

# MARBLE LITHIUM OPERATIONS WODGINA OPERATIONS

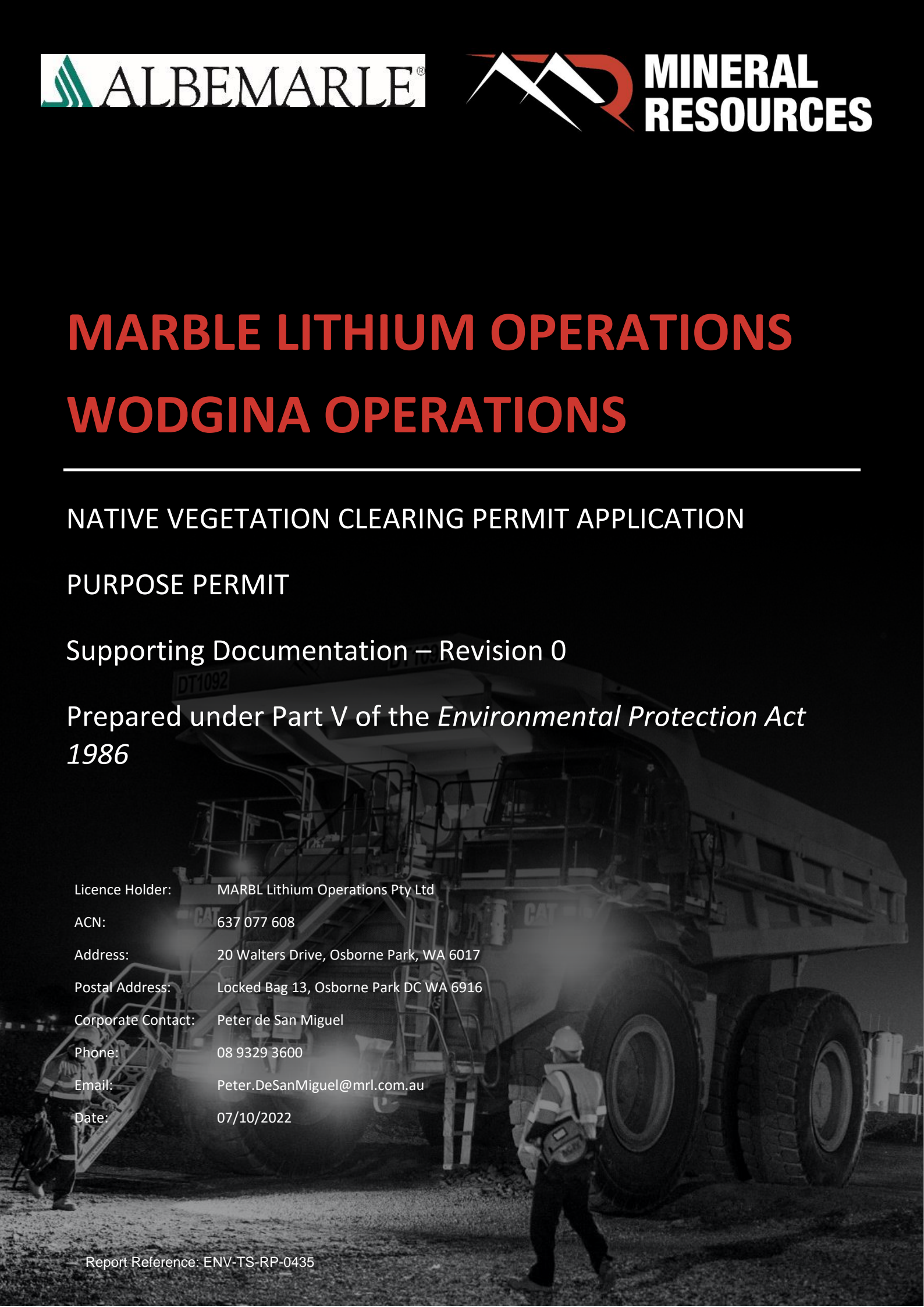
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## NATIVE VEGETATION CLEARING PERMIT APPLICATION

### PURPOSE PERMIT

#### Supporting Documentation – Revision 0

Prepared under Part V of the *Environmental Protection Act*  
1986



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## Revision History

Rev #	Issue Date	Prepared By	Reviewed By	Approved By	Description
0	07/10/2022	K. Dennison	M. Jones	P. de San Miguel	NVCP Application Supporting Document – Mine Plan Expansion Wodgina Lithium Project



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# 1. NATIVE VEGETATION CLEARING PERMIT APPLICATION

MARBL Lithium Operations Pty Ltd (MARBL), a joint venture between Mineral Resources Limited (MinRes) and the Albemarle Corporation (Albemarle), is applying for a Native Vegetation Clearing Permit (NVCP) Purpose Permit to facilitate the Mine Plan expansion at the Wodgina Lithium Operation (Wodgina or the Project). Wodgina is a historical mining project, that was been disturbed and mined in differing forms for nearly 120 years.

## 1.1 NVCP HISTORY

This NVCP Application is a replacement for withdrawn NVCP Clearing Permit System 8230/1 application submitted in 2018. The complete history related to this NVCP Application is summarised **Table 1**.

**TABLE 1: NVCP APPLICATION HISTORY**

Date	History
29 Oct 2018	Wodgina Lithium Pty Ltd (WLPL), a wholly owned subsidiary of MinRes and sole owner/operator (at the time), submitted an NVCP Application to the Department of Mines, Industry Regulation and Safety (DMIRS) for a proposed large scale Project expansion (NVCP CPS 8230/1). This application included a Significant Species Management Plan (SSMP) due to the size and potential impacts of the proposed NVCP Application.
14 Dec 2018	WLPL submitted a secondary NVCP Application to clear vegetation for the construction of a lithium hydroxide processing facility (NVCP CPS 8295/1).
14 Dec 2018	WLPL submitted a revised NVCP Application (Revision 1) with included management measures for entrapment of fauna in trenches and excavations.
24 Jan 2019	A Requests for Information (RFI) was received from DMIRS and the Department of Biodiversity, Conservation and Attractions (DBCA) requiring extensive work to be completed including an Impact Assessment and additional survey effort for conservation significant species. A copy of this correspondence is available in Appendix A of <b>Attachment 7</b> .
05 Nov 2019	NVCP CPS 8295/1 was formally withdrawn therefore the NVCP assessment would only require NVCP CPS 8230/1 to be considered.
29 Nov 2019	WLPL submitted a revised NVCP Application (Revision 2) addressing the RFI. Revision 2 included a smaller Permit Area and development of exclusion zones. In agreeance with DMIRS this included a revised Fauna Management Plan, to replace the SSMP, due to the reduction in potential impacts.
Nov 2019	Activities were commenced to place the Project in Care and Maintenance (C&M) due to a deterioration in the global Lithium market at the end of 2019.

Due to a deteriorating global lithium market at the end of 2019 activities were commenced to put the Project into Care and Maintenance (C&M). DMIRS continued to assess the NVCP Application during the C&M period until WLPL requested the assessment be placed 'On Hold' in 2020.

In 2021 mine and Project planning recommenced. On 23 September 2022 MARBL engaged DMIRS to discuss the revised Project expansion footprint as there are a number of changes when compared to the NVCP CPS 8230/1 submission. DMIRS advised MARBL to submit a new NVCP application (this document) and to provide a comparison, where possible, to the 2018 NVCP CPS 8230/1 submission to support the assessment. On 11 August 2022 WLPL held a final scoping meeting DMIRS to revise the NVCP Application approach.

As per advice from DMIRS, NVCP CPS 8230/1 was formally withdrawn via letter correspondence on 9 September 2022.



## 1.2 NVCP PURPOSE

The purpose of this NVCP Application is to facilitate the continuity of mining at the active Wodgina project, through a cutback of the existing pit and extension of the waste landform (Mine Plan Expansion). The planning process for the Mine Plan Expansion is focused on re-using existing disturbed areas at the Project and avoiding habitat for conservation significant fauna.

A key positive environmental outcome of this process has been to repurpose disused mine pits into a Tailings Storage Facility (TSF), this has removed the requirement for TSF4 (originally included in the 2018 NVCP submission). A separate stockpile location for Non-Acid Forming (NAF) mine waste has also been delineated within areas previously disturbed areas to support closure and rehabilitation outcomes.

The size and location of the ore body, and existing waste landform design, has triggered the requirement for clearing of native vegetation around the periphery of existing disturbed footprints. Such areas would have already been indirectly impacted by Operations during the life of the Project.

An overview of the proposed NVCP Application and the Mine Plan expansion is displayed in **Figure 1**.

### 1.2.1 Proposed Mine Expansion

The Mine Plan expansion includes expansion activities to ensure continual ore supply and Operation at Wodgina to meet increased market demands for Lithium.

Key aspects of the Mine Plan expansion covered by the 2022 NVCP submission (**Figure 1**) include:

- Cassiterite Pit expansion
- Eastern Waste Landform expansion
- Infrastructure corridors (LV and HV roads)
- Soil Stockpiles

## 1.3 NVCP APPLICATION

### 1.3.1 Purpose Permit

The key landforms required to facilitate the Mine Plan expansion will not differ from the proposed Disturbance Footprint presented in this Application. A Purpose Permit has been applied for to provide MARBL with some operational flexibility to move clearing areas within the proposed NVCP Permit Area. This may be required where technical modelling and assessments indicate the need to implement small changes to the Mine Plan to achieve the highest safety and environmental outcomes.

