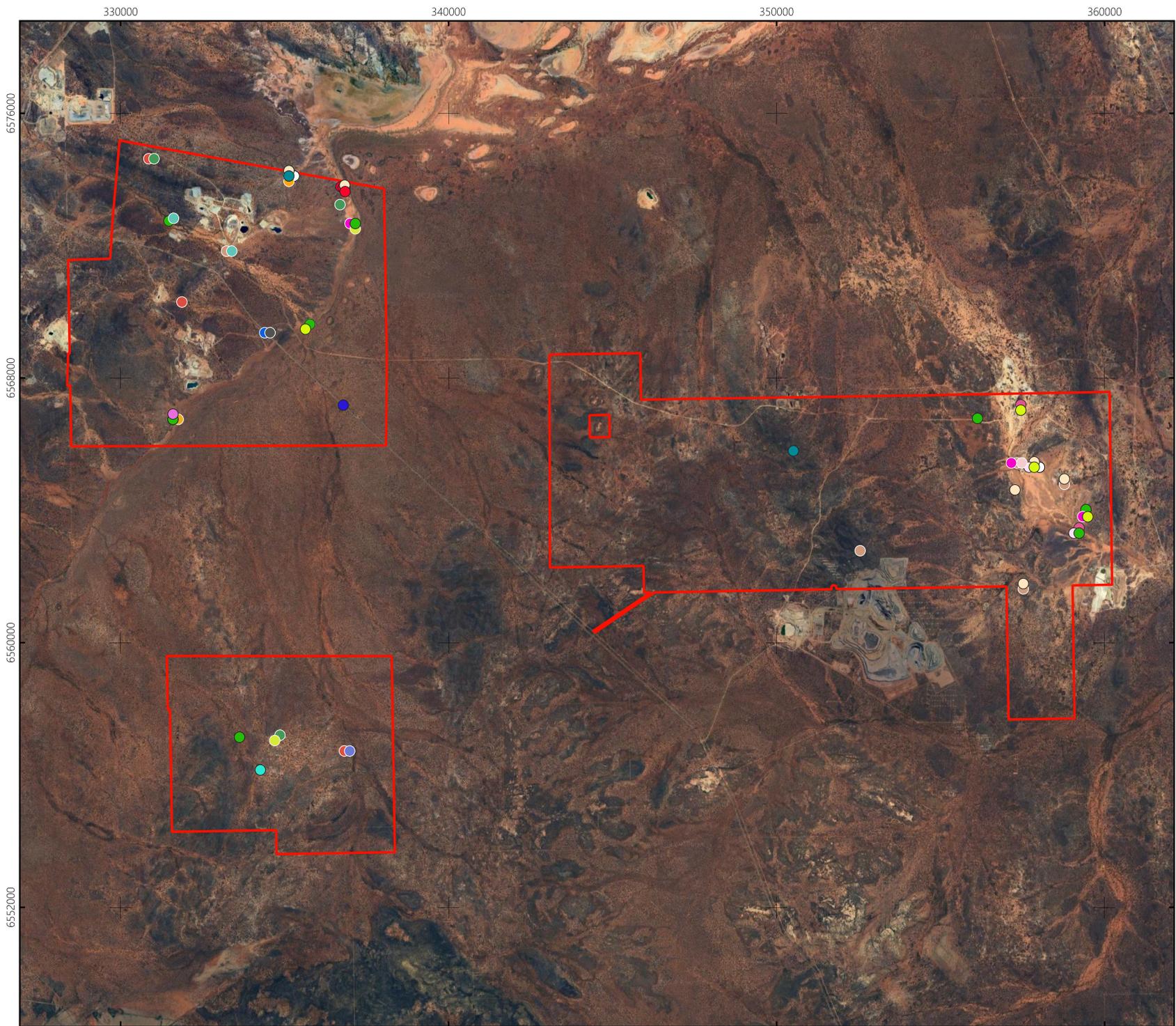
Of the remaining introduced flora species recorded, *\*Asphodelus fistulosus* and *\*Medicago minima* were the most widespread, commonly recorded on floodplains and drainage lines. Weeds were commonly recorded around disturbed areas, including old mining areas, with the majority of the Survey Area that was not previously disturbed having only scattered individuals present throughout. None of the introduced flora were a dominant species in any of the VTs.

All introduced flora species are listed in Table 3.4. Locations have been provided on Map 3.5 and are provided electronically with the report.

**Table 3.4: Introduced Flora**

Species	Abundance at the Survey Area	Environmental Significance
<i>*Agave americana</i>	1	Permitted - s11
<i>*Asphodelus fistulosus</i>	665	Permitted - s11
<i>*Carrichtera annua</i>	150	Permitted - s11
<i>*Cenchrus ciliaris</i>	10	Permitted- s11
<i>*Centaurea melitensis</i>	155	Permitted - s11
<i>*Cuscuta epithymum</i>	2	Permitted - s11
<i>*Datura ferox</i>	302	Permitted - s11
<i>*Dittrichia graveolens</i>	10	Permitted - s11
<i>*Eragrostis curvula</i>	2	Permitted - s11
<i>*Erodium cicutarium</i>	5	Permitted - s11
<i>*Heliotropium europaeum</i>	2	Permitted - s11
<i>*Hypochoeris glabra</i>	22	Permitted - s11
<i>*Lysimachia arvensis</i>	2	Permitted - s11
<i>*Medicago minima</i>	502	Permitted - s11
<i>*Medicago polymorpha</i>	200	Permitted - s11
<i>*Oligocarpus calendulaceus</i>	45	Permitted - s11
<i>*Oncosiphon suffruticosum</i>	20	Permitted - s11
<i>*Rostraria cristata</i>	20	Permitted - s11
<i>*Rumex vesicarius</i>	40	Permitted - s11
<i>*Salvia verbenaca</i>	260	Permitted - s11
<i>*Schismus arabicus</i>	1	Permitted - s11
<i>*Sonchus oleraceus</i>	43	Permitted - s11
<i>*Xanthium spinosum</i>	5	Declared Pest - s22(2)

Note: '\*' denotes weed species

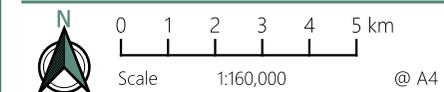


**Legend**

Hamptons Survey Area

**Introduced Flora**

- Agave americana*\*
- Asphodelus fistulosus*\*
- Carrichtera annua*\*
- Cenchrus ciliaris*\*
- Centaurea melitensis*\*
- Cuscuta epithymum*\*
- Datura ferox*\*
- Dittrichia graveolens*\*
- Eragrostis curvula*\*
- Erodium cicutarium*\*
- Heliotropium europaeum*\*
- Hypochaeris glabra*\*
- Lysimachia arvensis*\*
- Medicago minima*\*
- Medicago polymorpha*\*
- Oligocarpus calendulaceus*\*
- Oncosiphon suffruticosum*\*
- Rostraria cristata*\*
- Rumex vesicarius*\*
- Salvia verbenaca*\*
- Schismus arabicus*\*
- Sonchus oleraceus*\*
- Xanthium spinosum*\*



Coordinate System: GDA 2020 MGA Zone 51  
 Projection: Universal Transverse Mercator  
 Units: Metre



Author: ZG

Date: 20-09-2024

**Introduced Flora**

Mt Marion - Hamptons Tenement -  
 Detailed Flora & Vegetation  
 Assessment

MAP

Prepared for  
 Mineral Resources Limited

**3.5**

## 4. RESULTS & DISCUSSION- VEGETATION

### 4.1. Desktop Assessment

#### 4.1.1. TEC/PECs

No TEC/PECs were identified in the desktop review of the Study Area.

#### 4.1.2. Literature Review Significant Vegetation

Previously undertaken assessments were reviewed for significant vegetation. No vegetation analogous with any TEC or PEC were recorded in the Study Area. However, locally significant vegetation types were recorded within the Study Area and were identified as supporting Priority Flora (Table 4.1).

Table 4.1: Literature Review Significant Vegetation

Pre-survey Likelihood	Report	Description	Significance	Distance from Survey Area
Medium	Flora and vegetation survey for Mungai Gold Operations Cutters Ridge Project (Phoenix Environmental Sciences, 2019)	Mid <i>Eucalyptus clelandiorum</i> woodland with other <i>Eucalyptus</i> trees, frequently <i>E. celastroides</i> subsp. <i>celastroides</i> or <i>E. griffithsii</i> , over isolated shrubs to mid open <i>Dodonaea lobulata</i> , <i>Eremophila scoparia</i> and <i>Exocarpos aphyllus</i> shrubland over isolated low to sparse <i>Olearia muelleri</i> , <i>Ptilotus obovatus</i> and <i>Westringia rigida</i> shrubland.	Landform locally significant, supports Priority listed flora.	~20 km N
		Tall <i>Acacia burkittii</i> shrubland over sparse to open mid <i>Dodonaea lobulata</i> shrubland over isolated low <i>Ptilotus obovatus</i> shrubs	Landform locally significant, supports Priority listed flora.	~20 km N
		Isolated mid <i>Cratystylis subspinescens</i> , <i>Pimelea microcephala</i> and <i>Senna artemisioides</i> subsp. <i>filifolia</i> shrubs over low <i>Atriplex vesicaria</i> , <i>Tecticornia</i> sp. (sterile 1) and <i>Roycea divaricata</i> shrubland over isolated low <i>Disphyma crassifolium</i> , <i>Brachyscome ciliaris</i> and <i>Vittadinia dissecta</i> var. <i>hirta</i> forbs.	Landform locally significant, supports Priority listed flora.	~20 km N
		Mid <i>Eucalyptus transcontinentalis</i> woodland with other <i>Eucalyptus</i> trees frequently <i>E. clelandiorum</i> and <i>E. salubris</i> over mid open <i>Atriplex nummularia</i> , <i>Eremophila scoparia</i> and <i>Senna artemisioides</i> subsp. <i>filifolia</i> shrubland over isolated low <i>Olearia muelleri</i> , <i>Eremophila parvifolia</i> subsp. <i>auricampa</i> and <i>Ptilotus obovatus</i> shrubs.	Landform locally significant, supports Priority listed flora.	~20 km N
		Isolated tall <i>Melaleuca halmaturorum</i> shrubs over low <i>Tecticornia indica</i> subsp. <i>bidens</i> chenopod shrubland over isolated low <i>Disphyma crassifolium</i> forbs.	Landform locally significant, supports Priority listed flora.	~20 km N

### 4.2. Vegetation Types

A total of 25 vegetation types (VTs), from 17 floristic groups were recorded for the combined project (Spectrum, 2024). The 17 floristic groups were split into 24 VTs when there was a structural difference in the vegetation noted either in sub-groups of the dendrogram (VT10-VT11, VT13-VT21), or structurally in the dominant species (VT04-VT05). One VT (VT02) was derived by combining two floristic groups due to the similar vegetation structure and location of the quadrats. One VT (VT25) was derived from structural analysis only as there was a low species diversity within this VT, and the quadrats were excluded from the floristic analysis. The dendrogram of floristic analysis is presented in Figure 4.1.

#### 4.2.1. Vegetation Types – Hamptons

There were 22 VTs mapped at the Survey Area across a variety of habitats (Table 4.2; Map 4.1). The following dominant groups were recorded:

- Mixed *Eucalyptus* spp. mid open woodlands on clay or sandy plains, floodplains, and minor drainage areas.
- Mixed *Eucalyptus* spp. low woodlands over mixed *Acacia* spp. and *Allocasuarina* spp. tall shrublands on gentle to moderately sloping basalt hills.
- Chenopodiaceae (*Tecticornia*, *Cratystylis*, and *Atriplex* spp.) low shrublands on clay pans.
- *Acacia* spp. and *Melaleuca* spp. tall shrublands on and in the vicinity of granite slopes and outcrops.

The plains were primarily dominated by VT15, which was the most widespread VT at the Survey Area (mapped as 27.8% of the total Survey Area extent). VT15 was found on sandy-clay plains and was characterised by *Eucalyptus salmonophloia* and *Eucalyptus lesouefii* mid open woodlands over mixed Chenopodiaceae low shrublands. VT20 was the second most dominant (11.9%), characterised by *Eucalyptus cylindrocarpa* and *Eucalyptus yilgarnensis* mid open mallee woodland, with or without *Melaleuca sheathiana* tall sparse shrubland, over *Triodia scariosa* hummock grasses on more sandy soils. Other less dominant plain VTs included: VT21 (6.0%), VT19 (3.9%), VT16 (2.8%), VT10 (0.1%), and VT18 (<0.1%). These were all dominated by mixed *Eucalyptus* spp., woodlands.

Gentle to moderately sloping basalt hills were common at the Survey Area and included the areas surrounding Mt Marion and dominated by VT14 (12.9%). VT14 was characterised by *Eucalyptus griffithsii*, *Eucalyptus torquata*, and *Eucalyptus oleosa* subsp. *oleosa* mid mallee woodlands over mixed shrubs. VT23 (1.0%) was the primary vegetation of Mt Marion, restricted to the higher upper slopes in this area, and was dominated by *Allocasuarina* and *Acacia* shrublands. Additional basalt hills in the west and north of the Survey Area were mapped as VT13 (7.6%), characterised by *Eucalyptus lesouefii*, *Eucalyptus torquata*, and *Eucalyptus stricklandii* low open woodlands, over mixed shrubs. Other minor slope or drainage VTs on slopes included: VT08 (3.5%), VT09 (0.3%), and VT12 (<0.1%) which were also dominated by *Eucalyptus* woodlands and *Acacia* shrublands.

Saline clay pans and drainage areas were common in the eastern and northern parts of the Survey Area and were characterised by Chenopodiaceae low shrublands (*Tecticornia*, *Atriplex*, and *Cratystylis* spp.), with or without outcropping *Eucalyptus* trees, and included: VT05 (7.8%), VT04 (3.7%), and VT03 (0.4%). Floodplains and low dunes in the vicinity of the clay pans were mapped as VT07 (1.2%) and were characterised by *Acacia inceana* subsp. *conformis* and *Acacia rigens* tall sparse shrublands, over mixed Chenopodiaceae shrubs. Small, isolated clay pans were mapped in the north as VT25 (0.3%) and were characterised by *Melaleuca* tall shrublands. A cracking-clay low rise, restricted to an area in the vicinity of the eastern clay pan, was mapped as VT06 (0.3%), and this was characterised by *Eremophila interstans* subsp. *virgata* mid open shrubland.

Granite slopes and outcrops were recorded in the vicinity of the clay pans and were mapped as VT24 (7.5%), characterised by shrublands of *Acacia burkittii* and *Melaleuca hamata*. Granite outcrops were also recorded in restricted pockets, and was mapped as VT22 (0.6%), characterised by tall shrublands of *Acacia coolgardiensis*.

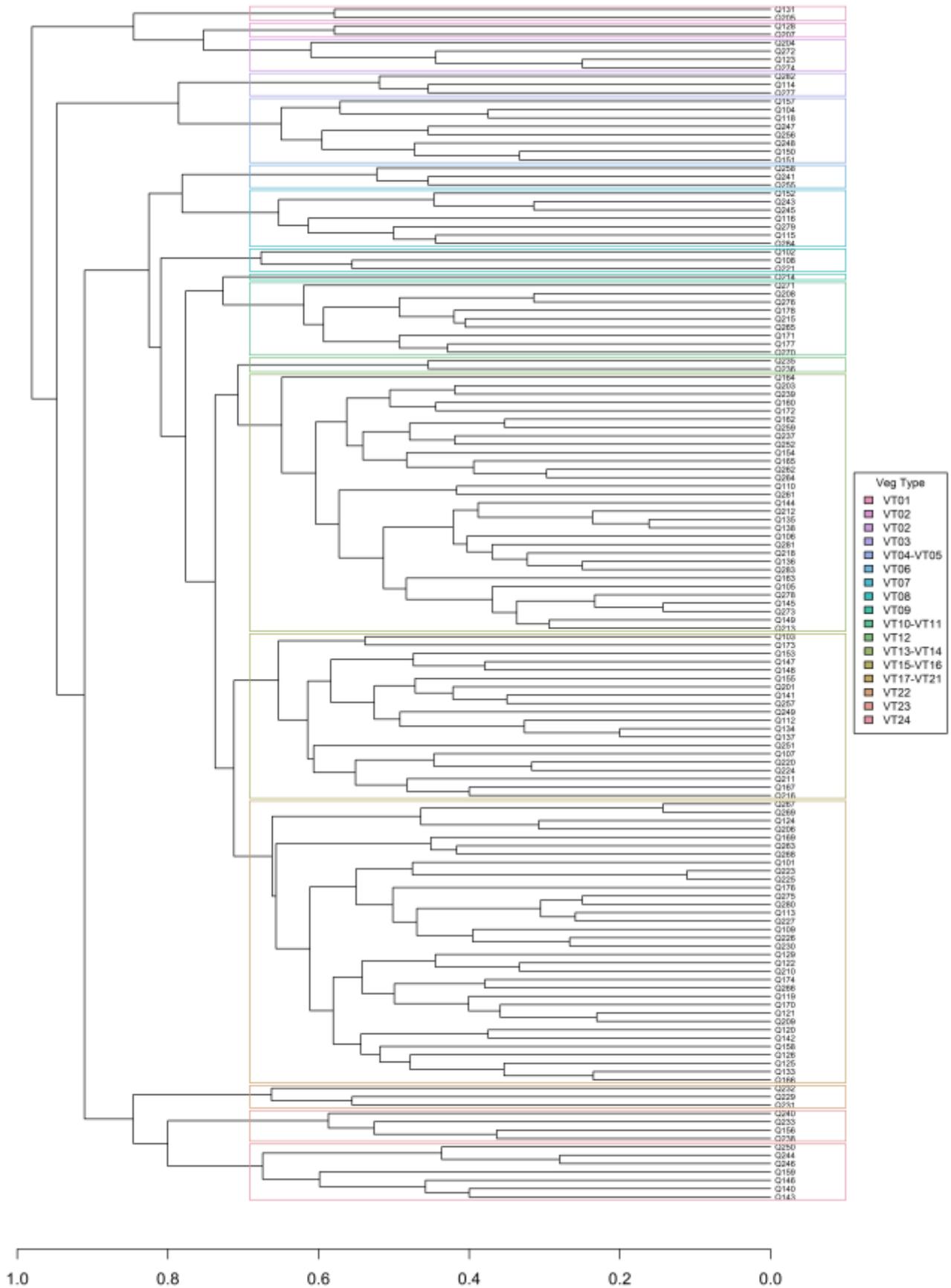


Figure 4.1: Dendrogram of Floristic Analysis

Table 4.2: Vegetation Types

VT	Vegetation Description (NVIS)	Associated Species	Landform & Condition	Sites (Sites Outside)*	Area (%) & Total Mapped	Representative Photo
VT02	+/- <i>Eucalyptus leptopoda</i> subsp. <i>subluta</i> mid open mallee woodland with <i>Acacia resinimarginea</i> , +/- <i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i> tall shrubland, over <i>Thryptomene planiflora</i> (P1), <i>Apectospermum subtenue</i> , +/- <i>Callitris preissii</i> mid open shrubland, over <i>Prostanthera grylloana</i> , <i>Leucopogon</i> sp. Coolgardie (M. Hislop & F. Hort MH 3197), <i>Phebalium filifolium</i> low isolated shrubs	<i>Acacia websteri</i> (P1), <i>Allocasuarina corniculata</i> , <i>Leucopogon</i> sp. Clyde Hill (M.A. Burgman 1207), <i>Micromyrtus erichsenii</i> , <i>Phebalium clavatum</i> (P2), <i>Thryptomene planiflora</i> (P1)	Slope simple, gentle. Yellow sand with common ironstone pebbles.  Pristine - Excellent: minor tracks.	Q128 (Q123, Q204, Q207, Q272, Q274)*	60.6 ha (0.3%)  Total: 227.8 ha	
VT03	<i>Tecticornia pruinosa</i> , <i>Tecticornia undulata</i> , <i>Atriplex lindleyi</i> subsp. <i>inflata</i> low sparse shrubland	<i>Disphyma crassifolium</i> subsp. <i>clavellatum</i> , <i>Frankenia irregularis</i> , * <i>Rumex vesicarius</i> , <i>Sarcosoma praecox</i> , <i>Sclerolaena cuneata</i> , <i>Tecticornia disarticulata</i> , <i>Tecticornia doliiformis</i> , <i>Tecticornia pergranulata</i> subsp. <i>pergranulata</i> , <i>Tecticornia</i> sp. Dennys Crossing (K.A. Shepherd & J. English KS 552)	Drainage line/clay pan. Red-brown clay.  Very Good: moderate grazing.	Q114, Q277, Q282, R117, R118	84.9 ha (0.4%)  Total: 84.9 ha	