No clearing of native vegetation will occur within the Exclusion Zone (refer to **Section 1.3.5**) or outside of the proposed NVCP Permit Area without separate clearing approvals or exemptions being in place. Future mine plan expansions will be addressed via amendments or new applications in agreeance with DMIRS.

### 1.3.2 Application Area

This proposed NVCP Application is for a Purpose Permit NVCP approving clearing activities for **113.8 hectares** of undisturbed native vegetation within a proposed NVCP Permit Area of **540.6 hectares**.

### 1.3.3 Clearing Techniques

Clearing will be undertaken using mechanical equipment (e.g. dozer / wheel loader) with the load out of material for stockpiling and reuse in rehabilitation activities.



### 1.3.4 Purpose

The purpose of the proposed Disturbance Envelope associated with this Application is to facilitate a pit expansion, waste landform expansion, infrastructure corridors (haul roads, light vehicle roads, pipelines, drainage controls, etc.), soil stockpiles, and groundwater bores.

### 1.3.5 Exclusion Zone

An exclusion zone has been developed within the proposed NVCP Permit Area to minimise impacts to identified Matters of National Environmental Significance. It also ensures potential impacts to conservation significant fauna and flora are restricted to the proposed Disturbance Footprint defined and assessed in this application. Specifically, the buffer zone includes:

- Areas of Rocky Ridge and Gorge Habitat outside of the proposed Disturbance Footprint (critical habitat for Northern Quoll and Pilbara Olive Python)
- One (1) diurnal roost will be retained with a 100 meter buffer (for Ghost Bat)

The exclusion zone is mapped on **Figure 1**.

### 1.3.6 Terminology

This NVCP Application utilises the terminology listed in **Table 2**.

**TABLE 2: NVCP APPLICATION TERMINOLOGY**

Terminology	Definition
<b>Proposed NVCP Permit Area</b>	Extent of the NVCP Purpose Permit Boundary applied for in this Application. Shown on <b>Figure 1</b> .
<b>Proposed Disturbance Footprint</b>	Proposed disturbance or clearing required to meet the revised Mine Plan expansion and total amount of clearing applied for in this Application. Shown on <b>Figure 1</b> .
<b>Flora or Vegetation Study Area</b>	Extent of Flora and/or Vegetation surveys over the wider Wodgina Project footprint covering approximately 6,745.11 ha. Surveys for significant flora extend outside this Study Area in areas where suitable habitat or populations are identified. Shown on <b>Figure 5</b> .
<b>Fauna Study Area</b>	Extent of Fauna surveys over the wider Wodgina Project footprint covering approximately 5,531.30 ha. Shown on <b>Figure 5</b> .

## 1.4 SUPPORTING SURVEYS AND ASSESSMENTS

Since the 2018 NVCP Application there have been a number of additional surveys undertaken onsite and the Impact Assessment (completed by Umwelt (Australia) Pty Ltd (Umwelt), formerly Woodman Environmental Consulting Pty Ltd (Woodman Environmental)) has been updated to reflect the new NVCP Application and the Mine Plan expansion. Details of these reports are outlined in **Table 3** including the scope and compliance with key Environmental Protection Authority (EPA) and other regulatory guidelines.



**TABLE 3: ENVIRONMENTAL SURVEYS AND IMPACT ASSESSMENT – SCOPE AND REGULATORY GUIDANCE**

Title	Scope and Regulatory Guidance
<b>Wodgina Project Level 2 Vertebrate Fauna Survey April 2019 (Version 3)</b> July 2019 Western Wildlife	<p>The Level 2 Fauna Survey Report covers a large portion of the Project and includes a literature review, summary of past surveys and additional survey effort to fill gaps in coverage.</p> <p>Survey works were undertaken in accordance with:</p> <ul style="list-style-type: none"> <li>• Statement of environmental <i>principles, factors and objectives</i> (EPA 2016c)</li> <li>• Environmental factor guideline – Terrestrial fauna (EPA 2016b)</li> <li>• Technical guidance – Terrestrial fauna surveys (EPA 2016d)</li> <li>• Technical Guide: terrestrial vertebrate fauna surveys for environmental impact assessment (EPA and DEC 2010)</li> <li>• State and Federal guidelines for surveying conservation significant fauna.</li> </ul> <p>All fauna survey information from this report is captured in the 2020 Report. The original report and IBSA data has been previously submitted to DMIRS as part of the 2018 submission.</p>
<b>Wodgina Lithium Project Detailed Flora and Vegetation Assessment</b> April 2020 Woodman Environmental	<p>The Assessment covers the Flora Study Area and includes a review and consolidation of previous flora and vegetation surveys/assessments plus results from a 2019 survey completed to focus on previously unsurveyed sections of Wodgina. As this Assessment includes all methods and findings from floristic surveys completed at Wodgina prior to 2020, all previous reports are no longer considered current.</p> <p>The survey and reporting works comply with the following documents:</p> <ul style="list-style-type: none"> <li>• Technical Guidance: – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016d)</li> <li>• Environmental Factor Guideline – Flora and Vegetation (EPA 2016a)</li> <li>• Report attached in <b>Attachment 4</b>. IBSA Submission IBSASUB-20221007-5D865C27.</li> </ul>
<b>Wodgina Project Level 2 Vertebrate Fauna Survey April 2019 (Version 5)</b> May 2020 Western Wildlife	<p>The Survey Report supersedes Version 3 report and covers the Fauna Study Area and includes a literature review and survey information from Phase 2 of the 2019 Level 2 fauna survey.</p> <p>The fauna survey was undertaken in accordance with the:</p> <ul style="list-style-type: none"> <li>• Statement of environmental <i>principles, factors and objectives</i> (EPA) (2016c)</li> <li>• Environmental factor guideline – terrestrial fauna (EPA 2016b),</li> <li>• Technical guidance – terrestrial fauna surveys (EPA 2016c)</li> <li>• Technical Guide: terrestrial vertebrate fauna surveys for environmental impact assessment (EPA and DEC 2010)</li> <li>• Relevant State and Federal Guidelines on surveying conservation significant fauna</li> </ul> <p>Report attached in <b>Attachment 5</b>. IBSA Submission IBSASUB-20221007-09A5D94B.</p>
<b>Memo Report: Wodgina – Targeted Significant Fauna Survey</b> June 2022 Stantec	<p>Targeted fauna survey which focused on determining the presence of significant fauna within the Rocky Ridge and Gorge habitat of the Survey Area (proposed Disturbance Footprint).</p> <p>The objectives and methods used in the survey were aligned with the following guidelines:</p> <ul style="list-style-type: none"> <li>• Technical Guidance: Terrestrial Fauna Surveys for Environmental Impact Assessment (EPA, 2020)</li> <li>• Environmental Factor Guideline – Terrestrial Fauna (EPA, 2016)</li> <li>• Referral Guideline for the Endangered Northern Quoll (DotE, 2016)</li> <li>• Survey Guidelines for Australia's Threatened Mammals (DSEWPaC, 2011)</li> <li>• Survey Guidelines for Australia's Threatened Bats (DEWHA, 2010)</li> <li>• Report attached in</li> </ul> <p><b>ATTACHMENT 6</b> Attachment 6 IBSA Submission IBSASUB-20221007-4A8E0823.</p>



Title	Scope and Regulatory Guidance
<p><b>Flora, Vegetation and Fauna Impact Assessment</b></p> <p>October 2022</p> <p>Woodman Environmental</p>	<p>A collation of the above three documents with regards to key environmental characteristics and findings. The assessment of potential impacts of the proposed NVCP Application with regards to direct, indirect, local, regional, and cumulative impacts. Key aspects of the Impact Assessment include:</p> <ul style="list-style-type: none"> <li>Quantification of direct impacts of the proposed Disturbance Footprint on vegetation units, conservation significant flora and critical habitat</li> <li>Evaluation of indirect impact</li> <li>Assessment of direct, indirect, and regional impacts, plus local, regional, and cumulative impacts</li> <li>Investigation into historic clearing and the pre-disturbance environment</li> </ul> <p>The impact assessment is aligned with the following:</p> <ul style="list-style-type: none"> <li>Matters of National Environmental Significance: Significant Impact Guidelines 1.1 (DoE 2013)</li> <li><i>Environment Protection and Biodiversity Conservation Act 1999</i>. (EPBC Act) referral guideline for the endangered northern quoll <i>Dasyurus hallucatus</i> (DoE 2016)</li> <li>Conservation listing advice for <i>Macroderma gigas</i> Ghost Bat (TSSC 2016a)</li> <li>Conservation listing advice for <i>Rhinonicteris aurantia</i> (Pilbara form) Pilbara leaf-nosed Bat' (TSSC 2016c)</li> <li>A guide to the assessment of applications to clear native vegetation, under Part V Division 2 of the Environmental Protection Act (DER 2014)</li> </ul> <p>Impact Assessment attached in <b>Attachment 7..</b></p> <p><b>NOTE</b> - This Impact Assessment does not include the additional Fauna survey effort undertaken in October 2019 and reported in Western Wildlife 2020. However, the additional survey effort did not identify any significant changes to what had been identified in previous survey effort. The Proposed Disturbance Footprint and immediate surrounding areas, identified as the Indirect Impact Assessment Zone (IIAZ)), are assessed in the Umwelt Impact Assessment and therefore ratings and impacts determined in the Assessment are directly related to this NVCP Application.</p>