VT	Vegetation Description (NVIS)	Associated Species	Landform & Condition	Sites (Sites Outside)*	Area (%) & Total Mapped	Representative Photo
VT04	<i>Cratystylis subspinescens</i> mid sparse shrubland, over <i>Atriplex vesicaria</i> , <i>Maireana glomerifolia</i> , <i>Tecticornia disarticulata</i> low sparse shrubland	<i>Calandrinia lefroyensis</i> (P1), <i>Disphyma crassifolium</i> subsp. <i>clavellatum</i> , <i>Frankenia interioris</i> , <i>Lycium australe</i> , <i>Maireana appressa</i> , <i>Plantago drummondii</i> , <i>Salvia verbenaca</i> *, <i>Sclerolaena cuneata</i> , <i>Sonchus oleraceus</i> *, <i>Tecticornia pruinosa</i>	Drainage line. Orange/brown clay with common quartz/ironstone pebbles.  Good – Excellent low to high grazing, clearing, some reduced native understorey in areas and low to high weeds present.	Q104, Q118, Q150, Q151, Q217, Q248	812.1 ha (3.7%)  Total: 812.1 ha	
VT05	<i>Eucalyptus salmonophloia</i> , <i>Eucalyptus salubris</i> mid open woodland, over <i>Cratystylis subspinescens</i> mid sparse shrubland, over <i>Atriplex vesicaria</i> , <i>Maireana glomerifolia</i> , <i>Tecticornia disarticulata</i> low sparse shrubland	<i>Calandrinia lefroyensis</i> (P1), <i>Didymanthus roei</i> , <i>Eremophila scoparia</i> , <i>Frankenia interioris</i> , <i>Maireana appressa</i> , <i>Minuria cunninghamii</i> , <i>Rhagodia drummondii</i> , <i>Sarcozona praecox</i> , <i>Scaevola spinescens</i> , <i>Sclerolaena cuneata</i> , <i>Sclerolaena diacantha</i>	Clay pan. Orange/brown clay, with common quartz/ironstone pebbles.  Very Good-Excellent: medium grazing, tracks.	Q247, Q253, Q256, R110, R112	1,690.8 ha (7.8%)  Total: 1,777.3 ha	
VT06	<i>Eremophila interstans</i> subsp. <i>virgata</i> mid open shrubland, over <i>Dodonaea microzyga</i> var. <i>acrolobata</i> , <i>Lawrencia squamata</i> , <i>Rhagodia drummondii</i> low sparse shrubland	<i>Leichhardtia australis</i> , <i>Lycium australe</i> , <i>Maireana georgei</i> , <i>Maireana radiata</i> , <i>Maireana triptera</i> , <i>Plantago drummondii</i> , <i>Ptilotus obovatus</i> , <i>Sclerolaena cuneata</i> , <i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	Low rise. Red-orange cracking clay, abundant granite/dactite stones.  Very Good: low grazing, minor tracks.	Q241, Q255, Q258	66.4 ha (0.3%)  Total: 66.4 ha	

VT	Vegetation Description (NVIS)	Associated Species	Landform & Condition	Sites (Sites Outside)*	Area (%) & Total Mapped	Representative Photo
VT07	+/- <i>Acacia inceana</i> subsp. <i>conformis</i> , <i>Acacia rigens</i> tall sparse shrubland, over <i>Cratystylis microphylla</i> , <i>Eremophila scoparia</i> mid sparse shrubland, over <i>Rhagodia drummondii</i> , <i>Scaevola spinescens</i> , <i>Tecticornia disarticulata</i> low open shrubland	<i>Calandrinia lefroyensis</i> (P1), <i>Cratystylis subspinescens</i> , <i>Dodoniaea viscosa</i> subsp. <i>angustissima</i> , <i>Eremophila decipiens</i> subsp. <i>decipiens</i> , <i>Eucalyptus clelandiorum</i> , <i>Exocarpos aphyllus</i> , <i>Grevillea acuaria</i> , <i>Leichhardtia australis</i> , <i>Lepidium genistoides</i> (P3), <i>Lycium australe</i> , <i>Maireana glomerifolia</i> , <i>Maireana triptera</i> , <i>Pittosporum angustifolium</i> , <i>Senna stowardii</i> , <i>Solanum nummularium</i>	Floodplains and low dunes surrounding clay pans/drainage. Orange/brown sandy clay. Abundant ironstone and granite pebbles.  Very Good-Excellent: minor grazing, low weeds.	Q115, Q116, Q152, Q243, Q245, Q279, Q284, R111, R113, R115, R116, R204	263.3 ha (1.2%)  Total: 263.3 ha	
VT08	<i>Eucalyptus clelandiorum</i> low open woodland with +/- <i>Eucalyptus celastroides</i> , <i>Eucalyptus salubris</i> mid open mallee woodland, over <i>Eremophila scoparia</i> mid isolated shrubs, over <i>Eremophila parvifolia</i> subsp. <i>auricampi</i> , <i>Sclerolaena diacantha</i> , <i>Maireana georgei</i> low isolated shrubs	<i>Acacia collegialis</i> , <i>Atriplex codonocarpa</i> , <i>Dodoniaea lobulata</i> , <i>Eremophila decipiens</i> subsp. <i>decipiens</i> , <i>Eriochiton sclerolaenoides</i> , <i>Eucalyptus campaspe</i> , <i>Eucalyptus yilgarnensis</i> , <i>Maireana trichoptera</i> , <i>Maireana triptera</i>	Slopes simple, gentle. Orange-brown, sandy clay. Continuous ironstone pebbles.  Excellent: minor tracks and clearing, low grazing.	Q102, Q108, Q221, R102, R103	761.7 ha (3.5%)  Total: 761.7 ha	
VT09	+/- <i>Eucalyptus longissima</i> mid open mallee woodland with <i>Acacia burkittii</i> tall shrubland, over <i>Olearia pimeleoides</i> , <i>Eremophila alternifolia</i> , <i>Eremophila decipiens</i> subsp. <i>decipiens</i> low isolated shrubs	<i>Alyxia buxifolia</i> , <i>Atriplex vesicaria</i> , <i>Exocarpos aphyllus</i> , <i>Pittosporum angustifolium</i> , <i>Santalum spicatum</i> , <i>Scaevola spinescens</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i>	Drainage line on flats and slopes. Red orange/brown clay.  Pristine.	Q214, R201	70.5 ha (0.3%)  Total: 70.5 ha	

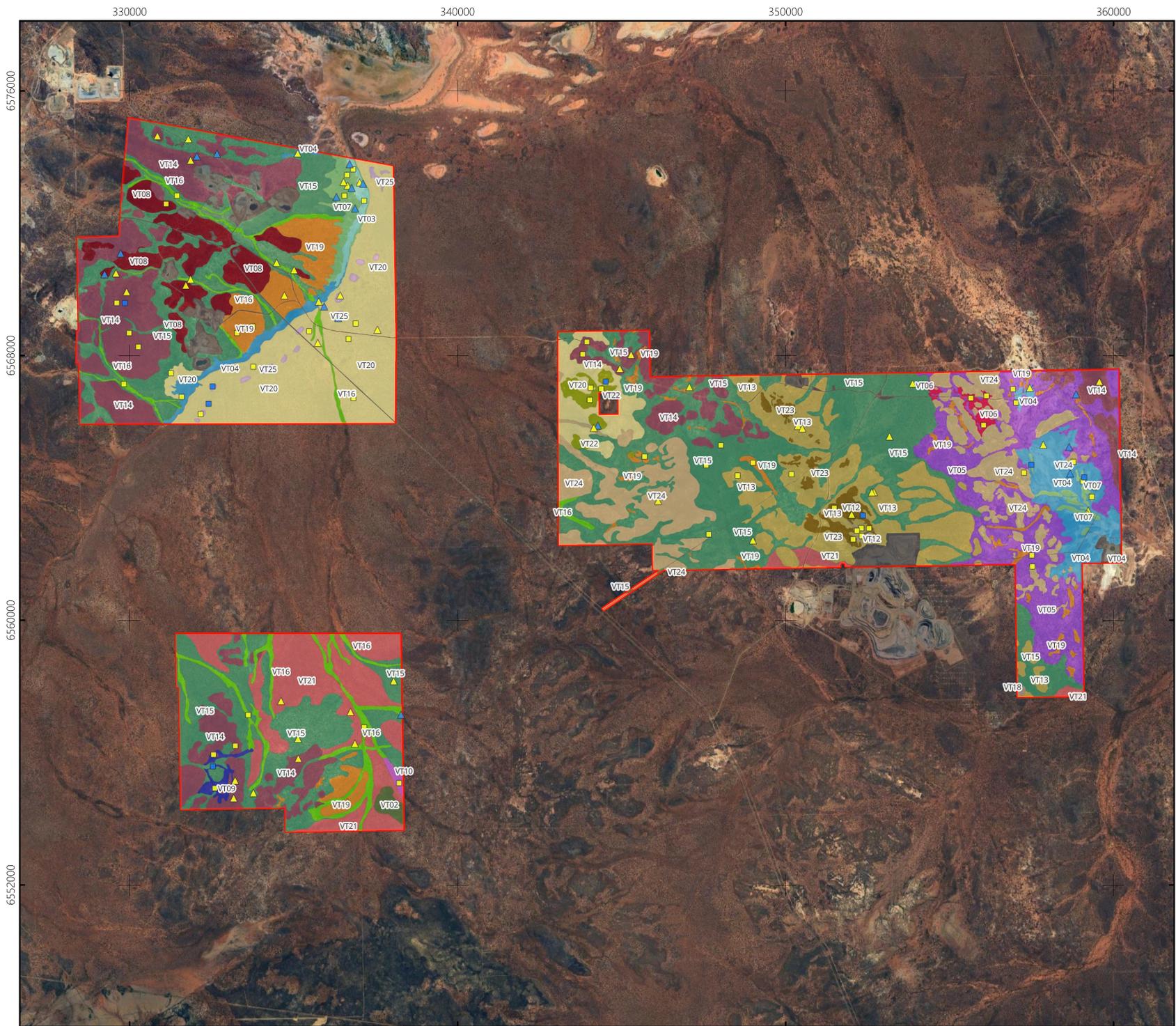
VT	Vegetation Description (NVIS)	Associated Species	Landform & Condition	Sites (Sites Outside)*	Area (%) & Total Mapped	Representative Photo
VT10	+/- <i>Eucalyptus longissima</i> , <i>Eucalyptus yilgarnensis</i> , <i>Eucalyptus pileata</i> mid open mallee woodland with <i>Acacia burkittii</i> , <i>Acacia gibbosa</i> tall open shrubland, over <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Eremophila granitica</i> mid sparse shrubland, over <i>Grevillea acuaria</i> , <i>Acacia leptopetala</i> , <i>Scaevola spinescens</i> low sparse shrubland	<i>Alyxia buxifolia</i> , <i>Beyeria sulcata</i> , <i>Eremophila decipiens</i> subsp. <i>decipiens</i> , <i>Eremophila ionantha</i> , <i>Eremophila scoparia</i> , <i>Exocarpos aphyllus</i> , <i>Melaleuca acuminata</i> , <i>Olearia muelleri</i> , <i>Olearia pimeleoides</i> , <i>Ozothamnus cassiope</i> , <i>Prostanthera grylloana</i> , <i>Rhagodia drummondii</i>	Drainage depression area, and flat plains. Red-orange sandy clay.  Excellent-Pristine: low grazing.	Q215 (Q130, Q178, Q208, Q265, Q271, Q276, R109)*	24.3 ha (0.1%)  Total: 138.3 ha	
VT12	<i>Eucalyptus longissima</i> , <i>Eucalyptus torquata</i> mid mallee woodland with <i>Acacia burkittii</i> tall sparse shrubland, over <i>Trymalium myrtillus</i> subsp. <i>myrtillus</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Ricinocarpos digynus</i> mid open shrubland, over <i>Dodonaea microzyga</i> var. <i>acrolobata</i> , <i>Senna cardiosperma</i> , <i>Alyxia buxifolia</i> low sparse shrubland	<i>Acacia warramaba</i> , <i>Allocasuarina helmsii</i> , <i>Austrostipa elegantissima</i> , <i>Beyeria lechenaultii</i> , <i>Eremophila clavata</i> , <i>Eucalyptus griffithsii</i> , <i>Eucalyptus websteriana</i> subsp. <i>norsemanica</i> (P1), <i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) (P2), <i>Olearia muelleri</i> , <i>Ricinocarpos digynus</i> (P1)	Drainage line on slopes of Mt Marion. Red-orange, brown clay loam. Abundant basalt stones.  Pristine.	Q235, Q236, R203	9.4 ha (<0.1%)  Total: 9.4 ha	
VT13	<i>Eucalyptus lesouefii</i> , <i>Eucalyptus torquata</i> , +/- <i>Eucalyptus stricklandii</i> low open woodland with +/- <i>Acacia burkittii</i> tall sparse shrubland, over <i>Alyxia buxifolia</i> , <i>Dodonaea lobulata</i> , <i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i> mid sparse shrubland, over <i>Scaevola spinescens</i> , <i>Acacia erinacea</i> , <i>Westringia rigida</i> low sparse shrubland	<i>Eremophila acutifolia</i> (P3), <i>Eremophila clavata</i> , <i>Eremophila glabra</i> subsp. <i>glabra</i> , <i>Eremophila granitica</i> , <i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i> , <i>Exocarpos aphyllus</i> , <i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) (P2), <i>Olearia muelleri</i> , <i>Santalum spicatum</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i>	Slope simple, moderate. Red orange/brown sandy clay. Continuous basalt/chert/ironstone stones and pebbles.  Excellent-Pristine: minor tracks.	Q154, Q160, Q172, Q203, Q237, Q239 (Q162, Q164, Q165, Q168, Q252, Q259, Q262, Q264, R120, R207, R209)*	1,659.9 ha (7.6%)  Total: 2,893.9 ha	

VT	Vegetation Description (NVIS)	Associated Species	Landform & Condition	Sites (Sites Outside)*	Area (%) & Total Mapped	Representative Photo
VT14	<i>Eucalyptus griffithsii</i> , <i>Eucalyptus torquata</i> , +/- <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> mid mallee woodland with <i>Eremophila interstans</i> subsp. <i>interstans</i> , +/- <i>Acacia burkittii</i> , <i>Casuarina pauper</i> tall sparse shrubland, over <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Dodonaea lobulata</i> , <i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i> mid sparse shrubland, over <i>Scaevola spinescens</i> , <i>Eremophila glabra</i> subsp. <i>glabra</i> , <i>Olearia muelleri</i> low sparse shrubland	<i>Acacia erinacea</i> , <i>Acacia leptopetala</i> , <i>Acacia tetragonophylla</i> , <i>Alyxia buxifolia</i> , <i>Atriplex vesicaria</i> , <i>Exocarpos aphyllus</i> , <i>Maireana georgei</i> , <i>Ptilotus obovatus</i> , <i>Santalum spicatum</i> , <i>Senna artemisioides</i> subsp. <i>x artemisioides</i> , <i>Westringia rigida</i>	Slope simple, moderate to steep. Red-orange sandy-clay. Continuous basalt stones.  Excellent-Pristine.	Q105, Q106, Q110, Q111, Q135, Q136, Q138, Q144, Q145, Q149, Q212, Q213, Q218, Q273, Q278, Q281, Q283, R105, R107, R210 (Q163, Q261)*	2,821.3 ha (12.9%)  Total: 2,870.2 ha	
VT15	<i>Eucalyptus salmonophloia</i> , <i>Eucalyptus lesouefii</i> mid open woodland with <i>Eremophila dempsteri</i> , <i>Exocarpos aphyllus</i> tall sparse shrubland, over <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Atriplex nummularia</i> subsp. <i>spathulata</i> , <i>Eremophila scoparia</i> mid sparse shrubland, over <i>Atriplex vesicaria</i> , <i>Cratystylis conocephala</i> , <i>Rhagodia drummondii</i> low sparse shrubland	<i>Acacia leptopetala</i> , <i>Austrostipa elegantissima</i> , <i>Maireana georgei</i> , <i>Maireana triptera</i> , <i>Olearia muelleri</i> , <i>Pittosporum angustifolium</i> , <i>Ptilotus obovatus</i> , <i>Ptilotus procumbens</i> (P1), <i>Scaevola spinescens</i> , <i>Sclerolaena diacantha</i> , <i>Senna artemisioides</i> subsp. <i>x artemisioides</i> , <i>Solanum nummularium</i>	Plains and floodplains. Red orange/brown sandy clay. Common ironstone and quartz pebbles.  Very Good-Pristine: minor tracks, low grazing, clearing, and/or weeds present.	Q103, Q112, Q132, Q134, Q137, Q141, Q147, Q148, Q153, Q155, Q201, Q257, Q260 (Q173, Q249, Q254, R206, R213)*	6,054.1 ha (27.8%)  Total: 7,567.4 ha	
VT16	+/- <i>Eucalyptus griffithsii</i> , <i>Eucalyptus salmonophloia</i> mid open woodland with <i>Eremophila interstans</i> subsp. <i>virgata</i> , <i>Exocarpos aphyllus</i> tall sparse shrubland, over <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Eremophila ionantha</i> , <i>Acacia leptopetala</i> mid sparse shrubland, over <i>Lycium australe</i> , <i>Atriplex vesicaria</i> , <i>Rhagodia drummondii</i> low sparse shrubland	<i>Atriplex nummularia</i> subsp. <i>spathulata</i> , <i>Enchylaena tomentosa</i> var. <i>tomentosa</i> , <i>Eremophila decipiens</i> subsp. <i>decipiens</i> , <i>Leichhardtia australis</i> , <i>Ptilotus holosericeus</i> , <i>Ptilotus obovatus</i> , <i>Scaevola spinescens</i> , <i>Sclerolaena diacantha</i> , <i>Sclerolaena obliquicuspis</i>	Drainage lines and floodplains on flats. Red-orange, sandy clay/clay.  Excellent: low grazing.	Q107, Q211, Q216, Q220, Q224, R108 (Q167, Q251)*	616.6 ha (2.8%)  Total: 705.3 ha	