## 1.5 NV-F01 FORM SUPPORTING ATTACHMENTS

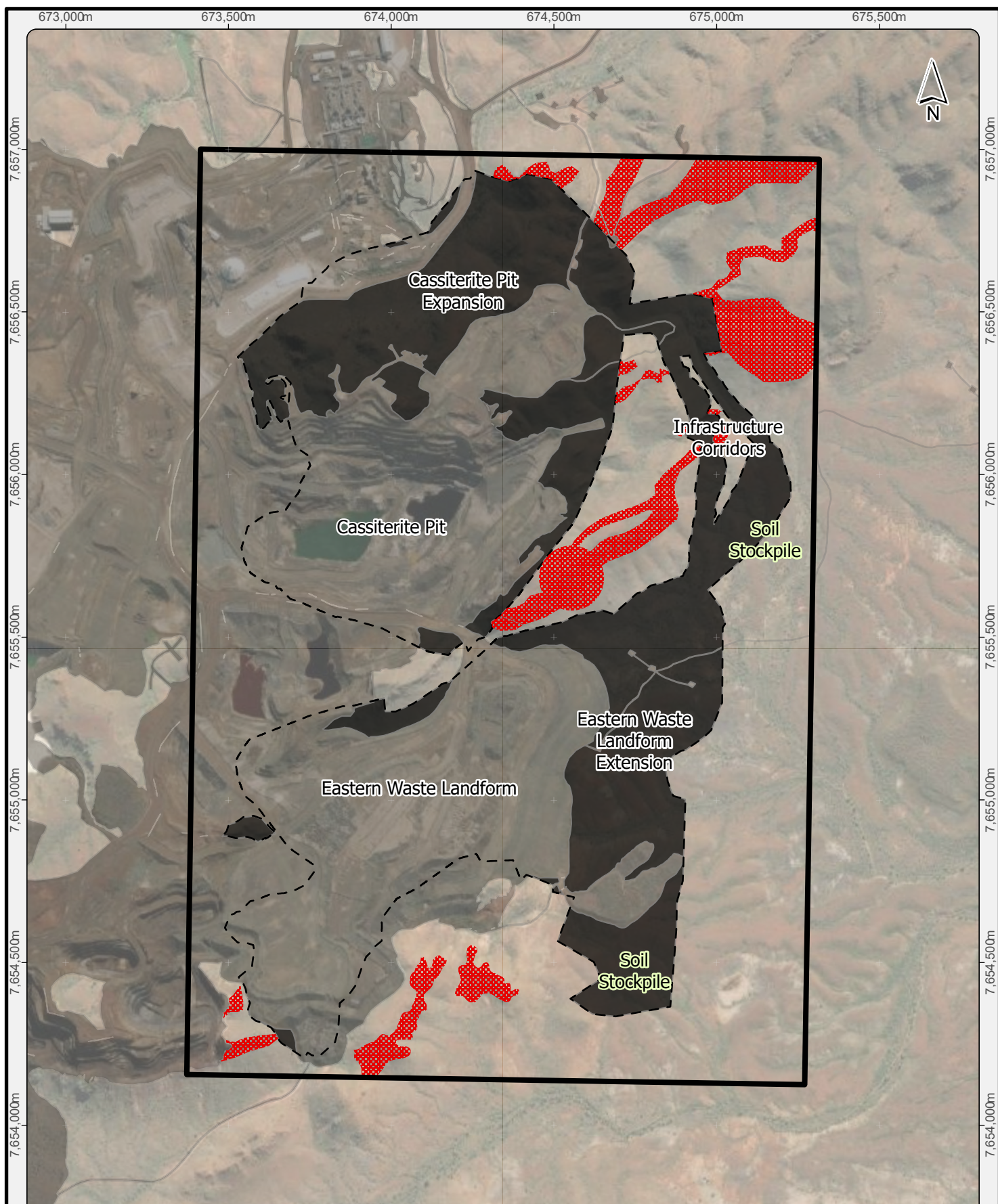
As per **Part 5 – Proposed Clearing** of *Form NV-F01 Application for new permit or referral to clear native vegetation* submitted with this application, the following spatial data (Projection GDA 2020 Zone 50) will be submitted in a separate zip folder.

- Proposed NVCP Permit Area.shp
- Proposed Disturbance Footprint.shp
- Proposed Exclusion Zone.shp

As per **Part 11 – Form Checklist** of *Form NV-F01 Application for new permit or referral to clear native vegetation*, submitted with this application, a series of photographs of the proposed NVCP Permit Area and a geotagged location Figure is provided in **Attachment 8**

.





**Legend**

Proposed NVCP Permit Area  
 Proposed Disturbance Footprint  
 Proposed Excursion Zone  
 Mine Plan Expansion  
 Current Disturbance (2022)

**ALBEMARLE®**



## PROPOSED 2022 NVCP APPLICATION AND EXCLUSION ZONE

0      295      590      1,180      1,770      2,360 metres

Scale @ A4: 1:15,733

GDA2020 MGA Zone 50

Drawn By: kim.dennison@mrl.com.au

MARBL - Wodgina Operations



## 2. COMPARISON OF THE 2022 NVCP APPLICATION AND 2018 NVCP CPS 8230/1

At the request of DMIRS, an assessment has been undertaken to compare the assessed impacts of the 2018 NVCP CPS 8230/1 submission with the revised 2022 NVCP Application (this submission). This assessment is summarised in **Section 2**.

### 2.1 PERMIT AREA AND PROPOSED CLEARING COMPARISON

The 2022 NVCP Application Permit Area and proposed clearing is significantly reduced from the 2018 NVCP CPS 8230/1 submission. The 2022 proposed Disturbance Footprint is 348.7 hectares less than the original submission (**Table 4**).

The reduction in footprint was triggered from a revision of the mine plan and the implementation of a staged process to mine development. This will ensure disturbance of native flora and fauna is minimised and ensures MARBL has the opportunity to seek new industry best practices and technologies to reduce impact on the environment from mining activities.

**TABLE 4: PROPOSED 2022 NVCP APPLICATION AND 2018 NVCP CPS 8230/1 COMPARISON - AREA COMPARISON**

	2018 Submission Rev 2 NVCP CPS 8230/1	2022 Submission Proposed NVCP	Difference
<b>Proposed NVCP Permit Area</b>	814.9 hectares	<b>540.6 hectares</b>	-274.3 hectares 66% of 2018
<b>Proposed Disturbance Footprint (new clearing)</b>	422.4 hectares	<b>113.8 hectares</b>	-308.6 hectares 27% of 2018
<b>Maximum clearing allocation applied for (NV-F01)</b>	462.5 hectares	<b>113.8 hectares</b>	-348.7 hectares 25% of 2018

### 2.2 PRIORITY FLORA COMPARISON

A direct comparison between the 2018 and 2022 NVCP Application for potentially disturbed Priority 3 Flora species is not suitable as the 2022 Impact Assessment completed a technical review of historic records and a number of updates have been made to the dataset (Umwelt 2022).

This NVCP Application however does not intersect any *Vigna triodiophila*, compared to the 2018 NVCP Submission which proposed to disturb eight (8) locations and 156 individuals.



**TABLE 5: PROPOSED 2022 NVCP APPLICATION AND 2018 NVCP CPS 8230/1 COMPARISON – PRIORITY 3 FLORA**

NOTE: Calculations for the proposed 2022 NVCP Application are based on revised Flora and Vegetation Data (Umwelt 2022). Refer to **Attachment 7** for full details.

Submission Year		Local – Proposed Disturbance Footprint					Regional*		Cumulative		
		2018		2022		Difference	2018	2022	2018	2022	Difference
		#	Impact Rating	#	Impact Rating	#	Impact Rating	Impact Rating	#	#	#
Individuals	<i>Euphorbia clementii</i>	58	Low	0	Low	<b>-58</b>	Low	Low	429	606	<b>177</b>
	<i>Terminalia supranitfolia</i>	376	Low	125	Low	<b>-251</b>	Low	Low	641	304	<b>-337</b>
	<i>Triodia chichesterensi</i>	290,667	Low	64,740	Low	<b>-225,927</b>	Low	Low	290,668	81,752	<b>-208,916</b>
	<i>Vigna triodiophila</i>	180	Low	-	-	<b>-180</b>	Low	-	180	-	<b>-180</b>
Locations	<i>Euphorbia clementii</i>	8	Low	0	Low	<b>-8</b>	Low	Low	35	46	<b>11</b>
	<i>Terminalia supranitfolia</i>	219	Moderate	71	Low	<b>-148</b>	Moderate	Low	337	167	<b>-170</b>
	<i>Triodia chichesterensi</i>	289	Low	80	Low	<b>-209</b>	Low	Low	290	246	<b>-44</b>
	<i>Vigna triodiophila</i>	10	Low	-	-	<b>-10</b>	Low	-	10	-	<b>-10</b>
		Hectares	Impact Rating	Hectares	Impact Rating	Hectares	Impact Rating	Impact Rating	Hectares	Hectares	Hectares
Habitat	<i>Euphorbia clementii</i>	39.6	Low	61.5	Low	<b>21.9</b>	Low	Low	47.4	174.0	<b>126.6</b>
	<i>Terminalia supranitfolia</i>	357.5	Low	71.0	Low	<b>-286.5</b>	Low	Low	438.6	165.7	<b>-272.9</b>
	<i>Triodia chichesterensi</i>	279.7	Low	105.7	Low	<b>-174</b>	Low	Low	297.8	200.5	<b>-97.3</b>
	<i>Vigna triodiophila</i>	184.3	Low	-	-	<b>-184.3</b>	Low	-	186.3	-	<b>-186.3</b>

\* Regional # or Hectares Data is not applicable and is represented in the Cumulative column