VT	Vegetation Description (NVIS)	Associated Species	Landform & Condition	Sites (Sites Outside)*	Area (%) & Total Mapped	Representative Photo
VT18	<i>Eucalyptus lesouefii</i> mid woodland with <i>Melaleuca sheathiana</i> tall open shrubland, over <i>Eremophila scoparia</i> , <i>Exocarpos aphyllus</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> mid sparse shrubland, over <i>Olearia muelleri</i> , <i>Acacia erinacea</i> low sparse shrubland	<i>Acacia burkittii</i> , <i>Atriplex nummularia</i> subsp. <i>spathulata</i> , <i>Eremophila clavata</i> , <i>Eremophila interstans</i> subsp. <i>interstans</i> , <i>Eucalyptus torquata</i> , <i>Maireana pentatropis</i> , <i>Sclerolaena diacantha</i> , <i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	Plains and low rises. Red orange/brown sandy/clay, clay. Common ironstone pebbles.  Very Good-Pristine: clearing and tracks.	(Q169, Q263, Q268, R122, R208)*	6.8 ha (<0.1%)  Total: 618.1 ha	
VT19	<i>Eucalyptus salubris</i> , <i>Eucalyptus clelandiorum</i> , +/- <i>Eucalyptus salmonophloia</i> low woodland, over <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Eremophila scoparia</i> , <i>Exocarpos aphyllus</i> mid sparse shrubland, over <i>Eremophila caperata</i> , <i>Eremophila parvifolia</i> subsp. <i>auricampi</i> , <i>Olearia muelleri</i> low sparse shrubland	<i>Alyxia buxifolia</i> , <i>Eremophila acutifolia</i> (P3), <i>Eremophila dempsteri</i> , <i>Eremophila rugosa</i> , <i>Eucalyptus celastroides</i> , <i>Eucalyptus ravida</i> , <i>Maireana georgei</i> , <i>Maireana radiata</i> , <i>Notisia intonsa</i> (P3), <i>Santalum acuminatum</i> , <i>Scaevola spinescens</i> , <i>Sclerolaena diacantha</i> , <i>Sclerolaena obliquicuspis</i>	Flat plains. Red-orange, sandy-clay. Continuous ironstone pebbles.  Excellent: low grazing, tracks.	Q101, Q127, Q202, Q223, Q225, Q242 (Q161)*	852.8 ha (3.9%)  Total: 916.3 ha	
VT20	<i>Eucalyptus cylindrocarpa</i> , <i>Eucalyptus yilgarnensis</i> mid open mallee woodland with +/- <i>Melaleuca sheathiana</i> tall sparse shrubland, over <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Eremophila scoparia</i> , <i>Acacia leptopetala</i> mid sparse shrubland, over <i>Olearia muelleri</i> , <i>Westringia rigida</i> low sparse shrubland with <i>Triodia scariosa</i> low sparse hummock grassland	<i>Acacia nyssophylla</i> , <i>Austrostipa elegantissima</i> , <i>Dianella revoluta</i> var. <i>divaricata</i> , <i>Eremophila caperata</i> , <i>Eremophila ionantha</i> , <i>Eremophila parvifolia</i> subsp. <i>auricampi</i> , <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>Exocarpos aphyllus</i> , <i>Grevillea huegellii</i> , <i>Lepidosperma</i> sp. <i>Kambalda</i> (A.A. Mitchell 5156) (P2), <i>Scaevola spinescens</i>	Flat plains. Orange sand.  Excellent-Pristine: low tracks and low grazing.	Q109, Q113, Q222, Q226, Q227, Q228, Q230, Q234, Q275, Q280, R114, R211 (Q176, R121)*	2,597.8 ha (11.9%)  Total: 2,688.9 ha	

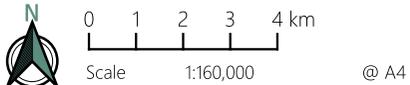
VT	Vegetation Description (NVIS)	Associated Species	Landform & Condition	Sites (Sites Outside)*	Area (%) & Total Mapped	Representative Photo
VT21	<i>Eucalyptus celastroides</i> , <i>Eucalyptus transcontinentalis</i> , <i>Eucalyptus salubris</i> mid woodland, over <i>Eremophila scoparia</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Eremophila ionantha</i> mid sparse shrubland, over <i>Olearia muelleri</i> , <i>Acacia leptopetala</i> , <i>Eremophila clavata</i> low sparse shrubland	<i>Acacia merrallii</i> , <i>Alyxia buxifolia</i> , <i>Austrostipa elegantissima</i> , <i>Cratystylis conocephala</i> , <i>Daviesia aphylla</i> , <i>Eremophila acutifolia</i> (P3), <i>Eremophila caperata</i> , <i>Eucalyptus urna</i> subsp. <i>xesta</i> (P3), <i>Exocarpos aphyllus</i> , <i>Maireana georgei</i> , <i>Maireana trichoptera</i> , <i>Santalum acuminatum</i> , <i>Scaevola spinescens</i> , <i>Sclerolaena diacantha</i> , <i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	Flat plains. Red-orange, sand/sandy-clay. Common ironstone/quartz pebbles.  Excellent-Pristine: clearing, tracks.	Q125, Q126, Q133 (Q119, Q120, Q121, Q122, Q142, Q158, Q166, Q170, Q174, Q175, Q209, Q210, Q266, R214)*	1,300.1 ha (6%)  Total: 4,071.9 ha	
VT22	+/- <i>Eucalyptus longissima</i> , <i>Eucalyptus melanoxylon</i> mid open mallee woodland with <i>Acacia coolgardiensis</i> tall shrubland, over +/- <i>Homalocalyx thryptomenoides</i> , <i>Phebalium canaliculatum</i> mid sparse shrubland, over <i>Prostanthera grylloana</i> low sparse shrubland	<i>Acacia burkittii</i> , <i>Amphipogon caricinus</i> var. <i>caricinus</i> , <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <i>Dianella revoluta</i> var. <i>divaricata</i> , <i>Eremophila clarkei</i> , <i>Hakea minyma</i> , <i>Melaleuca hamata</i> , <i>Rinzia carnos</i>	Flat plains. Yellow sand. Common granite pebbles.  Excellent: minor tracks and low grazing.	Q229, Q231, Q232, R104, R202	132.6 ha (0.6%)  Total: 132.6 ha	
VT23	<i>Allocasuarina campestris</i> , <i>Acacia collegialis</i> , <i>Acacia burkittii</i> tall open shrubland, over <i>Santalum spicatum</i> mid isolated shrubs, over <i>Prostanthera incurvata</i> , <i>Eremophila granitica</i> , <i>Pimelea microcephala</i> subsp. <i>microcephala</i> low sparse shrubland	<i>Brachychiton gregorii</i> , <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <i>Chrysocephalum puteale</i> , <i>Dampiera latealata</i> , <i>Eucalyptus websteriana</i> subsp. <i>norsemanica</i> (P1), <i>Eucalyptus websteriana</i> subsp. <i>websteriana</i> , <i>Euphorbia tannensis</i> subsp. <i>eremophila</i> , <i>Leichhardtia australis</i> , <i>Lepidosperma</i> sp. <i>Kambalda</i> (A.A. Mitchell 5156) (P2), <i>Ptilotus obovatus</i> , <i>Scaevola spinescens</i> , <i>Thysanotus manglesianus</i>	Moderate slopes of Mt Marion. Red-orange sandy-clay. Continuous basalt stones and boulders.  Pristine.	Q156, Q233, Q238, Q240	215.9 ha (1%)  Total: 227.4 ha	

VT	Vegetation Description (NVIS)	Associated Species	Landform & Condition	Sites (Sites Outside)*	Area (%) & Total Mapped	Representative Photo
VT24	<i>Acacia burkittii</i> , <i>Melaleuca hamata</i> , +/- <i>Brachychiton gregorii</i> tall shrubland, over <i>Eremophila granitica</i> , <i>Mirbelia depressa</i> , <i>Prostanthera grylloana</i> low sparse shrubland	<i>Acacia websteri</i> (P1), <i>Alyxia buxifolia</i> , <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <i>Leichhardtia australis</i> , <i>Lepidium genistoides</i> (P3), <i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) (P2), <i>Olearia pimeleoides</i> , * <i>Oligocarpus calendulaceus</i> , <i>Senna artemisioides</i> subsp. x <i>artemisioides</i> , <i>Thryptomene australis</i> subsp. <i>brachyandra</i> , <i>Thryptomene planiflora</i> (P1), <i>Thysanotus manglesianus</i> , <i>Vincetoxicum lineare</i>	Slopes simple, gentle. Red orange/cream clay loam. Continuous granite stones and boulders.  Excellent-Pristine: low grazing, low weeds.	Q143, Q146, Q244, Q246, Q250, R205 (Q140, Q159)*	1,633.4 ha (7.5%)  Total: 1,990.8 ha	
VT25	+/- <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> mid open mallee woodland with <i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i> , <i>Melaleuca lateriflora</i> tall open shrubland	<i>Acacia densiflora</i> , <i>Acacia tetragonophylla</i> , <i>Duma florulenta</i> , <i>Eucalyptus yilgarnensis</i> , <i>Melaleuca eleuterostachya</i> , <i>Melaleuca hamata</i> , <i>Melaleuca sheathiana</i> , <i>Swainsona canescens</i>	Clay pan, depression. Orange sand/clay loam.  Excellent: low grazing.	Q117, Q219, R106, R212	62.7 ha (0.3%)  Total: 62.7 ha	



**Legend**

- Hamptons Survey Area
- ▲ Phase 1 Quadrat
- ▲ Phase 1 Releve
- Phase 2 Quadrat
- Phase 2 Releve
- Completely Degraded
- VT10
- VT12
- VT13
- VT14
- VT15
- VT16
- VT18
- VT19
- VT20
- VT21
- VT22
- VT23
- VT24
- VT25



Coordinate System: GDA 2020 MGA Zone 51  
 Projection: Universal Transverse Mercator  
 Units: Metre



Author: ZG Date: 20-09-2024

**Vegetation Types**

Mt Marion - Hamptons Tenement -  
 Detailed Flora & Vegetation  
 Assessment

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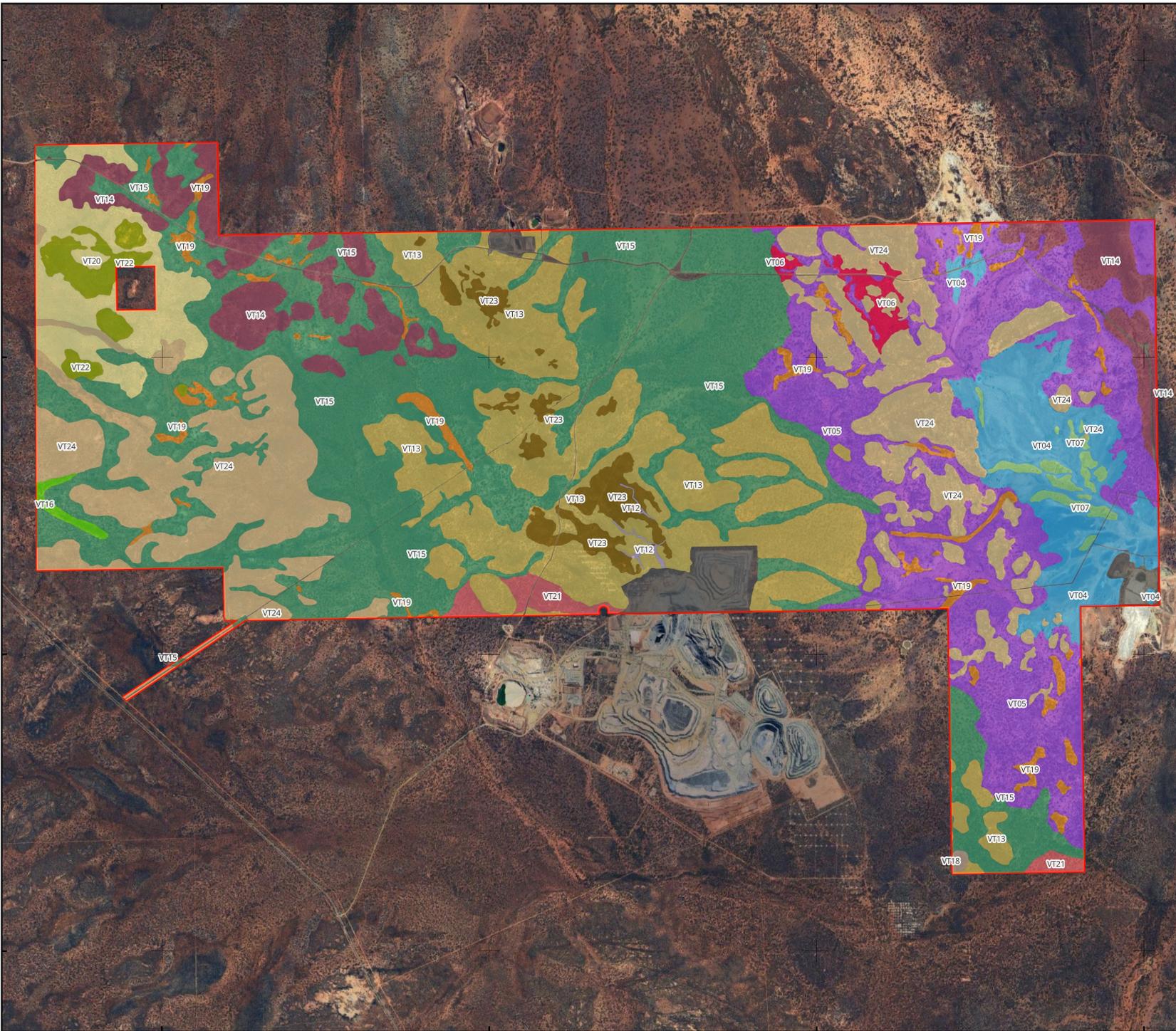
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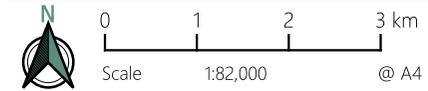
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### Legend

- Hamptons Survey Area
- VT16
- VT18
- Vegetation Type**
- VT04
- VT19
- VT05
- VT20
- VT06
- VT21
- VT07
- VT22
- VT12
- VT23
- VT13
- VT24
- VT14
- Completely Degraded
- VT15



Coordinate System: GDA 2020 MGA Zone 51  
 Projection: Universal Transverse Mercator  
 Units: Metre



Author: ZG

Date: 20-09-2024

## Vegetation Types - Survey Area East

Mt Marion - Hamptons Tenement -  
Detailed Flora & Vegetation  
Assessment

MAP

Prepared for  
Mineral Resources Limited

# 4.2

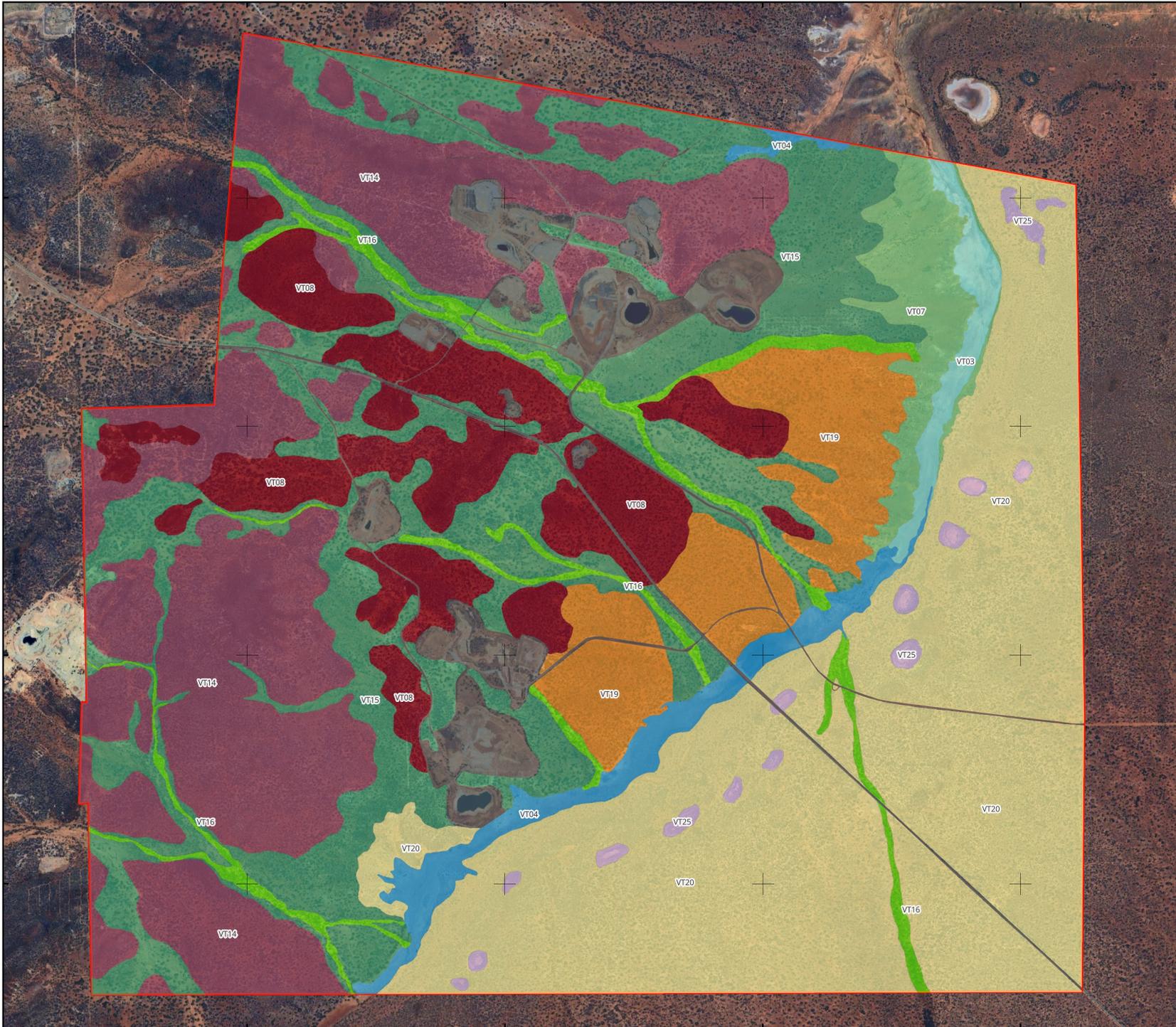
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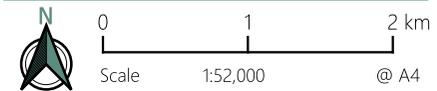


### Legend

Hamptons Survey Area

#### Vegetation Type

- VT03
- VT04
- VT07
- VT08
- VT14
- VT15
- VT16
- VT19
- VT20
- VT21
- VT25
- Completely Degraded



Coordinate System: GDA 2020 MGA Zone 51  
Projection: Universal Transverse Mercator  
Units: Metre