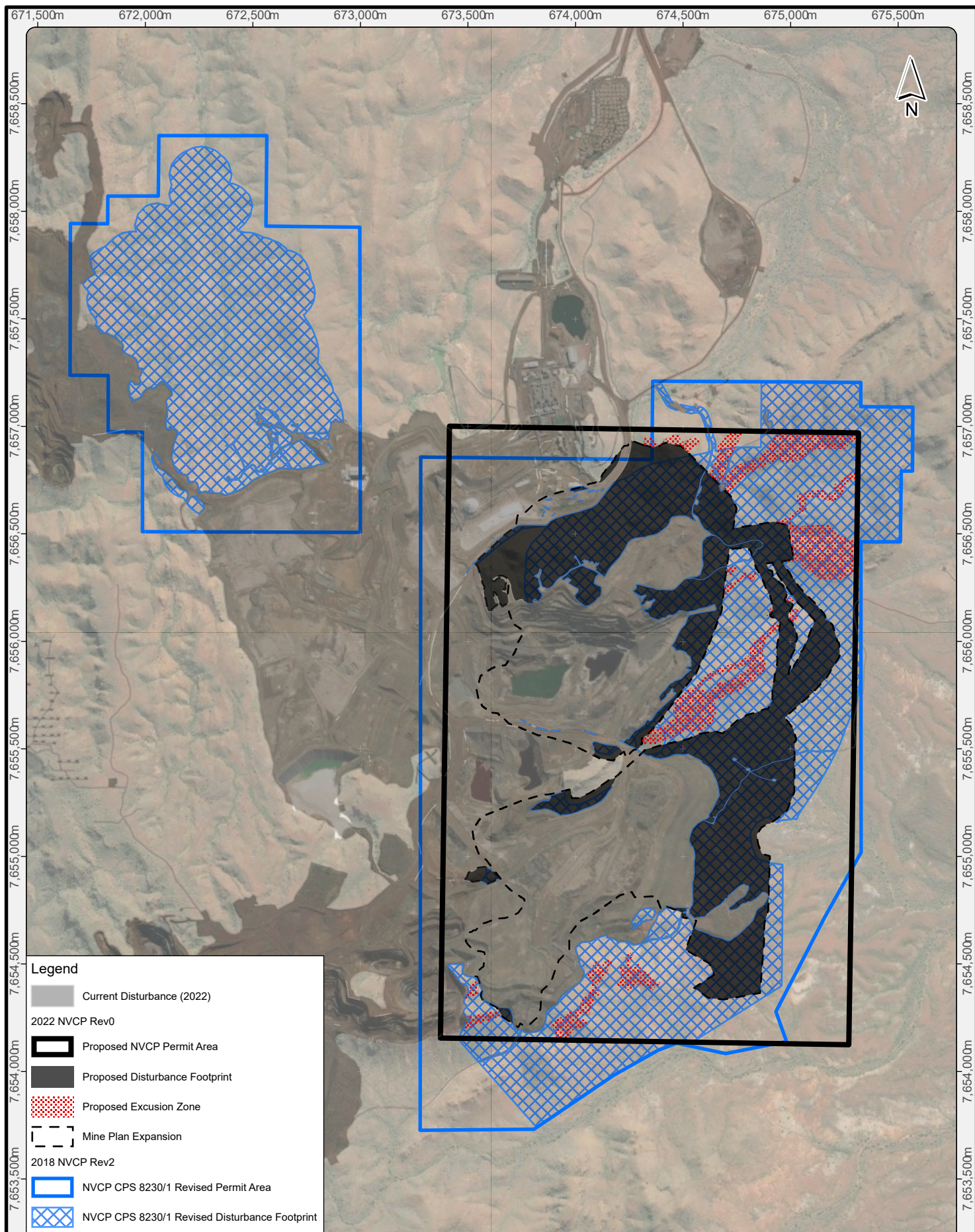
### 2.3 CONSERVATION SIGNIFICANT FAUNA - CRITICAL HABITAT COMPARISON

Rocky Ridge Habitat and Drainage Line Habitat are identified as being Critical and Important habitat to a number of conservation significant species (Umwelt 2022).

**The new 2022 NVCP Application includes a reduction in both Rocky Ridge and George Habitat (38.9 hectares) clearance and a reduction in Drainage Line habitat (23.9 hectares).**

- The 2018 NVCP proposed the clearance of 56.9 hectares of Rocky Ridge Habitat.
- The 2022 NVCP application includes the clearing of 18.0 hectares of Rocky Ridge Habitat  
Clearing of this habitat for the NVCP equates to **0.3% of the Fauna Study Area**  
Cumulative impacts to the Rocky Ridge and Gorge Habitat equates to 55.8 hectares or **4.0% of the pre-Atlas DSO habitat**
- The 2018 NVCP proposed the clearance of 29.5 hectares of Drainage Line Habitat.
- The 2022 NVCP application includes the clearing of 5.6 hectares of Drainage Line Habitat.  
Clearing of this habitat for the NVCP equates to less than **0.1% of the Fauna Study Area**.  
Cumulative impacts to the Drainage Habitat equates to 15.8 hectares or **3.3% of the Atlas DSO habitat**.





## PROPOSED 2022 NVCP APPLICATION AND 2018 NVCP CPS 8230/1 COMPARISON

0 437.5 875 1,750 2,625 3,500 metres

Scale @ A4: 1:23,254

GDA2020 MGA Zone 50

Drawn By: kim.dennison@mrl.com.au

MARBL - Wodgina Operations



### 3. PROJECT BACKGROUND

#### 3.1 LOCATION

The Project is located approximately 100 km south of Port Hedland in the Pilbara Region of Western Australia within the Town of Port Hedland local government area.

The Project is located on Kariyarra Country and the traditional owners of this area are the Kariyarra people. The main mining tenements are located on the Kangan Pastoral Lease, which is leased to the Aboriginal Prospecting Company and managed by the Yandeyarra Aboriginal Community. The Breccia borefield to the east is located on the Wallareenya (Tabba Tabba) Pastoral Lease, and the gas pipeline to the north is located on the Indee and Mundabullangana pastoral leases. Regional project location is shown on **Figure 3**.

#### 3.2 OWNERSHIP

The Project was acquired by MinRes in 2016 under the wholly owned subsidiary WLPL, from Global Advanced Metals Wodgina Pty Ltd (GAMW) while the Project was in C&M. Exploration drilling programs targeting Lithium were undertaken and commenced mining in 2017. On 1 November 2019, MinRes completed a transaction with Albemarle for the partial sale of the Project and established the MARBL Joint Venture (MARBL JV) and the MARBL Lithium Operations Pty Ltd (MARBL). Refer to **Attachment 1** for the Australian Securities and Investments Commission (ASIC) Current Company Extract for MARBL.

#### 3.3 TENEMENTS

The wider Project footprint extends over more than 30 tenements granted under the *Mining Act 1978*. The proposed NVCP Permit Area extends across ten (10) tenements as defined in **Table 6** and **Figure 4**.

Eight (8) of the tenements are held by the MARBL JV partners (WLPL and Albemarle) and the remaining two (2) are held by the previous Wodgina owner operators (GAMW and Atlas).

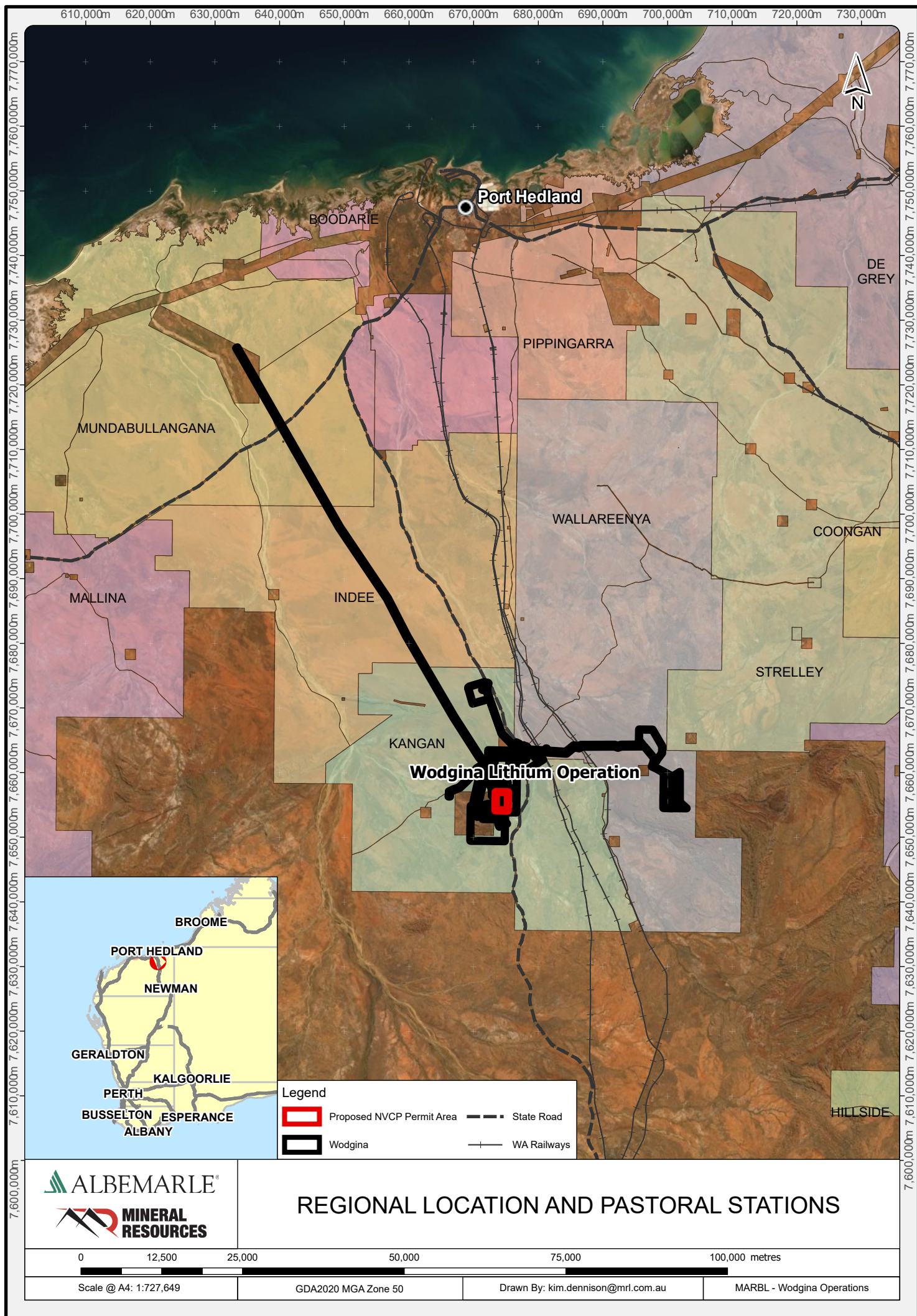
Refer to **Attachment 2** for mining tenement summary reports demonstrating current holder details.