Author: ZG

Date: 20-09-2024

## Vegetation Types - Survey Area Northwest

### Mt Marion - Hamptons Tenement - Detailed Flora & Vegetation Assessment

MAP

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# 4.3

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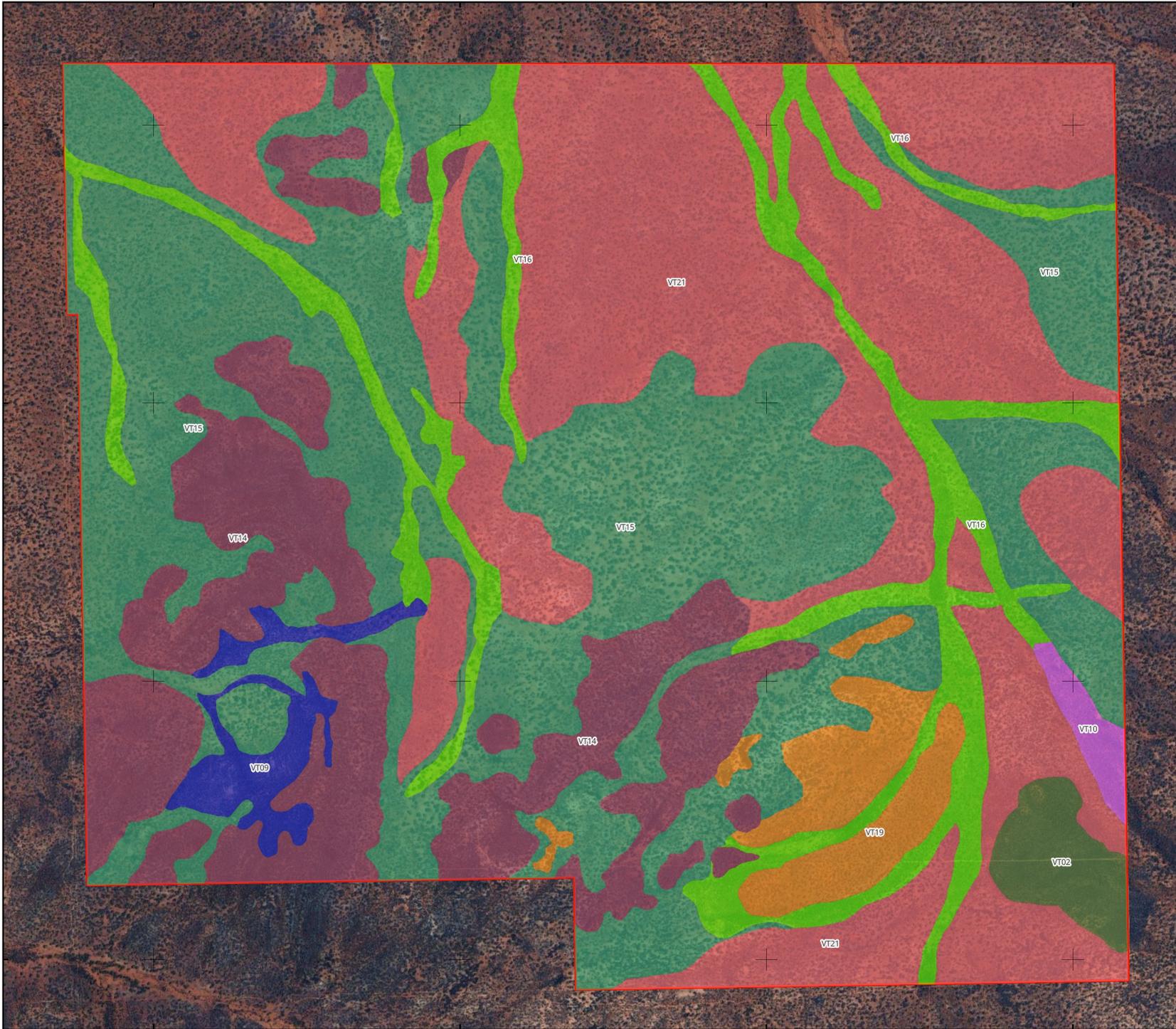
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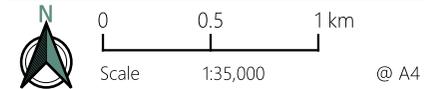


### Legend

Hamptons Survey Area

### Vegetation Type

- VT02
- VT09
- VT10
- VT12
- VT14
- VT15
- VT16
- VT19
- VT21



Coordinate System: GDA 2020 MGA Zone 51  
Projection: Universal Transverse Mercator  
Units: Metre



Author: ZG

Date: 20-09-2024

## Vegetation Types - Survey Area Southwest

### Mt Marion - Hamptons Tenement - Detailed Flora & Vegetation Assessment

MAP

Prepared for  
Mineral Resources Limited

# 4.4

### 4.3. Significant Vegetation

No VTs recorded within the Survey Area resemble any known TEC or PEC communities. Based on the definitions of significant vegetation listed in section 2.4.4 (Environmental Protection Authority, 2016a), the VTs that may be considered significant at the Survey Area are discussed in Table 4.3 with the following identified as significant:

- VT02 provides a role of refuge for the regionally significant Priority Flora taxon *Phebalium clavatum* (P2) (Spectrum, 2024).
- VT03 has a restricted extent in the Survey Area and the vegetation assemblage is dominated by *Tecticornia* a relatively unknown genus.
- VT06 has a restricted extent within the Survey Area and its landform, low rise of orange cracking clay with abundant granite/dactite stones, appears to be limited in the local area;
- VT07 provides a refuge for the locally significant Priority Flora taxon, *Lepidium genistoides* (P3) as well as another priority species, *Calandrinia lefroyensis* (P1).
- VT12 has a restricted extent within the Survey Area (appears on the upper hills of Mt Marion) and provides a role as refuge for the locally significant Priority Flora taxon *Eucalyptus websteriana* subsp. *norsemanica/websteriana* (P1?), and the locally and regionally significant Priority Flora taxon *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2). It also provides refuge to another Priority taxon *Ricinocarpos digynus* (P1).
- VT13 provides a role as refuge for the locally and regionally significant *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2) as well as another priority species, *Eremophila acutifolia* (P3).
- VT20 provides a role of refuge for the locally and regionally significant Priority Flora taxon *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2).
- VT22 has a restricted extent in the Survey with the vegetation assemblage appearing rare in the Survey Area.
- VT23 had a restricted extent (Mt Marion) in the Survey Area and provides refuge to the locally significant Priority Flora taxa, *Eucalyptus websteriana* subsp. *norsemanica* (P1) and the locally and regionally significant taxon, *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2).
- VT24 provides refuge to the locally significant Priority Flora taxon, *Lepidium genistoides* (P3) and the locally and regionally significant taxon, *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2).

**Table 4.3: Potential Significant Vegetation Discussion**

Significance	VT	Details
Identified as TEC	-	-
Identified as PEC	-	-
Restricted distribution ^  ^for the purpose of this assessment, there was a discussion for VTs with less than a 300 ha (<1%) mapped extent within the combined Survey Area's (Spectrum, 2024)	VT02	VT02 had a restricted extent at the combined Survey Area (227.8 ha). However, the landform this VT occurs on (gentle slopes with yellow sand and common ironstone/laterite gravel) appears widespread in the local area and therefore VT02 is not considered significant due to restricted distribution.
	VT06	VT06 had a restricted extent at the Survey Area (66.4 ha), and the landform this VT occurs on (low rise of orange cracking clay with abundant granite/dactite stones) does not appear widespread in the local area and therefore VT06 may be considered significant.
	VT03 VT09 VT10	VT03 (84.9 ha), VT09 (70.5 ha), and VT10 (138.3 ha) had a restricted extent at the combined Survey Area. The VTs were found on drainage lines and were all mapped as small extents within the Survey Area which is common due to the small size of

Significance	VT	Details
		the landforms they occur on; drainage line landforms are widespread throughout the local area and region and are therefore not considered significant VTs.
	VT12	VT12 had a restricted extent in the Survey Area (9.4 ha, <0.1%). The VT (drainage line on slope with abundant basalt stone) also does not appear widespread in the local area and identified on the upper hills of Mt Marion. The VT should be considered significant.
	VT22	VT22 had a restricted extent in the Survey Area (132.6 ha), while the yellow sandplain landforms that the VT occurs on appear widespread in the local area the vegetation assemblage of which it is made up of was not observed or recorded anywhere else. Therefore, VT22 is considered significant.
	VT23	VT23 had a restricted extent in the combined Survey Area (227.4 ha). VT23 is found on moderate slope landforms containing continuous basalt stones and boulders, which appear to be restricted to Mt Marion and therefore VT23 is considered significant.
	VT25	VT25 had a restricted extent in the Survey Area (62.7 ha), but the clay/depression landforms that the VT occurs on appear widespread in the local area. Therefore, VT25 is not considered significant.
Degree of historical impact from threatening processes	-	-
<p>A role as a refuge<sup>^</sup></p> <p><sup>^</sup>for the purpose of this report, Priority Flora recorded within the MinRes &amp; M15/717 Tenements Survey Area (Spectrum, 2024), were included in this discussion.</p>	VT02	VT02 provides a role of refuge for the Priority taxa <i>Acacia websteri</i> (P1), <i>Phebalium clavatum</i> (P2), and <i>Thryptomene planiflora</i> (P1). Of which <i>Phebalium clavatum</i> (P2) is considered regionally significant and thus VT01 should be considered a significant VT.
	VT04 VT05	VT04 and VT05 provides a role as refuge for the Priority Flora taxon <i>Calandrinia lefroyensis</i> (P1). However, this is not considered a locally or regionally significant taxon, therefore these VTs are not considered significant.
	VT07	VT07 provides a role as refuge for the Priority Flora taxa <i>Lepidium genistoides</i> (P3) and <i>Calandrinia lefroyensis</i> (P1). As <i>Lepidium genistoides</i> (P3) is considered locally significant, VT07 should also be considered a significant VT.
	VT12	VT12 provides a role as refuge for the locally significant Priority Flora taxon <i>Eucalyptus websteriana</i> subsp. <i>norsemanica/websteriana</i> (P1?), and the locally and regionally significant <i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) (P2). It also provides refuge to another Priority taxon <i>Ricinocarpos digynus</i> (P1). VT12 should therefore be considered significant.
	VT13	VT13 provides a role as refuge for <i>Eremophila acutifolia</i> (P3) and the locally and regionally significant <i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) (P2). Therefore, VT13 should be considered significant.
	VT19	VT19 provides a role as refuge for the Priority taxa <i>Eremophila acutifolia</i> (P3) and <i>Notisia intonsa</i> (P3). However, neither are considered a locally or regionally significant taxon, therefore the VT is not considered significant.
	VT20	VT20 provides a role of refuge for the locally and regionally significant Priority Flora taxon <i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) (P2). As such the VT should be considered significant.
	VT23	VT23 provides refuge to the locally significant Priority Flora taxon, <i>Eucalyptus websteriana</i> subsp. <i>norsemanica</i> (P1) and the locally and regionally significant taxon, <i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) (P2). As such the VT should be considered significant.
	VT24	VT24 provides a role of refuge for the locally and regionally significant Priority Flora taxon <i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) (P2) and the locally

Significance	VT	Details
		significant Priority Flora taxon <i>Lepidium genistoides</i> (P3). As such the VT should be considered significant.
Providing an important function required to maintain ecological integrity of a significant ecosystem	-	-
Groundwater Dependent Ecosystems	-	No GDE's identified in Survey Area.
Other – vegetation at risk from mining activities	VT03	VT03 is a clay pan/drainage line with a vegetation assemblage dominated by <i>Tecticornia</i> a relatively unknown genus. Therefore, the VT is considered significant.

### 4.3.1. Post-Survey Review of Desktop Assessment Vegetation

Four of the five significant vegetation from the literature review assigned 'Medium' likelihood of occurrence during the desktop assessment, were given a 'High' likelihood of occurrence post-survey, as the survey effort recorded similar VTs to those identified in the desktop assessment that supported Priority listed flora. The remaining identified significant vegetation was reduced to 'Low' as no similar VT was recorded in the survey. Details of the post-survey review of the literature review significant vegetation are provided in Table 4.4.

Table 4.4: Post-survey likelihood of Literature Review Significant Vegetation

Pre-survey Likelihood	Post-survey Likelihood	Report	Description	Significance	Distance from Survey Area	Details
Medium	High	Flora and vegetation survey for Mungai Gold Operations Cutters Ridge Project (Phoenix Environmental Sciences, 2019)	Mid <i>Eucalyptus clelandiorum</i> woodland with other <i>Eucalyptus</i> trees, frequently <i>E. celastroides</i> subsp. <i>celastroides</i> or <i>E. griffithsii</i> , over isolated shrubs to mid open <i>Dodonaea lobulata</i> , <i>Eremophila scoparia</i> and <i>Exocarpos aphyllus</i> shrubland over isolated low to sparse <i>Olearia muelleri</i> , <i>Ptilotus obovatus</i> and <i>Westringia rigida</i> shrubland.	Landform locally significant, supports Priority listed flora.	~20 km N	Similar VT identified in Survey Area (VT19) that also provided a role of refuge to the Priority Flora <i>Eremophila acutifolia</i> (P3) and <i>Notisia intonsa</i> (P3).
			Tall <i>Acacia burkittii</i> shrubland over sparse to open mid <i>Dodonaea lobulata</i> shrubland over isolated low <i>Ptilotus obovatus</i> shrubs	Landform locally significant, supports Priority listed flora.	~20 km N	Similar VT identified in Survey Area (VT24) that also provided a role of refuge to the Priority Flora <i>Lepidium genistoides</i> (P3) and <i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) (P2).
			Isolated mid <i>Cratystylis subspinescens</i> , <i>Pimelea microcephala</i> and <i>Senna artemisioides</i> subsp. <i>filifolia</i> shrubs over low <i>Atriplex vesicaria</i> , <i>Tecticornia</i> sp. (sterile 1) and <i>Roycea divaricata</i> shrubland over isolated low <i>Disphyma crassifolium</i> , <i>Brachyscome ciliaris</i> and <i>Vittadinia dissecta</i> var. <i>hirta</i> forbs.	Landform locally significant, supports Priority listed flora.	~20 km N	Similar VT identified in Survey Area (VT04) that also provided a role of refuge to the Priority Flora <i>Calandrinia lefroyensis</i> (P1).
			Mid <i>Eucalyptus transcontinentalis</i> woodland with other <i>Eucalyptus</i> trees frequently <i>E. clelandiorum</i> and <i>E. salubris</i> over mid open <i>Atriplex nummularia</i> , <i>Eremophila scoparia</i> and <i>Senna artemisioides</i> subsp. <i>filifolia</i> shrubland over isolated low <i>Olearia muelleri</i> , <i>Eremophila parvifolia</i> subsp. <i>auricampa</i> and <i>Ptilotus obovatus</i> shrubs.	Landform locally significant, supports Priority listed flora.	~20 km N	Similar VT identified in Survey Area (VT19 and VT21) that also provided a role of refuge to the Priority Flora <i>Eremophila acutifolia</i> (P3) and <i>Notisia intonsa</i> (P3).
	Low		Isolated tall <i>Melaleuca halmaturorum</i> shrubs over low <i>Tecticornia indica</i> subsp. <i>bidens</i> chenopod shrubland over isolated low <i>Disphyma crassifolium</i> forbs.	Landform locally significant, supports Priority listed flora.	~20 km N	Similar VT not identified in Survey Area

#### 4.3.2. Local & Regional Context of Vegetation Types

The vegetation types have been further considered at a local and regional context in Table 4.5. Local significance was determined if the vegetation types were locally restricted (by using vegetation mapping and/or landforms in the local vicinity), and/or were associated with locally significant flora taxa. Regional significance was determined if the vegetation types were regionally restricted (by using BVAs and/or land system mapping to determine a potential regional extent), and/or were associated with regionally significant flora taxa. Vegetation types were matched using the approximate spatial extent of the land systems and BVAs, and/or the species present. As the BVAs and land system mapping were undertaken at a broad scale, some vegetation types may not be matched, or some species may be outdated and/or generalised.

Table 4.5: Local &amp; Regional Context &amp; Discussion of Vegetation Types

Vegetation Type	Associated BVA	Associated Land System	Local Context & Discussion	Regional Context & Discussion
<b>VT02:</b> +/- <i>Eucalyptus leptopoda</i> subsp. <i>subluta</i> mid open mallee woodland with <i>Acacia resinimarginea</i> , +/- <i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i> tall shrubland, over <i>Thryptomene planiflora</i> , <i>Apectospermum subtenuae</i> , +/- <i>Callitris preissii</i> mid open shrubland, over <i>Prostanthera grylloana</i> , <i>Leucopogon</i> sp. Coolgardie (M. Hislop & F. Hort MH 3197), <i>Phebalium filifolium</i> low isolated shrubs	<b>1413:</b> <i>Acacia</i> spp., <i>Allocasuarina campestris</i> , and <i>Melaleuca uncinata</i> tall shrubland.	<b>AC1:</b> Gently sloping to gently undulating plateau areas, or uplands, on granites, gneisses, and allied rocks, with long gentle slopes and, in places, abrupt erosional scarps.	VT02 has a restricted extent in the combined Survey Area; the gentle slopes with yellow sand and common ironstone/laterite gravel landforms it occurs on are restricted throughout the Survey Area but not the local vicinity. The VT is not locally significant.	Associated with a widespread BVA; 1413 and widespread AC1 land system. The VT however provides a role of refuge for the regionally significant <i>Phebalium clavatum</i> (P2) and is therefore considered regionally significant.
<b>VT03:</b> <i>Tecticornia pruinosa</i> , <i>Tecticornia undulata</i> , <i>Atriplex lindleyi</i> subsp. <i>inflata</i> low sparse shrubland	<b>125:</b> Bare areas; salt lakes.	<b>SV15:</b> Gently sloping to gently undulating plateau areas, or uplands, on granites, gneisses, and allied rocks, with long gentle slopes and, in places, abrupt erosional scarps.	VT03 has a restricted extent in the Survey Area. The landform (salt flat/clay pan) on which it occurs appears limited in the local area. Additionally, the vegetation assemblage is dominated by <i>Tecticornia</i> species, a relatively unknown species. Therefore, the VT is considered locally significant.	Associated with a widespread BVA; 125 and widespread SV15 land system within the Coolgardie IBRA Bioregion. The VT is not regionally significant.
<b>VT04:</b> <i>Cratystylis subspinescens</i> mid sparse shrubland, over <i>Atriplex vesicaria</i> , <i>Maireana glomerifolia</i> , <i>Tecticornia disarticulata</i> low sparse shrubland	<b>936:</b> <i>Eucalyptus salmonophloia</i> , <i>Eucalyptus lesouefii</i> , and <i>Eucalyptus transcontinentalis</i> mid woodland, over <i>Atriplex</i> spp. open chenopod shrubland.	<b>My154:</b> Undulating country on acid volcanic rocks and sedimentary materials. <b>Mx43:</b> Gently undulating valley plains and pediments; some outcrop of basic rock.	VT04 was not a limited VT in the Survey Areas; the drainage line with orange/brown clay and common quartz/ironstone pebble landform it occurs on is widespread in the Survey Area and local vicinity. The VT is not locally significant.	Associated with a well-represented BVA (936) and widespread land systems (Mx43 and My154) within the Coolgardie IBRA Bioregion. The VT is not regionally significant.
<b>VT05:</b> <i>Eucalyptus salmonophloia</i> , <i>Eucalyptus salubris</i> mid open woodland, over <i>Cratystylis subspinescens</i> mid sparse shrubland, over <i>Atriplex vesicaria</i> , <i>Maireana glomerifolia</i> , <i>Tecticornia disarticulata</i> low sparse shrubland		<b>My154:</b> Undulating country on acid volcanic rocks and sedimentary materials.	VT05 was a common VT in the combined Survey Areas; the clay pan with quartz/ironstone pebble landform it occurs on is widespread in the Survey Area and local vicinity. The VT is not locally significant.	Associated with a well-represented BVA (936) and a widespread land system (My154) within the Coolgardie IBRA Bioregion. The VT is not regionally significant.
<b>VT06:</b> <i>Eremophila interstans</i> subsp. <i>virgata</i> mid open shrubland, over <i>Dodonaea microzyga</i> var. <i>acrolobata</i> , <i>Lawrencia squamata</i> , <i>Rhagodia drummondii</i> low sparse shrubland	No associated BVA for this VT.		VT06 has a restricted extent within the Survey Area. The landform of which it occurs; low rise of orange cracking clay with abundant granite/dactite stones, appears to be limited in the local area. Additionally, the land system in which it occurs; My154, has 9.1% of its total extent	Not associated with any BVA based on vegetation assemblage, but the land system My154 is well-represented in the Coolgardie IBRA Bioregion. The VT is not regionally significant.