Refer to **Attachment 3** for access agreements with GAMW and Atlas.

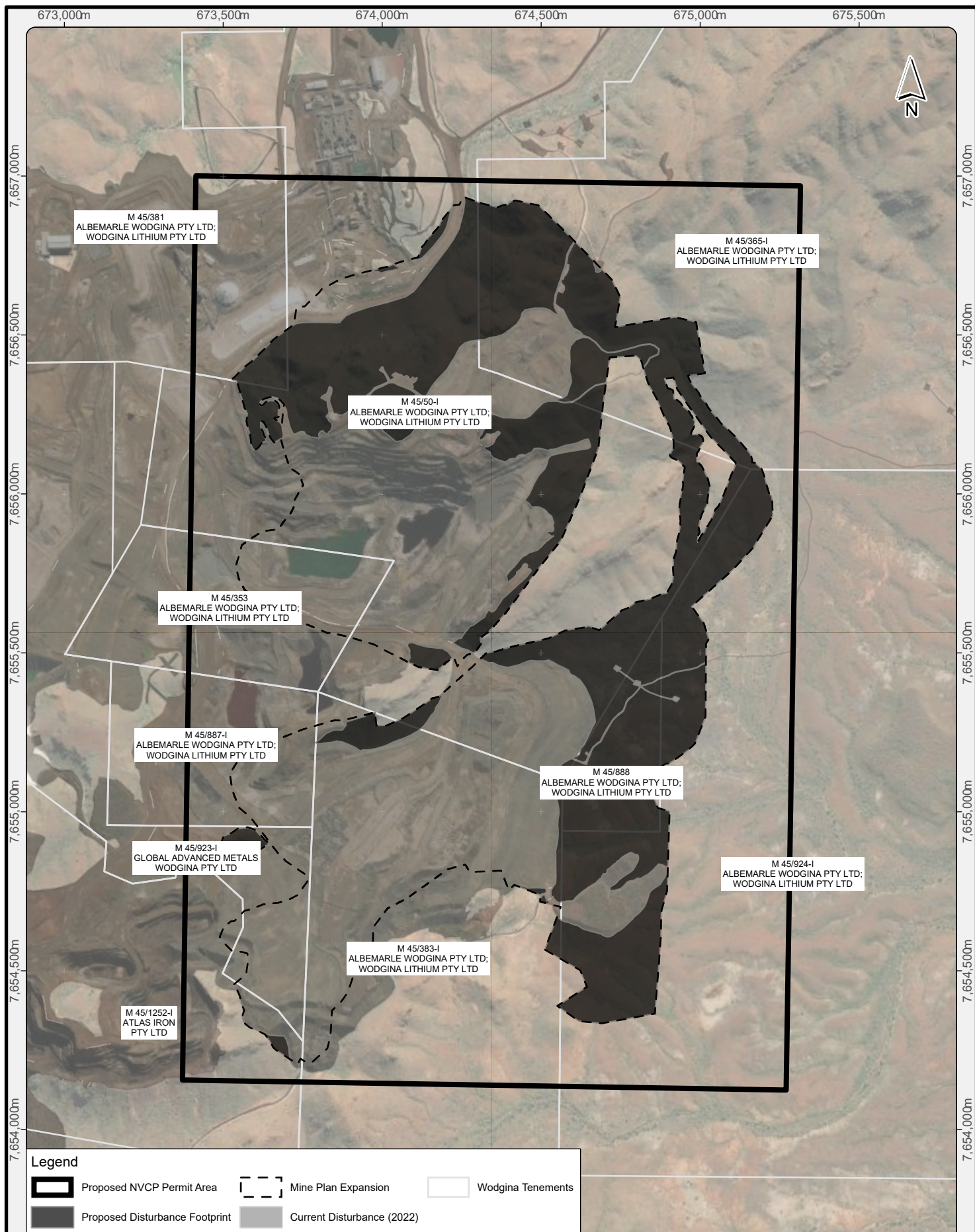
**TABLE 6: NVCP TENEMENTS**

Tenement	Holder
M 45/50	Wodgina Lithium Pty Ltd, Albemarle Wodgina Pty Ltd
M 45/353	Wodgina Lithium Pty Ltd, Albemarle Wodgina Pty Ltd
M 45/365	Wodgina Lithium Pty Ltd, Albemarle Wodgina Pty Ltd
M 45/381	Wodgina Lithium Pty Ltd, Albemarle Wodgina Pty Ltd
M 45/383	Wodgina Lithium Pty Ltd, Albemarle Wodgina Pty Ltd
M 45/887	Wodgina Lithium Pty Ltd, Albemarle Wodgina Pty Ltd
M 45/888	Wodgina Lithium Pty Ltd, Albemarle Wodgina Pty Ltd
M 45/923	Global Advanced Metals Wodgina Pty Ltd
M 45/924	Wodgina Lithium Pty Ltd, Albemarle Wodgina Pty Ltd
M 45/1252	Atlas Iron Pty Ltd









## MINING TENEMENTS AND TENEMENT OWNERS

0 295 590 1,180 1,770 2,360 metres

Scale @ A4: 1:15,733

GDA2020 MGA Zone 50

Drawn By: kim.dennison@mrl.com.au

MARBL - Wodgina Operations



### 3.4 HISTORY AND EXISTING FACILITIES

Wodgina was first discovered as an ore body in 1902 with mining commencing in 1904. Wodgina ore bodies have been mined for a range of commodities including Tin, Tantalum, Niobium, Beryllium, Iron Ore and Lithium by a number of companies and in a number of configurations. Since 1902 the Project has been tailored to a number of configurations depending on the target mineral. The Project has transitioned between Operation and C&M several times in response to global mineral market trends and ownership transfers.

In 2016 the Project was acquired by MinRes and exploration activities were commenced. In 2017 mining commenced with production of a Direct Ship Ore (DSO) product. Several approvals were granted between 2017-2019 to expand operations and upgrade site infrastructure to produce a lithium ore concentrate. Ore extraction at Wodgina is undertaken using conventional open pit mining methods, drill and blast and load and haul activities.

A range of facilities and landforms are present at the Project and are summarised below:

- Active pit – Cassiterite Pit (Tinstone Pit falls within an extension of Cassiterite Pit)
- Inactive pit – Hercules North, Hercules South, Anson, Arvo, Dragon, and Constellation Pit
- Active waste landform – Eastern Waste Landform
- Inactive waste landform – Atlas, Top and Valley Waste Dumps
- Active tailings storage facility (TSF) – TSF3 Extension
- Inactive TSF – TSF1, 2 and 3
- Borefields – Breccia, Old, North, and onsite Production Bores
- Water reservoir and ponds – Wodgina Pit, Process Water Pond, and the Retention Pond
- Seepage Bores and Monitoring Bores
- Fixed and mobile crushing
- Beneficiation Plant
- Reverse Osmosis Plant
- Stockyard Areas
- Power Station
- HME workshop including re-fuelling, stores, and a washbay
- Offices, buildings, laydowns, and general infrastructure corridors (LV and HV roads, pipelines)
- Soil Stockpiles
- Waste Water Treatment Facility
- Landfill (Inert Waste Type 1, Putrescible Waste, Clean Fill and Inert Waste Type 2 (tyres))
- Camp and overflow camp
- Gas Pipeline (to Port Hedland)
- Aerodrome



### 3.5 LEGISLATION AND APPROVALS

A number of approvals have been granted to MARBL for the operation and expansion of the Project. In summary these include:

- Mining leases and tenure granted by DMIRS under the *Mining Act 1978*
- Programme of Works granted by DMIRS under the *Mining Act 1978*
- Mining Proposals and Mine Closure Plans granted by DMIRS under the *Mining Act 1978*
- Prescribed Premises Licence to Operate granted by DWER under the *Environmental Protection Act 1986*
- Works Approval Licence to Construct granted by DWER under the *Environmental Protection Act 1986*
- Section 26D Licence to Construct or Alter Well granted by DWER under the *Rights in Water and Irrigation Act 1914*
- Section 5C Licence to Abstract granted by DWER under the *Rights in Water and Irrigation Act 1914*

Amendments to a number of the above approvals are currently under assessment, or amendments are being drafted, to support the Mine Plan expansion.