Vegetation Type	Associated BVA	Associated Land System	Local Context & Discussion	Regional Context & Discussion
			within the Survey Area. Therefore, the VT is locally significant.	
<b>VT07:</b> +/- <i>Acacia inceana</i> subsp. <i>conformis</i> , <i>Acacia rigens</i> tall sparse shrubland, over <i>Cratystylis microphylla</i> , <i>Eremophila scoparia</i> mid sparse shrubland, over <i>Rhagodia drummondii</i> , <i>Scaevola spinescens</i> , <i>Tecticornia disarticulata</i> low open shrubland	No associated BVA for this VT.	<b>My154:</b> Undulating country on acid volcanic rocks and sedimentary materials. <b>SV15:</b> Gently sloping to gently undulating plateau areas, or uplands, on granites, gneisses, and allied rocks, with long gentle slopes and, in places, abrupt erosional scarps.	VT07 had a limited extent in the Survey Area and provides a refuge for the locally significant Priority flora taxon, <i>Lepidium genistoides</i> (P3) as well as another priority species, <i>Calandrinia lefroyensis</i> (P1). Therefore, the VT is locally significant.	Not associated with any BVA based on vegetation assemblage, but the land systems My154 and SV15 are well-represented in the Coolgardie IBRA Bioregion. The VT is not regionally significant.
<b>VT08:</b> <i>Eucalyptus clelandiorum</i> low open woodland with +/- <i>Eucalyptus celastroides</i> , <i>Eucalyptus salubris</i> mid open mallee woodland, over <i>Eremophila scoparia</i> mid isolated shrubs, over <i>Eremophila parvifolia</i> subsp. <i>auricampi</i> , <i>Sclerolaena diacantha</i> , <i>Maireana georgei</i> low isolated shrubs	No associated BVA for this VT.	<b>BB5:</b> Rocky ranges and hills of greenstones-basic igneous rocks. <b>Mx43:</b> Gently undulating valley plains and pediments; some outcrop of basic rock.	VT08 was well-represented in the Survey Area and the landform (gentle slopes of orange, brown sandy clay with continuous ironstone pebble) on which it occurs is widespread in the local vicinity. The VT is not locally significant.	Not associated with any BVA based on vegetation assemblage, but the land systems BB5 and Mx43 are well-represented in the Coolgardie IBRA Bioregion. The VT is not regionally significant.
<b>VT09:</b> +/- <i>Eucalyptus longissima</i> mid open mallee woodland with <i>Acacia burkittii</i> tall shrubland, over <i>Olearia pimeleoides</i> , <i>Eremophila alternifolia</i> , <i>Eremophila decipiens</i> subsp. <i>decipiens</i> low isolated shrubs	No associated BVA for this VT.	<b>BB5:</b> Rocky ranges and hills of greenstones-basic igneous rocks.	VT09 had a restricted extent in the Survey Area. However, the drainage line landform on which it occurs are often mapped at a low extent due to their small size. Drainage areas are widespread in the local area and as such the VT is not considered locally significant.	Not associated with any BVA based on vegetation assemblage, but the land system BB5 is well-represented in the Coolgardie IBRA Bioregion. The VT is not regionally significant.
<b>VT10:</b> +/- <i>Eucalyptus longissima</i> , <i>Eucalyptus yilgarnensis</i> , <i>Eucalyptus pileata</i> mid open mallee woodland with <i>Acacia burkittii</i> , <i>Acacia gibbosa</i> tall open shrubland, over <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Eremophila granitica</i> mid sparse shrubland, over <i>Grevillea acuaria</i> , <i>Acacia leptopetala</i> , <i>Scaevola spinescens</i> low sparse shrubland	No associated BVA for this VT.	<b>AC1:</b> Gently sloping to gently undulating plateau areas, or uplands, on granites, gneisses, and allied rocks, with long gentle slopes and, in places, abrupt erosional scarps. <b>Mx42:</b> Broad flat to undulating valleys with isolated granitic rock outcrops and some low escarpments; some seasonal lakes and clay pans.	VT10 had a limited extent within the Survey Area. However, the drainage/depression landforms on which it occurs are often mapped at a low extent due to their small size. Drainage areas are widespread in the local area and as such the VT is not considered locally significant.	Not associated with any BVA based on vegetation assemblage, but the land systems AC1 and Mx42 are well-represented within the Coolgardie IBRA Bioregion. The VT is not regionally significant.

Vegetation Type	Associated BVA	Associated Land System	Local Context & Discussion	Regional Context & Discussion
<b>VT12:</b> <i>Eucalyptus longissima</i> , <i>Eucalyptus torquata</i> mid mallee woodland with <i>Acacia burkittii</i> tall sparse shrubland, over <i>Trymalium myrtillus</i> subsp. <i>myrtillus</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Ricinocarpos digynus</i> mid open shrubland, over <i>Dodonaea microzyga</i> var. <i>acrolobata</i> , <i>Senna cardiosperma</i> , <i>Alyxia buxifolia</i> low sparse shrubland	No associated BVA for this VT.	<b>BB5:</b> Rocky ranges and hills of greenstones-basic igneous rocks.	VT12 has a restricted extent within the Survey Area and provides a role as refuge for the locally significant Priority flora taxa <i>Eucalyptus websteriana</i> subsp. <i>?norsemanica/ websteriana</i> (P1?), and <i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) (P2). Therefore, the VT is locally significant.	Not associated with any BVA based on vegetation assemblage, but the land system BB5 is well-represented in the Coolgardie IBRA Bioregion. However, the VT provides a role of refuge for the regionally significant Priority flora taxon <i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) (P2). Therefore, the VT is regionally significant.
<b>VT13:</b> <i>Eucalyptus lesouefii</i> , <i>Eucalyptus torquata</i> , +/- <i>Eucalyptus stricklandii</i> low open woodland with +/- <i>Acacia burkittii</i> tall sparse shrubland, over <i>Alyxia buxifolia</i> , <i>Dodonaea lobulata</i> , <i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i> mid sparse shrubland, over <i>Scaevola spinescens</i> , <i>Acacia erinacea</i> , <i>Westringia rigida</i> low sparse shrubland	<b>9:</b> <i>Eucalyptus torquata</i> , <i>Eucalyptus lesouefii</i> , and <i>Eucalyptus clelandii</i> low woodland, over <i>Eremophila scoparia</i> , <i>Eremophila glabra</i> , and <i>Eremophila oldfieldii</i> tall sparse shrubland.	Associated with multiple land systems in the area; <b>BB5, Moriarty System, Mx43, and My54.</b>	VT13 had a large extent within the combined Survey Areas. However, the VT provides a role of refuge for the locally significant Priority flora taxon <i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) (P2), as well as another Priority flora, <i>Eremophila acutifolia</i> (P3). Therefore, the VT is considered locally significant.	Associated with a widespread BVA and multiple well-represented land systems. However, the VT provides a role of refuge for the regionally significant Priority flora taxon <i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) (P2). Therefore, the VT is considered regionally significant.
<b>VT14:</b> <i>Eucalyptus griffithsii</i> , <i>Eucalyptus torquata</i> , +/- <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> mid mallee woodland with <i>Eremophila interstans</i> subsp. <i>interstans</i> , +/- <i>Acacia burkittii</i> , <i>Casuarina pauper</i> tall sparse shrubland, over <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Dodonaea lobulata</i> , <i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i> mid sparse shrubland, over <i>Scaevola spinescens</i> , <i>Eremophila glabra</i> subsp. <i>glabra</i> , <i>Olearia muelleri</i> low sparse shrubland		Associated with multiple land systems in the area; <b>BB5, Moriarty System, and Gumland System.</b>	VT14 had a limited extent in the Survey Area but was widespread in the combined Survey Areas. The moderate to steep slopes with continuous basalt stone landform it occurs on is widespread in the Survey Area and local vicinity. The VT is not locally significant.	Associated with a widespread BVA (9) and multiple well-represented land systems (BB5, Moriarty System, and Gumland System) within the Coolgardie IBRA Bioregion. The VT is not regionally significant.
<b>VT15:</b> <i>Eucalyptus salmonophloia</i> , <i>Eucalyptus lesouefii</i> mid open woodland with <i>Eremophila dempsteri</i> , <i>Exocarpos aphyllus</i> tall sparse shrubland, over <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Atriplex nummularia</i> subsp. <i>spathulata</i> , <i>Eremophila scoparia</i> mid sparse shrubland, over <i>Atriplex vesicaria</i> , <i>Cratystylis conocephala</i> , <i>Rhagodia drummondii</i> low sparse shrubland	Associated with multiple BVAs in the area; <b>9, 128, 468, and 936.</b>	Associated with multiple land systems in the area; <b>BB5, Mx43, Mx41, Mx42, Moriarty System, and Gumland System.</b>	VT15 was common in the Survey Area and was widespread in the combined Survey Areas. The plains/floodplain with common ironstone/quartz pebble landform it occurs on is widespread in the Survey Area and local vicinity. The VT is not locally significant.	Associated with widespread BVAs and land systems in the area. The VT is not regionally significant.

Vegetation Type	Associated BVA	Associated Land System	Local Context & Discussion	Regional Context & Discussion
<b>VT16:</b> +/- <i>Eucalyptus griffithsii</i> , <i>Eucalyptus salmonophloia</i> mid open woodland with <i>Eremophila interstans</i> subsp. <i>virgata</i> , <i>Exocarpos aphyllus</i> tall sparse shrubland, over <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Eremophila ionantha</i> , <i>Acacia leptopetala</i> mid sparse shrubland, over <i>Lycium australe</i> , <i>Atriplex vesicaria</i> , <i>Rhagodia drummondii</i> low sparse shrubland	<b>936:</b> <i>Eucalyptus salmonophloia</i> , <i>Eucalyptus lesouefii</i> , and <i>Eucalyptus transcontinentalis</i> mid woodland, over <i>Atriplex</i> spp. open chenopod shrubland.	Associated with multiple land systems in the area; <b>Mx43</b> , <b>Mx42</b> , and <b>Gumland System</b> .	VT16 had a limited extent in the Survey Area but was widespread in the combined Survey Areas. The drainage lines and floodplains on flats landform it occurs on is widespread in the Survey Area and local vicinity. The VT is not locally significant.	Associated with a well-represented BVA (936) and multiple widespread land systems (Mx43, Mx42, and Gumland System) within the Coolgardie IBRA Bioregion. The VT is not regionally significant.
<b>VT18:</b> <i>Eucalyptus lesouefii</i> mid woodland with <i>Melaleuca sheathiana</i> tall open shrubland, over <i>Eremophila scoparia</i> , <i>Exocarpos aphyllus</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> mid sparse shrubland, over <i>Olearia muelleri</i> , <i>Acacia erinacea</i> low sparse shrubland	<b>9:</b> <i>Eucalyptus torquata</i> , <i>Eucalyptus lesouefii</i> , and <i>Eucalyptus clelandii</i> low woodland, over <i>Eremophila scoparia</i> , <i>Eremophila glabra</i> , and <i>Eremophila oldfieldii</i> tall sparse shrubland.	Associated with multiple land systems in the area; <b>BB5</b> , <b>My154</b> , <b>Mx43</b> , and <b>Mx42</b> .	VT18 was widespread within the Survey Area. The plains and low rises with red orange sandy clay/ clay landform on which it occurs are also widespread in the local area and as such the VT is not considered locally significant.	Associated with a well-represented BVA (9) and multiple widespread land systems (BB5, My154, Mx43, and Mx42) within the Coolgardie IBRA Bioregion. The VT is not regionally significant.
<b>VT19:</b> <i>Eucalyptus salubris</i> , <i>Eucalyptus clelandiorum</i> , +/- <i>Eucalyptus salmonophloia</i> low woodland, over <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Eremophila scoparia</i> , <i>Exocarpos aphyllus</i> mid sparse shrubland, over <i>Eremophila caperata</i> , <i>Eremophila parvifolia</i> subsp. <i>auricampi</i> , <i>Olearia muelleri</i> low sparse shrubland	No associated BVA for this VT.	Associated with multiple land systems in the area; <b>My154</b> , <b>Mx41</b> , and <b>Moriarty System</b> .	VT19 had a limited extent in the Survey Area but was widespread in the combined Survey Areas. The flat plains with red orange sandy clay and continuous ironstone pebbles landform it occurs on is widespread in the Survey Area and local vicinity. The VT provides a role of refuge for the Priority taxa <i>Eremophila acutifolia</i> (P3) and <i>Notisia intonsa</i> (P3). However, neither are considered a locally significant taxon. Therefore, the VT is not locally significant.	Not associated with any BVA based on vegetation assemblage, but the land systems My154, Mx41, and Moriarty System are well-represented within the Coolgardie IBRA Bioregion. The VT provides a role of refuge for the Priority taxa; <i>Eremophila acutifolia</i> (P3) and <i>Notisia intonsa</i> (P3). which are not considered regionally significant. Therefore, The VT is not regionally significant.
<b>VT20:</b> <i>Eucalyptus cylindrocarpa</i> , <i>Eucalyptus yilgarnensis</i> mid open mallee woodland with +/- <i>Melaleuca sheathiana</i> tall sparse shrubland, over <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Eremophila scoparia</i> , <i>Acacia leptopetala</i> mid sparse shrubland, over <i>Olearia muelleri</i> , <i>Westringia rigida</i> low sparse shrubland with <i>Triodia scariosa</i> low sparse hummock grassland	<b>128:</b> Bare areas; rock outcrops.	<b>Mx41:</b> Flat to undulating pediments marginal to unit AC1; granitic rock outcrop; some low escarpments. <b>Mx42:</b> Broad flat to undulating valleys with isolated granitic rock outcrops and some low escarpments; some seasonal lakes and clay pans.	VT20 had a large extent within the combined Survey Areas. However, the VT provides a role of refuge for the locally significant Priority flora taxon <i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) (P2). Therefore, the VT is considered locally significant.	Associated with a widespread BVA and multiple well-represented land systems. However, the VT provides a role of refuge for the regionally significant Priority flora taxon <i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) (P2). Therefore, the VT is considered regionally significant.

Vegetation Type	Associated BVA	Associated Land System	Local Context & Discussion	Regional Context & Discussion
<b>VT21:</b> <i>Eucalyptus celastroides</i> , <i>Eucalyptus transcontinentalis</i> , <i>Eucalyptus salubris</i> mid woodland, over <i>Eremophila scoparia</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Eremophila ionantha</i> mid sparse shrubland, over <i>Olearia muelleri</i> , <i>Acacia leptopetala</i> , <i>Eremophila clavata</i> low sparse shrubland	Associated with multiple BVAs in the area; <b>9</b> , <b>936</b> , and <b>522</b> .	Associated with multiple land systems in the area; <b>BB5</b> , <b>My154</b> , <b>My54</b> , <b>Mx41</b> , <b>Mx42</b> , <b>Mx43</b> , <b>Gumland System</b> and <b>Moriarty System</b> .	VT21 has a large extent within the Survey Area and the landform (flat plains, red orange sand/sandy clay) appears widespread in the local area. The VT provides a role of refuge for the Priority flora taxa; <i>Eremophila acutifolia</i> (P3) and <i>Eucalyptus urna</i> subsp. <i>xesta</i> (P3), however neither are considered a locally significant taxon. Therefore, the VT is not locally significant.	Associated with multiple well-represented BVAs and multiple widespread land systems within the Coolgardie IBRA Bioregion. The VT provides a role of refuge for the Priority flora taxa; <i>Eremophila acutifolia</i> (P3) and <i>Eucalyptus urna</i> subsp. <i>xesta</i> (P3), however neither are considered a regionally significant taxon. Therefore, the VT is not regionally significant.
<b>VT22:</b> +/- <i>Eucalyptus longissima</i> , <i>Eucalyptus melanoxydon</i> mid open mallee woodland with <i>Acacia coolgardiensis</i> tall shrubland, over +/- <i>Homalocalyx thryptomenoides</i> , <i>Phebalium canaliculatum</i> mid sparse shrubland, over <i>Prostanthera grylloana</i> low sparse shrubland	No associated BVA for this VT.	<b>My154:</b> Undulating country on acid volcanic rocks and sedimentary materials.	VT22 has a restricted extent within the Survey Area and the vegetation assemblage was uncommon in the area. The landform, yellow sandplain of common granite pebbles was rare in the local area. Additionally, the land system in which it occurs; My154, has 9.1% of its total extent within the Survey Area. Therefore, the VT could be considered locally significant.	Not associated with any BVA based on vegetation assemblage, but the land system My154 is well-represented within the Coolgardie IBRA Bioregion. Therefore, The VT is not regionally significant.
<b>VT23:</b> <i>Allocasuarina campestris</i> , <i>Acacia collegialis</i> , <i>Acacia burkittii</i> tall open shrubland, over <i>Santalum spicatum</i> mid isolated shrubs, over <i>Prostanthera incurvata</i> , <i>Eremophila granitica</i> , <i>Pimelea microcephala</i> subsp. <i>microcephala</i> low sparse shrubland	<b>1413:</b> <i>Acacia</i> spp., <i>Allocasuarina campestris</i> , and <i>Melaleuca uncinata</i> tall shrubland.	<b>BB5:</b> Rocky ranges and hills of greenstones-basic igneous rocks.	VT23 is associated with Mt Marion and has a restricted extent within the combined Survey Area. The moderate slopes of Mt Marion containing continuous basalt stones and boulders landform of which it occurs appears limited in the local area. Additionally, the VT provides a role of refuge for the locally significant Priority flora taxa; <i>Eucalyptus websteriana</i> subsp. <i>norsemanica</i> (P1) and <i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) (P2). Therefore, the VT is considered locally significant.	Associated with a widespread BVA (1413) and land system (BB5). However, the VT provides a role of refuge for the regionally significant Priority flora taxon <i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) (P2). Therefore, the VT is considered regionally significant.

Vegetation Type	Associated BVA	Associated Land System	Local Context & Discussion	Regional Context & Discussion
<p><b>VT24:</b> <i>Acacia burkittii</i>, <i>Melaleuca hamata</i>, +/- <i>Brachychiton gregorii</i> tall shrubland, over <i>Eremophila granitica</i>, <i>Mirbelia depressa</i>, <i>Prostanthera grylloana</i> low sparse shrubland</p>	<p><b>128:</b> Bare areas; rock outcrops.</p>	<p><b>Mx41:</b> Flat to undulating pediments marginal to unit AC1; granitic rock outcrop; some low escarpments.</p> <p><b>My54:</b> Broad very gently undulating plains with scattered rock outcrops occurring as mesas.</p>	<p>VT24 had a large extent within the combined Survey Areas. However, the VT provides a role of refuge for the locally significant Priority flora taxa; <i>Lepidium genistoides</i> (P3) and <i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) (P2). Therefore, the VT is considered locally significant.</p>	<p>Associated with a widespread BVA and multiple well-represented land systems (Mx41 and My54). However, the VT provides a role of refuge for the regionally significant Priority flora taxon <i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) (P2). Therefore, the VT is considered regionally significant.</p>
<p><b>VT25:</b> +/- <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> mid open mallee woodland with <i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i>, <i>Melaleuca lateriflora</i> tall open shrubland</p>	<p>No associated BVA for this VT.</p>	<p><b>Mx43:</b> Gently undulating valley plains and pediments; some outcrop of basic rock.</p>	<p>VT25 has a restricted extent in the Survey Area. The VT is identified from structural analysis from an area of low species diversity. As such it is expected to have a low extent within the Survey Area. The landform (clay pan/ depression) is common in the local vicinity. Therefore, the VT is not considered locally significant.</p>	<p>Not associated with any BVA based on vegetation assemblage, but the land system Mx43 is well-represented within the Coolgardie IBRA Bioregion. Therefore, the VT is not considered regionally significant.</p>

#### 4.4. Vegetation Condition

The majority of the Survey Area was mapped as 'Excellent' (48.7%) showing some scattered weeds, low levels of grazing, and/or minor dust pollution from exploration activities or off-road driving. Approximately 33.5% of the Survey Area was rated as 'Pristine' condition showing no signs of obvious disturbance and included some drainage areas, rocky outcrops and most of the hillcrests and slopes. Approximately 13.6% was rated as 'Very Good' where moderate to high weeds, dust and/or grazing was present and included most of the dry creek lines and clay/salt pans in the Survey Area and areas in close proximity to previously cleared infrastructure or drilling activity. Approximately 3.5% of the Survey Area was mapped as 'Completely Degraded', which includes the areas that have been cleared for roads and infrastructure with no vegetation present. The remaining 0.7% was mapped as 'Good' in areas with high grazing and weeds present where the native vegetation structure has been altered. Vegetation condition of the Survey Area is presented in Table 4.6 and mapped in Map 4.5.

Weeds were present and in high abundance in the drainage lines (VT04; 14 species) and floodplains (VT15; 10 species), and in some of the 'Completely Degraded' areas of the Survey Area. None of the introduced flora were a dominant species in any of the VTs.

**Table 4.6: Vegetation Condition**

Condition	Area (ha)	%	Disturbance Detail in Survey Area
Pristine	7,575.7	33.5	No obvious disturbance.
Excellent	10,994.3	48.7	Scattered weeds, minor litter present, low levels of grazing and/or minor dust. Additionally, areas in close proximity to cleared tracks, logging activities or rehabilitation.
Very Good	3,064.6	13.6	Moderate weed cover, moderate to high grazing, high dust present, low reductions in native vegetation structure and/or minor exploration activities in area.
Good	158.3	0.7	Major clearing, high grazing, high weeds and/or moderate alterations to the native vegetation structure.
Completely Degraded	789.2	3.5	No vegetation or plant species present, including roads, tracks, and areas cleared for infrastructure or drilling activities.

330000

340000

350000

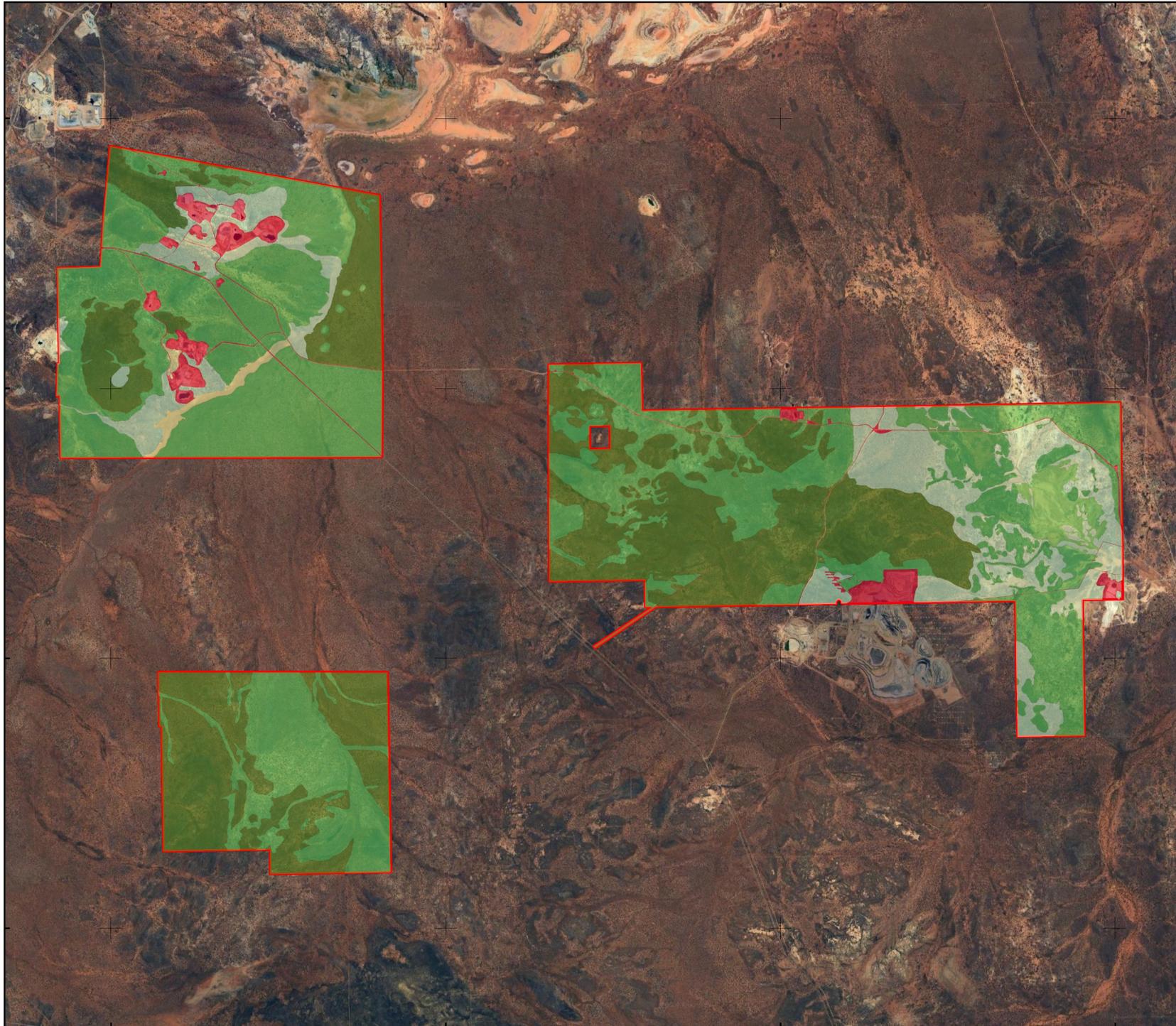
360000

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6560000

6552000

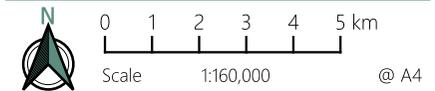


### Legend

 Hamptons Survey Area

#### Vegetation Condition

-  Pristine
-  Excellent
-  Very Good
-  Good
-  Completely Degraded



Coordinate System: GDA 2020 MGA Zone 51  
Projection: Universal Transverse Mercator  
Units: Metre



Author: ZG

Date: 20-09-2024

## Vegetation Condition

Mt Marion - Hamptons Tenement -  
Detailed Flora & Vegetation  
Assessment

MAP

Prepared for  
Mineral Resources Limited

# 4.5

## 5. CONCLUSION

### 5.1. Flora

No Threatened flora were recorded or considered likely to occur within the Survey Area. Eight Priority Flora taxa were recorded:

- Priority 1 (P1): *Calandrinia lefroyensis*, *Eucalyptus websteriana* subsp. *norsemanica*, *Ricinocarpos digynus*, *Thryptomene planiflora*.
- Priority 2 (P2): *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156).
- Priority 3 (P3): *Eremophila acutifolia*, *Lepidium genistoides*, *Notisia intonsa*.

Multiple populations of Sandalwood (*Santalum spicatum*), a controlled species under the BC Act, were recorded from 19 locations in the Survey Area.

No Threatened or Priority Flora species were assigned a 'High' post-survey likelihood of occurrence at the Survey Area.

Of the eight Priority Flora taxa recorded, three were assigned a high local or regional significance at the Survey Area:

*Eucalyptus websteriana* subsp. *norsemanica* (P1) was assigned a high local significance. This taxon has only two local records prior to the survey. The species has 15 known records within the Coolgardie IBRA Bioregion and was therefore assigned a low regional significance.

*Lepidium genistoides* (P3) was assigned a high local significance. This taxon has not been previously recorded within the vicinity of the Survey Area, indicating that it may have limited distribution locally, however this taxon is known from multiple IBRA regions and is not considered regionally significant.

*Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2) was assigned a high local and regional significance. This taxon has limited distribution locally, with only two previous local records outside of the Survey Area and is restricted within the Coolgardie IBRA region.

One of the introduced flora recorded in the Survey Area, *Xanthium spinosum*, is a declared pest and has a category 3 management requirement within the Coolgardie Bioregion.

### 5.2. Vegetation

Based on the definitions of significant vegetation listed in section 2.4.4 (EPA 2016b), VT02, VT07, VT13, VT20, and VT24 are considered significant as they act as a role as refuge (providing habitat) for locally or regionally significant Priority Flora, while VT03, VT06, and VT22 are considered significant as they have a restricted extent within the Survey Area and the landforms or vegetation assemblage they are associated with appear limited in the local vicinity. VT12 and VT23 are both restricted in extent and provide a role of refuge for the locally and regionally significant Priority Flora taxon *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2) and the locally significant Priority Flora taxon *Eucalyptus websteriana* subsp. *norsemanica* (P1).

VT02 which covers 60.6 ha (0.3%) of the Survey Area provides a role of role of refuge for the regionally significant Priority Flora taxon *Phebalium clavatum* (P2) and is considered regionally significant. The VT, while restricted in extent, is not considered locally significant as it appears that based on aerial imagery of the local area that the landform (simple slopes of yellow sand and ironstone pebble) is more widespread to the south of the Survey Area.

VT03 covers just 84.9 ha (0.4%) of the Survey Area and the vegetation assemblage is dominated by *Tecticornia* species, a relatively unknown species. Therefore, VT03 is considered locally significant. The land systems (125; bare areas, salt lakes) and BVA (SV15) that VT03 is associated with is widespread regionally within the Coolgardie Bioregion and is not considered to be regionally significant.

VT06 covers just 66.4 ha (0.3%) of the Survey Area and the landform of which it occurs, low rise of orange cracking clay with abundant granite/dactite stones, appears to be limited in the local area. The VT was not associated with any BVA in the region but is associated with the well-represented land system, My154, in the Coolgardie Bioregion. Therefore, VT06 is considered locally significant but is not considered regionally significant.

VT07 covers 263.3 ha (1.2%) of the Survey Area and provides a role of refuge to the locally significant Priority Flora taxon, *Lepidium genistoides* (P3) as well as the Priority 1 species, *Calandrinia lefroyensis* (P1). Therefore, VT07 is considered locally significant. The VT was not associated with any BVA in the region but is associated with the well-represented land systems, My154 and SV15, in the Coolgardie Bioregion. Therefore, VT06 is considered locally significant but is not considered regionally significant.

VT12 covers just 9.4 ha (<0.1%) of the Survey Area and is mapped as a drainage line within the slopes of Mt Marion. The restricted VT provides a role as refuge for the locally significant Priority Flora taxon *Eucalyptus websteriana* subsp. *norsemanica/websteriana* (P1?), and the locally and regionally significant Priority Flora taxon *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2). It also provides refuge to another Priority taxon *Ricinocarpus digynus* (P1). Therefore, VT12 is considered locally and regionally significant.

VT13 covers 1,659.9 ha (7.6%) of the Survey Area and provides a role as refuge for the locally and regionally significant *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2) as well as another priority species, *Eremophila acutifolia* (P3). Therefore, VT13 is considered locally and regionally significant.

VT20 covers 2,597.8 ha (11.9%) of the Survey Area and provides a role as refuge for the locally and regionally significant *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2) as well as another priority species, *Eremophila acutifolia* (P3). Therefore, VT13 is considered locally and regionally significant.

VT22 covers just 132.6 ha (0.6%) of the Survey Area and the vegetation assemblage of the VT appeared rare within the local vicinity. Additionally, the landform of which it occurs, yellow sandplain with common granite pebbles, was restricted within the Survey Area. Therefore, VT22 is considered locally significant.

VT23 covers just 215.9 ha (1%) of the Survey Area and is mapped as moderate slopes of Mt Marion that contain continuous basalt stones and boulders. This landform is restricted within the Survey Area and the local vicinity and provides refuge to the locally significant Priority Flora taxa, *Eucalyptus websteriana* subsp. *norsemanica* (P1) and the locally and regionally significant taxon, *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2). Therefore, VT23 is considered locally and regionally significant.

VT24 covers 1,633.4 ha (7.5%) of the Survey Area and provides refuge to the locally significant Priority Flora taxon, *Lepidium genistoides* (P3) and the locally and regionally significant taxon, *Lepidosperma* sp. Kambalda (A.A. Mitchell 5156) (P2). Therefore, VT24 is considered locally and regionally significant.

No GDEs were identified in the Survey Area.

Four of the five significant vegetation from the literature review assigned 'Medium' likelihood of occurrence during the desktop assessment, were given a 'High' likelihood of occurrence post-survey, as the survey effort recorded similar VTs to those identified in the desktop assessment that supported Priority listed flora.

Vegetation condition varied within VTs based on disturbances (clearing, weeds, grazing, and dust) and proximity to the cleared tracks. Weeds were in highest abundance within floodplains (VT15), drainage lines (VT04), and 'Completely Degraded' areas in the Survey Area. None of the introduced flora were dominant in any of the VTs.

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## Appendix A: Conservation Codes



## Appendix A1: Definitions of Conservation Categories under the EPBC Act

Category	Definition
<b>Extinct</b>	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.
<b>Extinct in the Wild</b>	A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time: <ul style="list-style-type: none"> <li>(a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or</li> <li>(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.</li> </ul>
<b>Critically Endangered</b>	A native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
<b>Endangered</b>	A native species is eligible to be included in the endangered category at a particular time if, at that time: <ul style="list-style-type: none"> <li>(a) it is not critically endangered; and</li> <li>(b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.</li> </ul>
<b>Vulnerable</b>	A native species is eligible to be included in the vulnerable category at a particular time if, at that time: <ul style="list-style-type: none"> <li>(a) it is not critically endangered or endangered; and</li> <li>(b) it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.</li> </ul>
<b>Conservation Dependent</b>	A native species is eligible to be included in the conservation dependent category at a particular time if, at that time: <ul style="list-style-type: none"> <li>(a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered, or critically endangered; or</li> <li>(b) the following subparagraphs are satisfied: <ul style="list-style-type: none"> <li>(i) the species is a species of fish;</li> <li>(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;</li> <li>(iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory;</li> <li>(iv) cessation of the plan of management would adversely affect the conservation status of the species.</li> </ul> </li> </ul>

## Appendix A2: Definitions of Conservation Categories Under the BC Act

Code	Definition (BC Act)
<b>Threatened Species (T)</b>	Listed by order of the Minister as Threatened in the category of critically endangered, endangered, or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the Biodiversity Conservation Act 2016 (BC Act). <b>Threatened fauna</b> is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for Threatened Fauna. <b>Threatened flora</b> is that subset of 'Rare Flora' listed under schedules 1 to 3 of the Wildlife Conservation (Rare Flora) Notice 2018 for Threatened Flora. The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.
Critically Endangered (CR)	Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under <b>schedule 1</b> of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.
Endangered (EN)	Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under <b>schedule 2</b> of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.
Vulnerable (VU)	Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under <b>schedule 3</b> of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.

Code	Definition (BC Act)
<b>Extinct species</b>	
Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.	
Extinct species (EX)	Species where “there is no reasonable doubt that the last member of the species has died”, and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act). Published as presumed extinct under <b>schedule 4</b> of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for extinct fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for extinct flora.
Extinct in the wild species (EW)	Species that “is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form”, and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.
<b>Specially protected species</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.	
Migratory species (MI)	Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act). Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species. Published as migratory birds protected under an international agreement under <b>schedule 5</b> of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.
Conservation Dependent (CD)	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act). Published as conservation dependent fauna under <b>schedule 6</b> of the Wildlife Conservation (Specially Protected Fauna) Notice 2018
Other specially protected fauna (OS)	Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act). Published as other specially protected fauna under <b>schedule 7</b> of the Wildlife Conservation (Specially Protected Fauna) Notice 2018
<b>Priority species (P)</b>	
Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora. Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.	
Priority 1: Poorly known species (P1)	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.

Code	Definition (BC Act)
Priority 2: Poorly known species (P2)	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.
Priority 3: Poorly known species (P3)	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 need further survey.
Priority 4: Rare, Near Threatened and other species in need of monitoring (P4)	(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

### Appendix A3: Legal Status Definition of Listed Plants in Western Australia

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

## Appendix B: Flora Site Data



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## Appendix C: Likelihood of Occurrence Assessment – Flora



Pre-Survey Likelihood	Post-Survey Likelihood	Status	EPBC Act/ BC Act	Family	Taxon	Description	Habitat	Closest Record (km)	Likelihood Notes	Lifeform	Flowering Period
Recorded	Recorded	P3	-	Scrophulariaceae	<i>Eremophila acutifolia</i>	Low, dense, rounded shrub, 0.3-0.8 m high. Fl. white.	Clay loam, gravelly loam. Undulating flats.	0	Recorded within the Survey Area.	Perennial	Nov to Dec.
High	Recorded	P1	-	Myrtaceae	<i>Thryptomene planiflora</i>	Shrub to 0.5-2 m high, broadly, or very broadly obovate leaves with no obvious apical point. Flowering white/pink.	Gentle undulating and flat yellow brown sandy loam plains.	2	Recorded within 10 km of the Survey Area with land system, geology, and vegetation match.	Perennial	Jun to Oct
High	Medium	P1	--	Fabaceae	<i>Acacia websteri</i>	Shrub, 1.2-5 m high, bark fibrous. Fl. yellow.	Red sand, clay, or loam. Low-lying areas, flats.	4	Recorded within 10 km of the Survey Area with land system, geology, and vegetation match.	Perennial	Jan, Jun.
High	Medium	P3	-	Scrophulariaceae	<i>Eremophila veronica</i>	Spreading, erect shrub, 0.5-1 m high. Fl. purple.	Stony clay, clay loam. Lateritic breakaways.	4	Recorded within 10 km of the Survey Area with land system, geology and vegetation match.	Perennial	Apr to May
High	Medium	P2	-	Rutaceae	<i>Phebalium clavatum</i>	Upright shrub, 0.5-1.5 m high. Fl. white.	Sandy soils.	4	Recorded within 10 km of the Survey Area with land system, geology and vegetation match.	Perennial	Aug to Sept
High	Medium	P3	-	Proteaceae	<i>Grevillea georgeana</i>	Erect to widely spreading shrub, 1-3 m high, up to 4 m wide. Fl. red/red & pink & cream.	Stony loam/clay. Ironstone hilltops & slopes.	5	Recorded within 10 km of the Survey Area with land system, geology and vegetation match.	Perennial	Jan, Mar, Sept to Nov.
High	Medium	P1	-	Orchidaceae	<i>Pterostylis xerampelina</i>	-	Granite/Ironstone hills.	6	Recorded within 10 km of the Survey Area with land system, geology, and vegetation match.	Annual	Sep to Nov

Pre-Survey Likelihood	Post-Survey Likelihood	Status	EPBC Act/ BC Act	Family	Taxon	Description	Habitat	Closest Record (km)	Likelihood Notes	Lifeform	Flowering Period
High	Medium	P1	-	Goodeniaceae	<i>Dampiera plumosa</i>	Erect perennial, herb, 0.15-0.2 m high. Fl. blue.	Red sandy soils.	7	Recorded within 10 km of the Survey Area with land system, geology, and vegetation match.	Perennial	Oct.
High	Recorded	P3	-	Asteraceae	<i>Notisia intonsa</i>	Annual herb	Moist red sand. Lake bank.	7	Recorded within 10 km of the Survey Area with land system, geology, and vegetation match.	Annual	-
High	Medium	P3	-	Ericaceae	<i>Styphelia rectiloba</i>	Compact, erect shrub to 70cm high.	Lateritic/granitic breakaways.	8	Recorded within 10 km of the Survey Area with land system, geology, and vegetation match.	Perennial	Jan.
High	Medium	P2	-	Poaceae	<i>Austrostipa frankliniae</i>	Tussock grass to 0.4m.	Basalt crest or slopes.	8	Recorded within 10 km of the Survey Area with land system, geology, and vegetation match.	Perennial	Oct to Nov.
High	Medium	P3	-	Poaceae	<i>Austrostipa turbinata</i>	Tussock grass to 0.4m.	Clay pan, basalt slopes.	9	Recorded within 10 km of the Survey Area with land system, geology, and vegetation match.	Perennial	April, Oct to Nov.
High	Medium	P4	-	Scrophulariaceae	<i>Eremophila caerulea</i> subsp. <i>merrallii</i>	Spreading or sprawling shrub, to 0.35 m high, to 0.8 m wide. Fl. blue purple.	Sand, clay or loam. Undulating plains.	9	Recorded within 10 km of the Survey Area with land system, geology and vegetation match.	Perennial	Oct to Dec.
Medium	Recorded	P1	-	Myrtaceae	<i>Eucalyptus websteriana</i> subsp. <i>norsemanica</i>	(Spreading mallee), to 3 m high, bark 'Minniritchi'. Fl. yellow.	Rocky rises.	10	Recorded 10 km out of the Survey Area with land system, geology, and vegetation match.	Perennial	Sept to Nov.
Medium	Low	P1	-	Fabaceae	<i>Acacia coatesii</i>	Low-domed shrub <40 cm.	Grows in shallow, red sandy clay on flat or gently sloping ground towards the base of a low greenstone ridge	10	Recorded 10 km out of the Survey Area with land system, geology, and vegetation match.	Perennial	Sept to Oct.