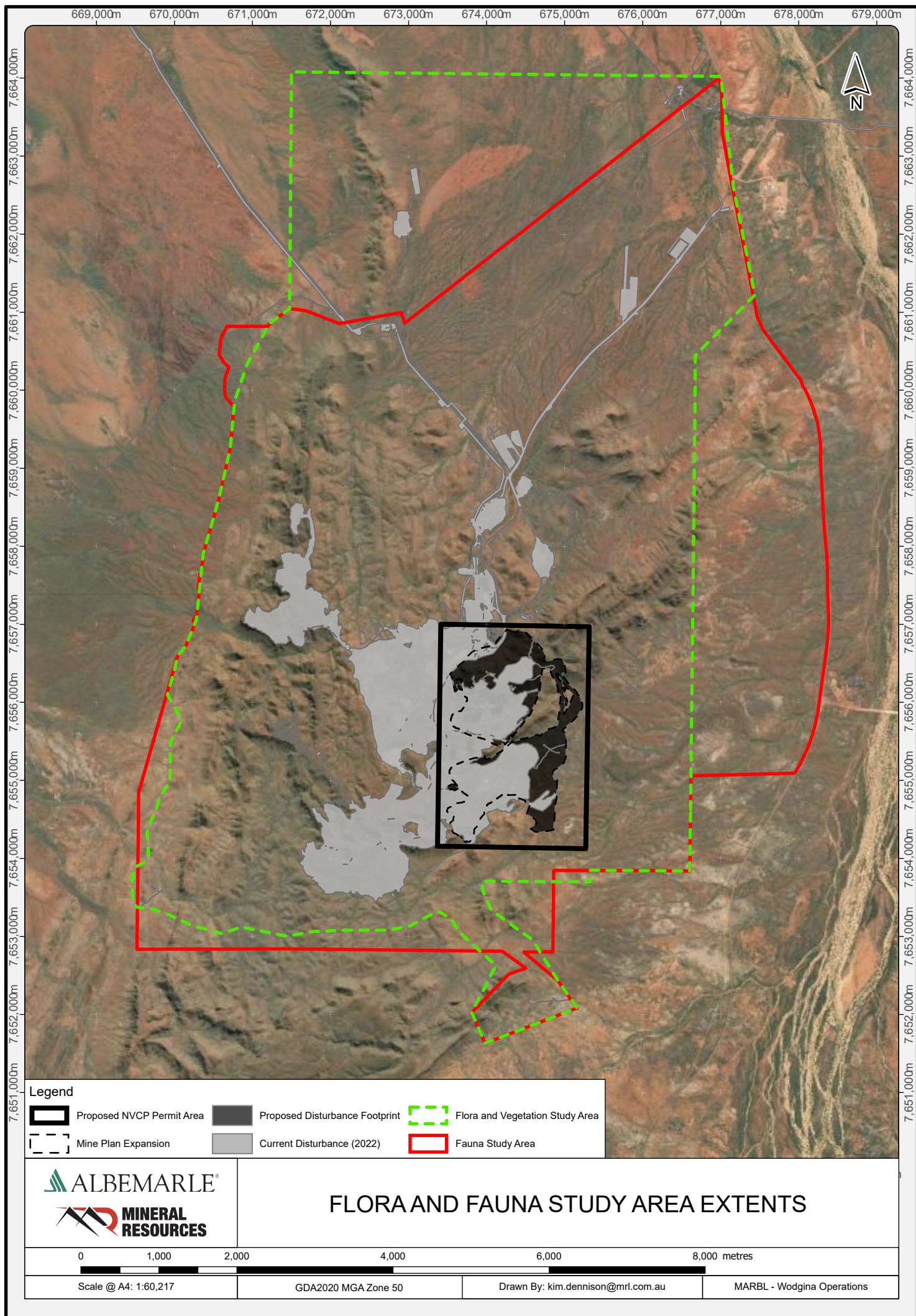
#### 3.5.1 EPA Engagement – Part IV Approval

On 12 June 2018 the previous planned expansion (reflected in the larger NVCP CPS 8230/1 footprint) was presented to DWER and DMIRS. At this time the regulator advised that the impact of clearing activities, construction and mining operations could be adequately managed under Part V of the *Environmental Protection Act 1986*. The Project was therefore not referred to the Environmental Protection Authority (EPA) and referral to the EPA for the current proposal is not considered warranted.

#### 3.5.2 DEE Engagement - EPBC Act Federal Referral

On 8 May 2018, the previous planned expansion (reflected in the larger NVCP CPS 8230/1 footprint) was referred to the Department of Climate Change, Energy, the Environment and Water (DCCEEW), previously known as the Department of Environment and Energy (DEE), pursuant to the *Environment Protection and Biodiversity Conservation Act 1999*. The DEE issued a decision on 2 November 2018 advising that the Wodgina Lithium Project is **not a controlled action** (EPBC 2018/8194). Given the reduction in clearing for the current proposal, referral to the Commonwealth is not proposed.







## 4. EXISTING ENVIRONMENT

### 4.1 CLIMATE

Under the Köppen climate classification system, the inland Pilbara region is classified as an arid, hot, desert climate. Rainfall in the Pilbara mostly occurs because of tropical cyclone systems in the January to March months. Rainfall during May and June is generally a result of cold fronts moving across the south of the State, which occasionally extend into the Pilbara. Storms are typically infrequent, short duration and intense events, resulting in flash flooding, rapid infiltration and subject to limited evaporative losses.

The most representative long-term official Bureau of Meteorology (BoM) weather station near the Project area is at Marble Bar (Station Number 4106) (BoM 2022), located approximately 110 km north-east of the Project. A summary of monthly averages for temperatures and rainfall recorded at Station 4106.

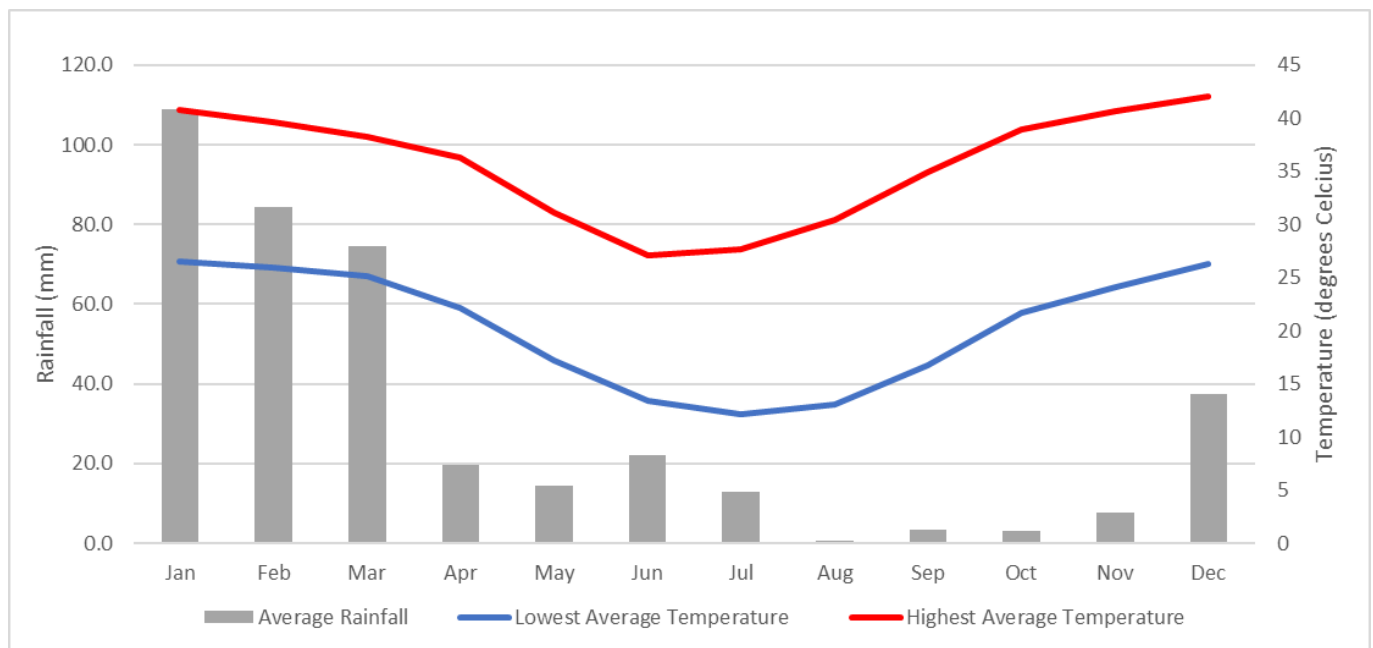


FIGURE 6: MONTHLY AVERAGE RAINFALL AND TEMPERATURE DATA FOR MARBLE BAR BOM STATION 4106

### 4.2 ABORIGINAL HERITAGE AND CULTURAL VALUES

MARBL in conjunction with the Kariyarra Native Title Group identifies, manages and protects known Aboriginal Heritage sites within the Project footprint in compliance with the *Aboriginal Heritage Act 1972* (AH Act) and *Aboriginal Cultural Heritage Act 2021* (ACH Act) and cultural obligations with strict internal processes and procedures.

A number of heritage surveys have been undertaken at Wodgina between 1988 and 2022 and included participants from the Kariyarra Native Title Group and Yamatji Marlpa Aboriginal Corporation (YMAC). Further heritage surveys have been commissioned for completion during 2022. All identified heritage sites are managed and protected by MARBL in compliance with the AH Act and ACH Act with strict internal procedures and processes.