Pre-Survey Likelihood	Post-Survey Likelihood	Status	EPBC Act/ BC Act	Family	Taxon	Description	Habitat	Closest Record (km)	Likelihood Notes	Lifeform	Flowering Period
							in open woodland.				
Medium	Low	P3	-	Fabaceae	<i>Acacia crenulata</i>	Bushy shrub or tree, 0.7-3 m high. Fl. yellow.	Clay, sandy clay, yellow sand. Rocky rises, granite outcrops, breakaways.	11	Recorded within 10 km of the Survey Area with land system, geology, and vegetation match.	Perennial	April.
Medium	Low	P3	-	Fabaceae	<i>Bossiaea celata</i>	Compact, intricately branched shrub, to 0.8 m high. Fl. yellow-red-orange.	Deep sand. Open mallee.	11	Land system, geology, and vegetation match but, recorded outside 10 km of the Survey Area	Perennial	Sep to Oct.
Medium	Low	P1	-	Myrtaceae	<i>Cyathostemon divaricatus</i>	Erect straggly shrub to 1 m high, 0.8 m wide, white to pale pink flowers.	Hills.	11	Land system, geology, and vegetation match but, recorded outside 10 km of the Survey Area	Perennial	Aug.
Medium	Low	P1	-	Cyperaceae	<i>Lepidosperma</i> sp. Parker Range (N. Gibson & M. Lyons 2094)	Sedge.	Ridge/slope. Granite. Dry brown loam.	11	Recorded within 10 km of the Survey Area with land system, geology, and vegetation match.	Perennial	-
Medium	Low	P4	-	Myrtaceae	<i>Eucalyptus jutsonii</i> subsp. <i>jutsonii</i>	(Mallee), 4-7 m high, bark rough over most stems, grey to light grey, brown.	Red to pale orange deep sands. Undulating areas and on dunes.	12	Land system, geology and vegetation match but, recorded outside 10 km of the Survey Area	Perennial	Mar, Nov.
Medium	Low	P4	-	Frankeniaceae	<i>Frankenia glomerata</i>	Prostrate shrub. Fl. pink, white.	White sand.	12	Recorded within 30 km of the Survey Area however limited habitat match (Saline Flats)	Perennial	Nov.
Medium	Low	P3	-	Rhamnaceae	<i>Cryptandra crispula</i>	Non-spinescent shrub, 0.25-0.9 m high.	Brown sandy clay, yellow loamy sand, red soil, pebbles. Dune	14	Recorded within 10 km of the Survey Area with land system, geology, and vegetation match.	Perennial	Jul to Sep

Pre-Survey Likelihood	Post-Survey Likelihood	Status	EPBC Act/ BC Act	Family	Taxon	Description	Habitat	Closest Record (km)	Likelihood Notes	Lifeform	Flowering Period
							ridges, hills, near salt lakes.				
Medium	Low	P2	-	Scrophulariaceae	<i>Eremophila praecox</i>	Broom-like shrub, 1.5-3 m high. Fl. purple.	Red/brown sandy loam. Undulating plains.	15	Land system, geology and vegetation match but recorded outside 10 km of the Survey Area.	Perennial	Oct to Dec.
Medium	Low	P2	-	Goodeniaceae	<i>Goodenia salina</i>	Annual, herb, 0.02 to 0.2 m high.	Well-drained, saline, grey or brown loamy clay. Low gypseous dunes near salt pans.	15	Recorded within 30 km of the Survey Area however limited habitat match (Saline Flats)	Annual	May, Aug to Nov.
Medium	Medium	P3	-	Cyperaceae	<i>Isolepis australiensis</i>	Annual, grass-like or herb (sedge), 0.03-0.055 m high.	Silty sand, sandy clay. Lake margins, pools.	15	Recorded within 30 km of the Survey Area with limited habitat match (Saline Flats)	Annual	Jun or Sept.
Medium	Low	P2	-	Fabaceae	<i>Acacia kerryana</i>	Low, spreading, domed shrub, 0.3-1 m high. Fl. yellow.	Granitic loamy sand, stony clayey loam, or clayey sand. Low stony ridges, undulating plains.	16	Recorded within 10 km of the Survey Area with habitat match	Perennial	Oct to Dec or Jan to Feb.
Medium	Low	P3	-	Casuarinaceae	<i>Allocasuarina eriochlamys</i> subsp. <i>grossa</i>	Dioecious or monoecious shrub, 1-3 m high, bracteoles prominently exceeding cone.	Stony loam, laterite clay. Granite outcrops.	16	Land system, geology, and vegetation match but, recorded outside 10 km of the Survey Area	Perennial	Jul.
Medium	Recorded	P1	-	Montiaceae	<i>Calandrinia lefroyensis</i>	Perennial herb, 30-40 cm high x 10-20 cm wide. Twining succulent herb, flowers dark pink, present within low shrubs.	Saline flats.	16	Recorded within 30 km of the Survey Area however limited habitat match (Saline Flats)	Perennial	Apr, Oct to Nov.

Pre-Survey Likelihood	Post-Survey Likelihood	Status	EPBC Act/ BC Act	Family	Taxon	Description	Habitat	Closest Record (km)	Likelihood Notes	Lifeform	Flowering Period
Medium	Recorded	P2	-	Cyperaceae	<i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156)	Tussock-like sedge with shiny flowering stems and serrated leaf margins, growing approximately 0.3 m tall.	Rocky areas.	16	Land system, geology, and vegetation match but, recorded outside 10 km of the Survey Area	Perennial	-
Medium	Low	P4	-	Myrtaceae	<i>Eucalyptus x brachyphylla</i>	(Mallee) or tree, to 4 m high, bark rough, flaky. Fl. white.	Sandy loam. Granite outcrops.	16	Land system, geology, and vegetation match but, recorded outside 10 km of the Survey Area	Perennial	Jun.
Medium	Low	P3	-	Stylidiaceae	<i>Stylidium choreanthum</i>	Creeping perennial, herb, 0.01-0.03 m high, to 0.3 m wide. Fl. pink/white.	White/yellow or red sand. Plains.	16	Recorded outside 10 km of the Survey Area with land system, geology and vegetation match.	Perennial	Sep to Oct
Medium	Low	P1	-	Cyperaceae	<i>Lepidosperma lyonsii</i>	Tufted rhizomatous, perennial, herb (sedge), leaves 0.31 to 0.53 m high, culms and leaves distichous.	Pale orange skeletal sandy loam with banded ironstone gravel & rock, well-drained shallow stony loamy with quartz. Gentle hill slopes, upper slopes of large hill.	17	Recorded outside 10 km of the Survey Area with land system, geology, and vegetation match.	Perennial	-
Medium	Low	P2	-	Proteaceae	<i>Hakea rigida</i>	Shrub, 0.6-2.7 m high.	Sandy soils, yellow sand.	17	Recorded Within 30 km of the Survey Area with land system and geology match	Perennial	Sept to Oct.

Pre-Survey Likelihood	Post-Survey Likelihood	Status	EPBC Act/ BC Act	Family	Taxon	Description	Habitat	Closest Record (km)	Likelihood Notes	Lifeform	Flowering Period
Medium	Low	P1	-	Rutaceae	<i>Phebalium appressum</i>	Rounded shrub, ca 1 m high, leaves cordate-ovate, ca 2 mm long; flowers usually solitary; pedicels short, thick, ca 1 mm long. Flowers, white.	Yellow sandplain.	17	Land system, geology, and vegetation match but, recorded outside 10 km of the Survey Area	Perennial	Jul.
Medium	Recorded	P1	-	Euphorbiaceae	<i>Ricinocarpos digynus</i>	-	Hillslope. Dry, rocky red-brown sandy loam.	17	Nearest recorded taken within a Salt mine with some match to habitat.	Perennial	-
Medium	Low	P3	-	Apocynaceae	<i>Alyxia tetanifolia</i>	Erect, rigid, pungent shrub, 1-2 m high, to 2.5 m wide. Fl. white-cream.	Sandy clay, loam, concretionary gravel. Drainage lines, near lakes.	18	Land system, geology, and vegetation match but, recorded outside 10 km of the Survey Area	Perennial	May to June, Nov.
Medium	Low	P1	-	Fabaceae	<i>Acacia sclerophylla</i> var. <i>teretiuscula</i>	Spreading, much-branched shrub, 0.25-2.5 m high. Fl. yellow.	Clay & loamy soils.	19	Land system, geology, and vegetation match but, recorded outside 10 km of the Survey Area	Perennial	Sept to Oct.
Medium	Low	P3	-	Asteraceae	<i>Cratystylis centralis</i>	Much-branched, brittle, greyish shrub, to 1 m high.	Red sandy loam with ironstone gravel. Flat plains, breakaway country.	20	Recorded outside 10 km of the Survey Area with land system, geology, and vegetation match.	Perennial	Aug to Nov
Medium	Low	T	VU/-	Elaeocarpaceae	<i>Tetratheca spenceri</i>	-	Breakaway system, lateritic soil with tantalite.	20	Recorded in Coolgardie town, next nearest record to the south outside 10 km of the Survey Area with some land system, geology, and vegetation match.	Perennial	Oct

Pre-Survey Likelihood	Post-Survey Likelihood	Status	EPBC Act/ BC Act	Family	Taxon	Description	Habitat	Closest Record (km)	Likelihood Notes	Lifeform	Flowering Period
Medium	Low	P3	-	Scrophulariaceae	<i>Eremophila microphylla</i>	Rounded shrub, 0.45-0.9 m high, to 1 m wide.	Red-brown clay loam.	23	Recorded within 30 km of the Survey Area with land system, geology, and vegetation match.	Perennial	Nov to Dec.
Medium	Low	P2	-/VU	Chenopodiaceae	<i>Tecticornia flabelliformis</i>	Erect shrub, to 0.2 m high.	Clay. Saline flats.	23	Recorded within 30 km of the Survey Area with limited habitat match (Saline Flats)	Perennial	Jan to May.
Medium	Low	P3	-	Asteraceae	<i>Chrysocephalum apiculatum</i> subsp. <i>norsemanense</i>	Erect perennial herb 0.3-0.6 m high.	Various soil types including yellow or red sand, yellow sandy clay, and calcareous soil.	24	Nearest Record in Coolgardie town (considered inaccurate). Next closest 24km with some habitat match	Perennial	Sep to Oct.
Medium	Low	P2	-	Fabaceae	<i>Bossiaea laxa</i>	Lax, open, spreading shrub, to 2 m high. Fl. yellow green.	Brown loam over deep granite. Sheltered positions around outcrops.	25	Geology and vegetation match and recorded outside 10 km of the Survey Area	Perennial	May
Medium	Low	T	VU/EN	Fabaceae	<i>Gastrolobium graniticum</i>	Erect, open shrub, to 2.5 m high. Fl. yellow, orange, and red.	Sand, sandy loam, granite. Margins of rock outcrops, along drainage lines.	26	Recorded within 10 km of the Survey Area but closest records are from 1900 and at Coolgardie, so should disregard these one. next closest 26 km	Perennial	-
Medium	Low	P3	-	Myrtaceae	<i>Melaleuca coccinea</i>	Much branched shrub, 1.5-2.6 m high.	Sandy loam over granite. Granite outcrops, sandplain, river valleys.	26	Recorded within 30 km of the Survey Area with limited habitat match (Saline Flats)	Perennial	Sep to Nov, or Jan.

Pre-Survey Likelihood	Post-Survey Likelihood	Status	EPBC Act/ BC Act	Family	Taxon	Description	Habitat	Closest Record (km)	Likelihood Notes	Lifeform	Flowering Period
Medium	Medium	P1	-	Amaranthaceae	<i>Ptilotus procumbens</i>	Spreading procumbent annual, herb, ca 0.1 m high. Fl. pink, white.	Red clay.	26	Recorded near Kalgoorlie town. Habitat match in area.	Annual	Nov.
Medium	Low	P1	-	Ericaceae	<i>Melichrus</i> sp. Coolgardie (K.R. Newbey 8698)	-	Flat or undulating yellow loamy sand	27	Recorded Within 30 km of the Survey Area with land system and geology match	Perennial	-
Medium	Low	P1	-	Myrtaceae	<i>Chamelaucium</i> sp. Parker Range (B.H. Smith 1255)	Shrub. Flowers white.	Sandplain.	29	Land system, geology, and vegetation match but, recorded outside 10 km of the Survey Area	Perennial	Nov to Dec
Medium	Low	P2	-	Asteraceae	<i>Elachanthus pusillus</i>	Ascending or decumbent annual, herb, to 0.15 m high. Fl. yellow green.	In mallee, woodland, shrubland and coastal vegetation.	29	Land system, geology, and vegetation match but, recorded outside 10 km of the Survey Area	Annual	Aug to Oct.
Low	Low	P3	-	Ericaceae	<i>Styphelia saxicola</i>	-	Laterite/duricrust outcropping. Dry orange/salmon/white clay loam.	30	Land system, geology, and vegetation match but, recorded outside 30 km of the Survey Area	Perennial	Apr to May.
Low	Low	P1	-	Chenopodiaceae	<i>Tecticornia mellarium</i>	-	Sand dunes near Salt Lake. Brown, red-orange sand, sandy clay.	31	Recorded within 30 km of the Survey Area with limited habitat match (Saline Flats)	Perennial	-
Low	Low	P1	-	Rutaceae	<i>Philotheca pachyphylla</i>	Erect shrub, 0.3-1.5 m high. Fl. white.	Sand, red loam, clay loam. Sandplains, hill tops.	32	Recorded outside 30 km of the Survey Area with some habitat match	Perennial	May or Sep.
Low	Low	P1	-	Rutaceae	<i>Philotheca apiculata</i>	Erect shrub, 0.5-1.5 m high. Fl. white, pink.	Stony clay loam. Rocky outcrops, hillsides.	32	Recorded outside 30 km of the Survey Area with some habitat match	Perennial	Aug to Nov.
Low	Low	P1	-	Scrophulariaceae	<i>Eremophila xanthaemus</i>	Erect shrub to 1.2-3.0 m high. Flowers pink.	Stony, brown loam soils in Eucalyptus-	34	Recorded outside 30 km of the Survey Area, some habitat match	Perennial	Sept to Oct.

Pre-Survey Likelihood	Post-Survey Likelihood	Status	EPBC Act/ BC Act	Family	Taxon	Description	Habitat	Closest Record (km)	Likelihood Notes	Lifeform	Flowering Period
							Casuarina woodland on the upper slopes of low rocky hills.				
Low	Low	P1	-	Lamiaceae	<i>Prostanthera splendens</i>	Erect, openly branched shrub, 0.2-1 m high. Fl. blue purple.	Stony loam, shallow soils with ironstone pebbles. Breakaways.	37	Recorded outside 30 km of the Survey Area with some habitat match	Perennial	Aug to Oct
Low	Low	P3	-	Scrophulariaceae	<i>Eremophila arachnoides</i> subsp. <i>tenera</i>	Broom-like shrub, to 3 m high, branches with tubercles often elongated & coalescing. Fl. white/blue purple.	Plain.	39	Recorded outside 30 km of the Survey Area, limited habitat match	Perennial	Sep to Dec
Low	Low	P1	-	Amaranthaceae	<i>Ptilotus rigidus</i>	Shrubs, stems several, more or less prostrate.	Quartz / rocky low hill.	39	Recorded outside 30 km of the Survey Area and only geology match	Perennial	-
Low	Low	P2	-	Myrtaceae	<i>Eucalyptus educta</i>	(Straggling & spreading mallee), 3-5 m high, bark rough, 'Minni-ritchi'. Fl. cream yellow.	Shallow soils. Granite rocks.	40	Recorded outside 30 km of the Survey Area, some habitat match	Perennial	-
Low	Low	P3	-	Scrophulariaceae	<i>Eremophila annosicaulis</i>	Small, slightly aromatic shrub to 0.8 m tall with one or a number of branches arising from ground level, the wood very gnarled.	Ironstone.	41	Recorded outside 30 km of the Survey Area, limited habitat match	Perennial	Jul, Sep

Pre-Survey Likelihood	Post-Survey Likelihood	Status	EPBC Act/ BC Act	Family	Taxon	Description	Habitat	Closest Record (km)	Likelihood Notes	Lifeform	Flowering Period
Low	Low	P3	-	Lamiaceae	<i>Pityrodia scabra</i> subsp. <i>dendrotricha</i>	Shrub.	Flat on drainage line to lake edge. Dry red-orange sandy loam.	43	Recorded outside 30 km of the Survey Area with some habitat match	Perennial	-
Low	Low	P1	-	Fabaceae	<i>Acacia epedunculata</i>	Low spreading, becoming rounded, multi-stemmed shrub, 0.5-0.65 m high. Fl. yellow.	Yellow sand. Sandplains.	45	Recorded outside 30 km of the Survey Area, limited habitat match	Perennial	Aug.
Low	Low	P3	-	Rutaceae	<i>Phebalium drummondii</i>	-	Ridge or plains with white-yellow sandy loam, gravel.	45	Recorded outside 30 km of the Survey Area with some habitat match	Perennial	Oct to Nov
Low	Low	P2	-	Araliaceae	<i>Trachymene pyrophila</i>	Annual, herb, 0.1-0.5 m high, indumentum of patent glandular hairs. Fl. white.	Yellow or orange sand. Sandplains; germinating after fire or other disturbances such as mining.	46	Geology and vegetation match, but recorded outside 30 km of the Survey Area	Annual	Nov to Dec or Jan to Mar.
Low	Low	P3	-	Asteraceae	<i>Angianthus prostratus</i>	Prostrate annual, herb. Fl. white yellow.	Red clay or loamy soils. Saline depressions.	47	Recorded outside 30 km of the Survey Area, limited habitat match	Annual	Jul to Sep.
Low	Low	P1	-	Asteraceae	<i>Rhodanthe uniflora</i>	Erect, woolly annual, herb, 0.02-0.1(-0.3) m high. Fl. yellow.	Brown earth. Open eucalyptus woodland.	47	Recorded outside 30 km of the Survey Area and only geology match	Annual	Aug to Oct.
Low	Low	P4	-	Haloragaceae	<i>Myriophyllum petraeum</i>	Aquatic annual, herb, stems 0.15-0.3 m long. Fl. white.	Strictly confined to ephemeral rock pools on granite outcrops.	47	Recorded outside 30 km of the Survey Area, some habitat match	Annual	Aug to Dec.
Low	Low	P1	-	Scrophulariaceae	<i>Eremophila perglandulosa</i>	Low, spreading, viscid shrub, ca 0.25 m high. Fl. blue purple.	Orange/brown sand or sandy loam.	48	Recorded outside 30 km of the Survey Area with no habitat match	Perennial	Jan.