The long history of mining at Wodgina has meant that heritage surveys have been undertaken progressively over the last 20 years. The vast majority of the known places are located outside the historical and current project footprint. Those that were located in now mined areas and on land currently used for supporting infrastructure have been subject to Ministerial consent under Section 18 of the AH Act. In recognition of the length of time that has passed since some heritage places were recorded, from the beginning of 2022, MinRes has collaborated with Kariyarra native title holders and knowledge holders to conduct ethnographic and archaeological heritage surveys.



over the Project footprint to bring the historical heritage information up to current standards. In parallel, cultural heritage surveys are progressing over areas proposed for expansion to the project footprint. In combination, these engagements have covered over 776 hectares within and around the Project.

Once the survey program is complete, MinRes will engage further with Kariyarra native title holders and knowledge holders to determine cultural heritage management requirements for the identified cultural heritage places. This work will form the basis of the Cultural Heritage Management Plan(s) referred to above.

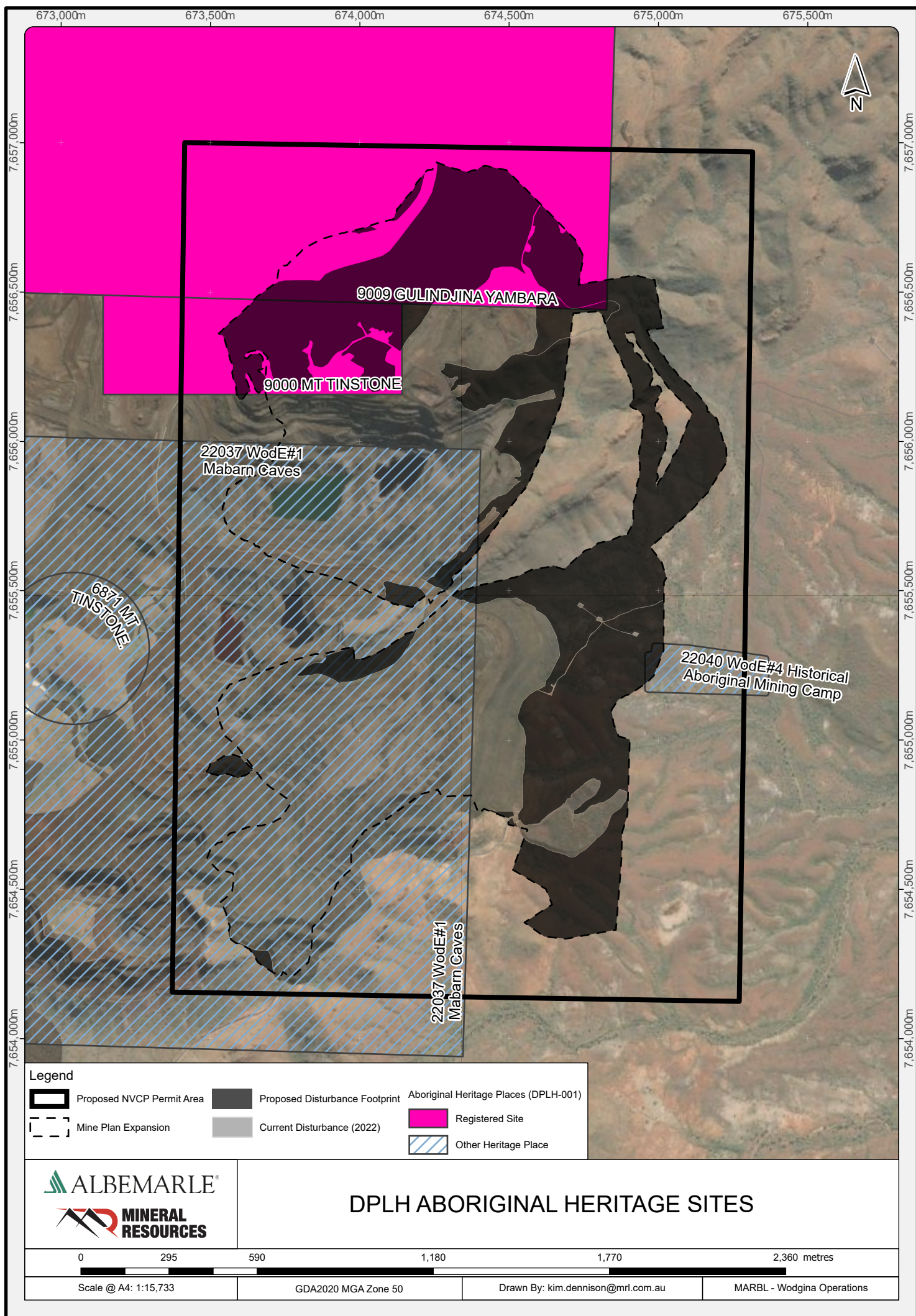
Where cultural heritage disturbance is unavoidable, MinRes will secure approval as appropriate from those for whom the cultural heritage has significance, in accordance with contractual requirements, and through the correct regulatory AH Act and ACH Act mechanisms.

A search of the Department of Planning, Lands and Heritage (DPLH) Aboriginal Heritage Inquiry System (AHIS) identified four (4) DPLH registered sites occurring within the proposed NVCP Permit Area. As shown in Figure 7 and Table 7.

**TABLE 7: ABORIGINAL HERITAGE PLACES AS REPORTED TO THE REGISTRAR OF ABORIGINAL SITES**

Place ID	Name	Status	Type
9000	Mt Tinstone	Registered	Mythological
9009	Gulindjina Yambara	Registered	Ceremonial, mythological
22037	WodE#1 Mabarn Caves	Lodged	Mythological, Rock shelter
22040	WodE#4 Historical Aboriginal Mining Camp	Lodged	Historical, camp, water source







### 4.3 ENVIRONMENTALLY SENSITIVE AREAS

There are no Environmentally Sensitive Areas (ESAs) within or in proximity to the proposed NVCP Permit Area.

The closest DBCA managed Nature Reserve is the Mungaroona Range Natural Reserve (DWER 2021). The Reserve is 'class A' and covers approximately 105,842 ha is located 50 km to the South West of the Project (DEC 2011).

### 4.4 SCHEDULE ONE AREAS

There are no Schedule 1 areas as defined by the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* within or in proximity to the proposed NVCP Permit Area.

The closest Schedule 1 area mapped by DWER is over 500 m to the west and correlates to a Downgraded Wild Rivers Catchment, refer to **Section 4.6.2**.

### 4.5 LANDFORM

#### 4.5.1 Land Use

The proposed NVCP Permit Area is located within the Pilbara region of Western Australia which is dominated by Pastoral Stations, Aboriginal lands and reserves, Unallocated Crown land and Crown Reserves, Conservation Areas and mining activities (Kendrick and McKenzie 2001). Pastoral Stations are detailed in **Section 3.1** and **Figure 3**.

#### 4.5.2 Landscape

The landscape within the region is variable and shaped by the structure of the underlying geology and imposed weathering processes (DAWE 2007). The Pilbara has moderately high relief with a number of ranges, river valleys and peneplains which, in the north, fall away to form a gently sloping coastal plain. The rangelands are generally rugged with prominent strike ridges and hills of outcropping rock separated by deep valleys in which thick sequences of infill have locally accumulated (DAWE 2007).

#### 4.5.3 Land Systems

The proposed NVCP Permit Area is located within two Land and Soil Systems defined by DPIRD (2022b) (**Table 8**).

**TABLE 8: LAND AND SOIL SYSTEMS OF THE PROPOSED NVCP PERMIT AREA**

Land System	Description	Proposed NVCP Permit Area (ha)
<b>Capricorn (280Cp)</b>	Rugged sandstone hills, ridges, stony footslopes and interfluves supporting low acacia shrublands or hard spinifex grasslands with scattered shrubs. Stoniness confers resistance to erosion.	408.7
<b>Platform (280PI)</b>	Dissected slopes and raised plains supporting shrubby hard spinifex grasslands. The system is not susceptible to erosion.	131.9

#### 4.5.4 Topography

The Pilbara region is characterised by a gently sloping coastal plain building up in the central region to moderately high relief ranges with prominent strike ridges and outcropping rocks with deep valleys and rivers (van Vreeswyk *et al* 2004). The North half of the proposed NVCP Permit Area is characterised by ridgelines reaching above 300 mRL running to the north east of outcropping bare rock and stony footslopes incised by drainage lines and valleys dipping to the 200 mRL. The South East area of the proposed NVCP boundary stretches out into a large floodplain across the granitic peneplain dipping to the 185 mRL with ephemeral creek lines (MBS 2019).

Contours for the proposed NVCP Permit Area are shown in **Figure 9**.



#### 4.5.5 Geology

The Project is located within the Pilbara Craton at the edge of the Mount Bruce Supergroup and consists of a thin cover of weathered Cenozoic sedimentary and metasedimentary regolith over the (northern) Carlindi and (southern) Yule granitoid complexes. These complexes consist of intrusive, sheared intrusive or tectonic contacts with surrounding metamorphic greenstones. The two are separated by the Wodgina Greenstone Belt. The granitic rocks were subsequently intruded by younger veins and dykes of quartz and pegmatite, which form the resource body for the Wodgina mine (MBS 2019).

#### 4.5.6 Soils

Soils within the proposed NVCP Permit Area were mapped by MBS in 2019. The South East corner of the proposed NVCP Permit Area was not originally mapped by MBS as it was outside the 2018 NVCP Permit Area. Soil mapping in this area has been extrapolated based on topography, landforms, and site reconnaissance.