Pre-Survey Likelihood	Post-Survey Likelihood	Status	EPBC Act/ BC Act	Family	Taxon	Description	Habitat	Closest Record (km)	Likelihood Notes	Lifeform	Flowering Period
Low	Low	P1	-	Proteaceae	<i>Grevillea phillipsiana</i>	Prickly shrub, 0.8-1.5 m high. Fl. red/red & orange.	Red sand, stony loam. Granite hills.	49	Recorded outside 30 km of the Survey Area with some habitat match	Perennial	Jul to Sep.
Not identified in Desktop Survey	Recorded	P3	-	Brassicaceae	<i>Lepidium genistoides</i>	Spreading, dense shrub, 0.25-0.6 m high. Fl. white	Sandy loam	>100	Nearest record more than 85km away and thus not identified in Desktop survey.	Perennial	Sep to Oct.
Low	Low	P4	-	Asparagaceae	<i>Sowerbaea multicaulis</i>	Tufted perennial, herb, 0.075-0.25 m high. Fl. purple violet.	Yellow-brown sand.	-	Nearest recorded taken in 1897 within a Salt Lake and no match to habitat.	Perennial	Oct to Dec or Jan.
Low	Low	P1	-	Myrtaceae	<i>Thryptomene</i> sp. Coolgardie (E. Kelso s.n. 1902)	Perennial shrub.	Sandplain. Orange sandy flats.	-	Nearest record was taken within Coolgardie town in 1902, not an accurate record and the only one	Perennial	-
Low	Low	P2	-	Brassicaceae	<i>Lepidium merrallii</i>	Erect to spreading annual (possibly ephemeral), herb, 0.03-0.15 m high.	Clay loam.	-	Nearest record was taken within Coolgardie town in 1902, not an accurate record and the only one	Annual	-
Low	Low	P3	-	Malvaceae	<i>Alyogyne</i> sp. Great Victoria Desert (D.J. Edinger 6212)	-	Black soil, freshwater swamp.	-	Nearest record was taken within Coolgardie town in 1902, not an accurate record and the only one	-	-

## Appendix D: Flora Species List



Family	Species	Comment
Aizoaceae	<i>Disphyma crassifolium</i> subsp. <i>clavellatum</i>	
	<i>Gunnipopsis quadrifida</i>	
	<i>Sarcozona praecox</i>	
Amaranthaceae	<i>Ptilotus carlsonii</i>	
	<i>Ptilotus eremita</i>	
	<i>Ptilotus exaltatus</i>	
	<i>Ptilotus gaudichaudii</i>	
	<i>Ptilotus helichrysoides</i>	
	<i>Ptilotus holosericeus</i>	
	<i>Ptilotus obovatus</i>	
	<i>Surreya diandra</i>	
Apiaceae	<i>Daucus glochidiatus</i>	
Apocynaceae	<i>Alyxia buxifolia</i>	
	<i>Leichhardtia australis</i>	
	<i>Vincetoxicum lineare</i>	
Araliaceae	<i>Trachymene ornata</i>	
Asparagaceae	* <i>Agave americana</i>	Weed
	<i>Lomandra effusa</i>	
	<i>Thysanotus manglesianus</i>	
Asphodelaceae	* <i>Asphodelus fistulosus</i>	Weed
Asteraceae	<i>Angianthus tomentosus</i>	
	<i>Asteridea athrixioides</i>	
	<i>Brachyscome ciliaris</i>	
	<i>Calotis hispidula</i>	
	<i>Centaurea melitensis</i>	Weed
	<i>Cephalipterum drummondii</i>	
	<i>Chrysocephalum puteale</i>	
	<i>Cratystylis conocephala</i>	
	<i>Cratystylis microphylla</i>	
	<i>Cratystylis subspinescens</i>	
	<i>Cratystylis conocephala</i> x <i>C. microphylla</i>	
	* <i>Dittrichia graveolens</i>	Weed
	<i>Erymophyllum ramosum</i> subsp. <i>ramosum</i>	
<i>Hyalosperma demissum</i>		

Family	Species	Comment
	<i>*Hypochaeris glabra</i>	Weed
	<i>Isoetopsis graminifolia</i>	
	<i>Minuria cunninghamii</i>	
	<i>Notisia intonsa</i> (P3)	Priority 3
	<i>Olearia muelleri</i>	
	<i>Olearia pimeleoides</i>	
	<i>*Oligocarpus calendulaceus</i>	Weed
	<i>*Oncosiphon suffruticosum</i>	Weed
	<i>Ozothamnus cassiope</i>	
	<i>Podolepis aristata</i> subsp. <i>affinis</i>	
	<i>Pogonolepis muelleriana</i>	
	<i>Rhodanthe battii</i>	
	<i>Rhodanthe floribunda</i>	
	<i>Rhodanthe pygmaea</i>	
	<i>Rhodanthe stricta</i>	
	<i>Schoenia filifolia</i> subsp. <i>filifolia</i>	
	<i>Senecio glossanthus</i>	
	<i>Senecio lacustrinus</i>	
	<i>Siemssenia capillaris</i>	
	<i>*Sonchus oleraceus</i>	Weed
	<i>Streptoglossa liatroides</i>	
	<i>Vittadinia sulcata</i>	
	<i>Waitzia acuminata</i> var. <i>acuminata</i>	
	<i>*Xanthium spinosum</i>	Weed
<b>Boraginaceae</b>	<i>Halgania andromedifolia</i>	
	<i>Halgania cyanea</i> var. <i>Charleville</i> (R.W. Purdie +111)	
	<i>Heliotropium curassavicum</i>	
	<i>*Heliotropium europaeum</i>	Weed
<b>Brassicaceae</b>	<i>*Carrichtera annua</i>	Weed
	<i>Lepidium genistoides</i> (P3)	Priority 3/Range Extension
	<i>Stenopetalum filifolium</i>	
<b>Casuarinaceae</b>	<i>Allocasuarina campestris</i>	
	<i>Allocasuarina helmsii</i>	
	<i>Casuarina obesa</i>	

Family	Species	Comment
	<i>Casuarina pauper</i>	
Celastraceae	<i>Stackhousia</i> sp. Mt Keith (G. Cockerton & G. O'Keefe 11017)	
Chenopodiaceae	<i>Atriplex codonocarpa</i>	
	<i>Atriplex lindleyi</i> subsp. <i>inflata</i>	
	<i>Atriplex nana</i>	
	<i>Atriplex nummularia</i> subsp. <i>spathulata</i>	
	<i>Atriplex stipitata</i>	
	<i>Atriplex vesicaria</i>	
	<i>Chenopodium curvispicatum</i>	
	<i>Didymanthus roei</i>	
	<i>Dissocarpus paradoxus</i>	
	<i>Dysphania pumilio</i>	
	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	
	<i>Eriochiton sclerolaenoides</i>	
	<i>Maireana amoena</i>	
	<i>Maireana appressa</i>	
	<i>Maireana erioclada</i>	
	<i>Maireana georgei</i>	
	<i>Maireana glomerifolia</i>	
	<i>Maireana pentatropis</i>	
	<i>Maireana pyramidata</i>	
	<i>Maireana radiata</i>	
	<i>Maireana sedifolia</i>	
	<i>Maireana suaedifolia</i>	
	<i>Maireana tomentosa</i> subsp. <i>tomentosa</i>	
	<i>Maireana trichoptera</i>	
	<i>Maireana triptera</i>	
	<i>Malacocera tricornis</i>	Range Extension
	<i>Rhagodia drummondii</i>	
	<i>Rhagodia eremaea</i>	
	<i>Salsola australis</i>	
	<i>Sclerolaena cuneata</i>	
	<i>Sclerolaena diacantha</i>	
	<i>Sclerolaena drummondii</i>	

Family	Species	Comment
	<i>Sclerolaena eurotioides</i>	
	<i>Sclerolaena fusiformis</i>	
	<i>Sclerolaena obliquicuspis</i>	
	<i>Sclerolaena parviflora</i>	
	<i>Tecticornia disarticulata</i>	
	<i>Tecticornia doliiformis</i>	
	<i>Tecticornia pergranulata</i> subsp. <i>pergranulata</i>	
	<i>Tecticornia pruinosa</i>	
	<i>Tecticornia</i> sp. 1	
	<i>Tecticornia</i> sp. Dennys Crossing (K.A. Shepherd & J. English KS 552)	
	<i>Tecticornia syncarpa</i>	
	<i>Tecticornia undulata</i>	
Colchicaceae	<i>Wurmbea</i> sp. 1	Not identified to species
Convolvulaceae	<i>Convolvulus remotus</i>	
	* <i>Cuscuta epithymum</i>	Weed
Crassulaceae	<i>Crassula colorata</i>	
Cucurbitaceae	<i>Cucumis</i> sp. 1. indet.	Not identified to species
Cyperaceae	<i>Lepidosperma</i> sp. Kambalda (A.A. Mitchell 5156) (P2)	
Ericaceae	<i>Leucopogon</i> sp. Clyde Hill (M.A. Burgman 1207)	
Euphorbiaceae	<i>Beyeria lechenaultii</i>	
	<i>Beyeria sulcata</i>	
	<i>Euphorbia multifaria</i>	Range Extension
	<i>Euphorbia porcata</i>	Range Extension
	<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	
	<i>Ricinocarpos digynus</i> (P1)	Priority 1
Fabaceae	<i>Acacia acuaria</i>	
	<i>Acacia andrewsii</i>	
	<i>Acacia burkittii</i>	
	<i>Acacia collegialis</i>	
	<i>Acacia colletioides</i>	
	<i>Acacia coolgardiensis</i>	
	<i>Acacia densiflora</i>	
	<i>Acacia effusifolia</i>	
	<i>Acacia erinacea</i>	

Family	Species	Comment
	<i>Acacia hemiteles</i>	
	<i>Acacia inceana</i> subsp. <i>conformis</i>	
	<i>Acacia jennerae</i>	
	<i>Acacia leptopetala</i>	
	<i>Acacia ligulata</i>	
	<i>Acacia merrallii</i>	
	<i>Acacia nyssophylla</i>	
	<i>Acacia oswaldii</i>	
	<i>Acacia pachypoda</i>	
	<i>Acacia prairii</i>	
	<i>Acacia resinimarginea</i>	
	<i>Acacia resinistipulea</i>	
	<i>Acacia rigens</i>	
	<i>Acacia tetragonophylla</i>	
	<i>Acacia warramaba</i>	
	<i>Acacia xerophila</i> var. <i>brevior</i>	
	<i>Cullen cinereum</i>	
	<i>Cullen discolor</i>	
	<i>Daviesia nematophylla</i>	
	<i>Lotus cruentus</i>	
	* <i>Medicago minima</i>	Weed
	* <i>Medicago polymorpha</i>	Weed
	<i>Mirbelia depressa</i>	
	<i>Senna artemisioides</i> subsp. <i>filifolia</i>	
	<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	
	<i>Senna cardiosperma</i>	
	<i>Senna stowardii</i>	
	<i>Swainsona canescens</i>	
<b>Frankeniaceae</b>	<i>Frankenia desertorum</i>	
	<i>Frankenia interioris</i>	
	<i>Frankenia irregularis</i>	
<b>Geraniaceae</b>	* <i>Erodium cicutarium</i>	Weed
	<i>Erodium crinitum</i>	
<b>Goodeniaceae</b>	<i>Coopernookia strophiolata</i>	

Family	Species	Comment
	<i>Dampiera latealata</i>	
	<i>Goodenia havilandii</i>	
	<i>Goodenia mimuloides</i>	
	<i>Scaevola spinescens</i>	
<b>Haloragaceae</b>	<i>Haloragis trigonocarpa</i>	
<b>Hemerocallidaceae</b>	<i>Dianella revoluta</i> var. <i>divaricata</i>	
<b>Lamiaceae</b>	<i>Prostanthera althoferi</i> subsp. <i>althoferi</i>	
	<i>Prostanthera grylloana</i>	
	<i>Prostanthera incurvata</i>	
	* <i>Salvia verbenaca</i>	Weed
	<i>Westringia cephalantha</i> var. <i>cephalantha</i>	
	<i>Westringia rigida</i>	
<b>Loranthaceae</b>	<i>Amyema benthamii</i>	
	<i>Amyema miquelii</i>	
	<i>Amyema preissii</i>	
<b>Malvaceae</b>	<i>Abutilon cryptopetalum</i>	
	<i>Abutilon oxycarpum</i>	
	<i>Brachychiton gregorii</i>	
	<i>Lawrenzia diffusa</i>	
	<i>Lawrenzia repens</i>	
	<i>Lawrenzia squamata</i>	
	<i>Malva weinmanniana</i>	
	<i>Sida</i> sp. dark green fruits (S. van Leeuwen 2260)	
<b>Marsileaceae</b>	<i>Marsilea drummondii</i>	
<b>Montiaceae</b>	<i>Calandrinia eremaea</i>	
	<i>Calandrinia lefroyensis</i> (P1)	Priority 1
	<i>Calandrinia</i> sp. Gypsum (F. Obbens & L. Hancock FO 10/14)	
<b>Myrtaceae</b>	<i>Calothamnus gilesii</i>	
	<i>Eucalyptus campaspe</i>	
	<i>Eucalyptus celastroides</i>	
	<i>Eucalyptus clelandiorum</i>	
	<i>Eucalyptus cylindrocarpa</i>	
	<i>Eucalyptus griffithsii</i>	
	<i>Eucalyptus lesouefii</i>	

Family	Species	Comment
	<i>Eucalyptus longissima</i>	
	<i>Eucalyptus melanoxydon</i>	
	<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i>	
	<i>Eucalyptus prolixa</i>	
	<i>Eucalyptus ravida</i>	
	<i>Eucalyptus salmonophloia</i>	
	<i>Eucalyptus salubris</i>	
	<i>Eucalyptus stricklandii</i>	
	<i>Eucalyptus torquata</i>	
	<i>Eucalyptus transcontinentalis</i>	
	<i>Eucalyptus websteriana</i> subsp. <i>norsemanica</i> (P1)	Priority 1
	<i>Eucalyptus websteriana</i> subsp. <i>norsemanica/websteriana</i> (P1?)	Potential Priority 1
	<i>Eucalyptus websteriana</i> subsp. <i>websteriana</i>	
	<i>Eucalyptus yilgarnensis</i>	
	<i>Homalocalyx thryptomenoides</i>	
	<i>Melaleuca eleuterostachya</i>	
	<i>Melaleuca hamata</i>	
	<i>Melaleuca lanceolata</i>	
	<i>Melaleuca lateriflora</i>	
	<i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i>	
	<i>Melaleuca sheathiana</i>	
	<i>Rinzia carnosus</i>	
	<i>Thryptomene australis</i> subsp. <i>brachyandra</i>	
	<i>Thryptomene planiflora</i> (P1)	Priority 1
<b>Oxalidaceae</b>	<i>Oxalis perennans</i>	
<b>Pittosporaceae</b>	<i>Pittosporum angustifolium</i>	
<b>Plantaginaceae</b>	<i>Plantago debilis</i>	
	<i>Plantago drummondii</i>	
<b>Poaceae</b>	<i>Amphipogon caricinus</i> var. <i>caricinus</i>	
	<i>Aristida contorta</i>	
	<i>Austrostipa elegantissima</i>	
	<i>Austrostipa nitida</i>	
	<i>Austrostipa platychaeta</i>	
	<i>Austrostipa puberula</i>	

Family	Species	Comment
	<i>Austrostipa scabra</i> subsp. <i>scabra</i>	
	* <i>Cenchrus ciliaris</i>	Weed
	<i>Enneapogon avenaceus</i>	
	<i>Enneapogon caerulescens</i>	
	<i>Enteropogon ramosus</i>	
	* <i>Eragrostis curvula</i>	Weed
	<i>Eragrostis eriopoda</i>	Range Extension
	<i>Eragrostis setifolia</i>	
	<i>Monachather paradoxus</i>	
	<i>Paspalidium basi cladum</i>	Range Extension
	<i>Paspalidium gracile</i>	
	* <i>Rostraria cristata</i>	Weed
	<i>Rytidosperma acerosum</i>	
	<i>Rytidosperma caespitosum</i>	
	* <i>Schismus arabicus</i>	Weed
	<i>Thyridolepis mitchelliana</i>	Range Extension
	<i>Triodia scariosa</i>	
	<i>Tripogonella loliiformis</i>	
<b>Polygonaceae</b>	<i>Duma florulenta</i>	
	* <i>Rumex vesicarius</i>	Weed
<b>Primulaceae</b>	* <i>Lysimachia arvensis</i>	Weed
<b>Proteaceae</b>	<i>Grevillea acuaria</i>	
	<i>Grevillea huegelii</i>	
	<i>Grevillea nematophylla</i> subsp. <i>nematophylla</i>	
	<i>Grevillea sarissa</i> subsp. <i>sarissa</i>	
	<i>Hakea kippistiana</i>	
	<i>Hakea minyma</i>	
	<i>Hakea preissii</i>	
<b>Pteridaceae</b>	<i>Cheilanthes lasiophylla</i>	
	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	
<b>Rhamnaceae</b>	<i>Pomaderris forrestiana</i>	
	<i>Trymalium myrtillus</i>	
	<i>Trymalium myrtillus</i> subsp. <i>myrtillus</i>	
<b>Rutaceae</b>	<i>Cyanothamnus coerulescens</i> subsp. <i>spinescens</i>	

Family	Species	Comment
	<i>Phebalium canaliculatum</i>	
	<i>Phebalium laevigatum</i>	
	<i>Philotheca brucei</i> subsp. <i>brucei</i>	
<b>Santalaceae</b>	<i>Exocarpos aphyllus</i>	
	<i>Santalum acuminatum</i>	
	<i>Santalum spicatum</i>	
<b>Sapindaceae</b>	<i>Dodonaea adenophora</i>	
	<i>Dodonaea lobulata</i>	
	<i>Dodonaea microzyga</i> var. <i>acrolobata</i>	
	<i>Dodonaea stenozyga</i>	
	<i>Dodonaea viscosa</i> subsp. <i>angustissima</i>	
<b>Scrophulariaceae</b>	<i>Eremophila acutifolia</i> (P3)	Priority 3
	<i>Eremophila alternifolia</i>	
	<i>Eremophila caperata</i>	
	<i>Eremophila clarkei</i>	
	<i>Eremophila clavata</i>	
	<i>Eremophila decipiens</i> subsp. <i>decipiens</i>	
	<i>Eremophila dempsteri</i>	
	<i>Eremophila gibbosa</i>	
	<i>Eremophila glabra</i> subsp. <i>glabra</i>	
	<i>Eremophila granitica</i>	
	<i>Eremophila interstans</i> subsp. <i>interstans</i>	
	<i>Eremophila interstans</i> subsp. <i>virgata</i>	
	<i>Eremophila ionantha</i>	
	<i>Eremophila maculata</i> subsp. <i>brevifolia</i>	
	<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>	
	<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>	
	<i>Eremophila parvifolia</i> subsp. <i>auricampi</i>	
	<i>Eremophila psilocalyx</i>	
	<i>Eremophila rugosa</i>	
	<i>Eremophila scoparia</i>	
<b>Solanaceae</b>	* <i>Datura ferox</i>	Weed
	<i>Lycium australe</i>	
	<i>Nicotiana rotundifolia</i>	

Family	Species	Comment
	<i>Solanum cleistogamum</i>	
	<i>Solanum hoplopetalum</i>	
	<i>Solanum nummularium</i>	
<b>Thymelaeaceae</b>	<i>Pimelea microcephala</i> subsp. <i>microcephala</i>	
<b>Zygophyllaceae</b>	<i>Roepera compressa</i>	
	<i>Roepera eremaea</i>	
	<i>Roepera ovata</i>	
	<i>Roepera reticulata</i>	