The Project is dominated by loamy and stony calcareous soils associated with hills and ridges, red shallow loam duplex soils on extensive stony sheet washed alluvium plains and areas of bare rock outcrops (MBS 2019). Areas of material were identified in areas of bare rock outcrop consisting of shallow pockets of loamy topsoil over competent rock suitable for armouring rehabilitation purposes.

MBS (2019) separated soil resources into three categories based on their potential dispersive characteristics. Soil types have been mapped in **Figure 8**. A summary of each soil type and characteristics test results from samples are provided:

- **Loamy Soils** – Soil Groups 507 and 521 – Soils characterised by darker colour and higher iron content with a thin layer of ferruginous gravel lag suitable for flat areas of rehabilitation.
- **Stony Soils** – Soil Group 202 - Predominantly calcareous and with a substantial layer of stony lag material suitable for stable rehabilitation outcomes, underlying weathered oxide bedrock (where suitable) could provide additional rehabilitation resources.
- **Hillslope / Rock Outcrop** – Soil Group 101 – Frequently bare rock outcrops with minimal true 'soil' material however suitable for rock armouring rehabilitation.

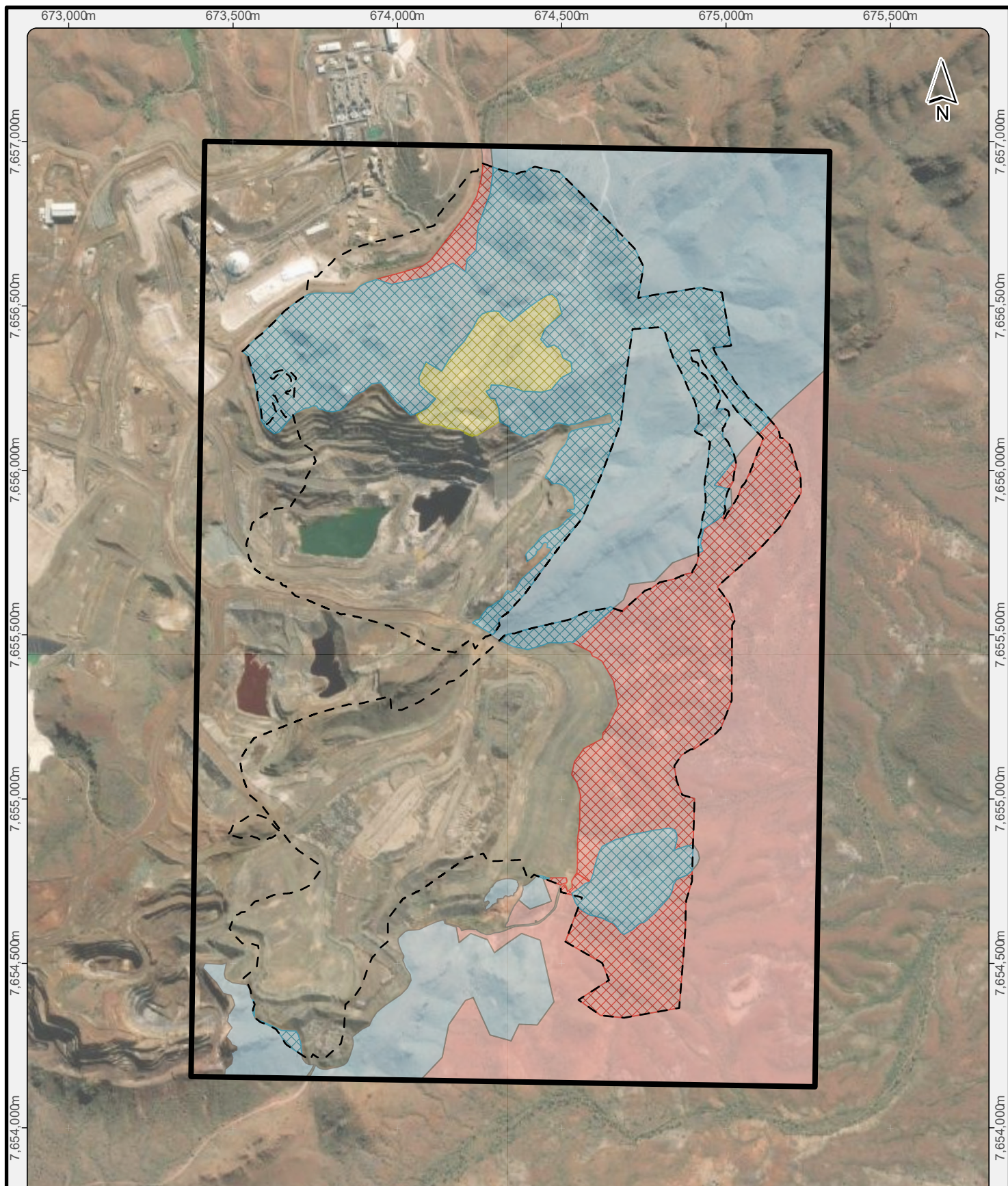
The proposed NVCP Permit Area includes areas of previous disturbance where soil resources remain *in-situ* and will be recovered during clearing activities, these calculations are shown in **Table 9** and therefore equate to a larger footprint when compared to proposed vegetation mapping.










**TABLE 9: SOIL TYPES AVAILABLE WITHIN THE PROPOSED NVCP PERMIT AREA AND TO BE RECOVERED**

Soil Group	Soil Type and Description	Recoverable Soil Types	
		Proposed NVCP Permit Area	Proposed Disturbance Footprint
		Hectares	Hectares
Loamy Soil			
507	<b>Red / brown loamy duplex</b> <ul style="list-style-type: none"><li>Occurs on flat low-lying areas</li><li>Shallow deep red / brown loam with minor fine ferruginous gravels (200 mm) over sub-rounded and sub-angular gravelly soil.</li><li>No defined organic (O) horizon.</li><li>Plant roots evident to 200 mm.</li><li>Compacted B1 horizon of siliceous and ferruginous (but not calcareous) gravel in a silty loam grading to gravelly loam matrix in the B2 horizon.</li></ul>	133.9	47.3
521	<b>Calcareous shallow loam</b> <ul style="list-style-type: none"><li>Occurs on gently undulating slopes of up to 5 degrees</li><li>Grey / light brown loamy sand with large proportion of fines content.</li><li>Aggregated are loose within the soil profile and are friable by hand.</li><li>General absence of an organic (O) surface horizon and cryptogamic surface crusting.</li><li>Mixture of siliceous, calcareous, or ferruginous stony lag at surface.</li><li>Light brown surface topsoil layer up to 30 cm, with plant roots evident throughout.</li></ul>		
Stony Soils			
202	<b>Calcareous Stony Soils</b> <ul style="list-style-type: none"><li>Occurs on slopes of 2 to 5 degrees on mid-slopes.</li><li>White/grey cobbles throughout the soil profile.</li><li>Light to medium brown silty sand topsoil layer to approximately 20 cm with minimal coarse fragments.</li><li>Prominent stony lag scattered across the surface – mixture of siliceous and ferruginous lag.</li></ul>	10.4	10.4
Hillslope / Rock Outcrops			
101	<b>Bare Rock</b> <ul style="list-style-type: none"><li>Occurs predominantly on hill slopes and small crests.</li></ul>	162.6	72.2





# Legend

	Proposed NVCP Permit Area		2019 Soil Assessment (MBS) Stony Soils - Recover		Hillslope / Rock Outcrop		Loamy Soils
	Mine Plan Expansion		Hillslope / Rock Outcrop - Recover		Loamy Soils - Recover		



## SOIL TYPES

0 295 590 1,180 1,770 2,360 metres

Scale @ A4: 1:15,733

GDA2020 MGA Zone 50

Drawn By: kim.dennison@mrl.com.au

MARBL - Wodgina Operations



## 4.6 SURFACE WATER

### 4.6.1 Regional Catchment Areas

The Project is located on the catchment divide of the Turner River catchment (to the east) and the Yule River catchment (to the west). The confluence of the Turner River West and greater Turner River is approximately 9 km downstream (to the north) of the Project (AQ2 2022b).

### 4.6.2 Wild Rivers

The western side of the Project falls within the mapped Upper Yule River Wild River Catchment however has been downgraded due to anthropogenic development and impacts altering the pristine condition of the Catchment and is no longer identified as a Wild River Catchment (DWER 2020).

### 4.6.3 Wetlands

There are no RAMSAR, EPA Redbook or nationally significant watercourses or wetlands within or in proximity to the proposed NVCP Permit Area. The closed significant wetland areas are Eighty Mile Beach (RAMSAR site) located over 170 km to the North East and Leslie (Port Hedland) Saltfields System (Directory of Important Wetlands in Australia) located 90 km to the North (DBCA 2017a, DBCA 2017b; DBCA 2018).

No wetland vegetation, in the form of swamps, marshes or ephemeral wetlands have been mapped within the proposed NVCP Permit Area (Woodman Environmental 2019).

### 4.6.4 Surface Water

There are no perennial surface water systems in the Project area although small semi-permanent pools may occur from time to time following heavy rainfall events (AQ2 2022b). A number of semi-permanent pools have been identified within the Flora Study Area however none are identified within the proposed NVCP Permit Area.

The proposed NVCP Application does not involve the interference with any bed or banks of a watercourse.

There are several ephemeral drainage lines within the proposed NVCP Permit Area running through the ridgeline valleys and down onto the peneplain (**Figure 9**). These drainage lines flow for short durations following large rainfall events predominantly occurring in the Pilbara wet season (AQ2 2022b).

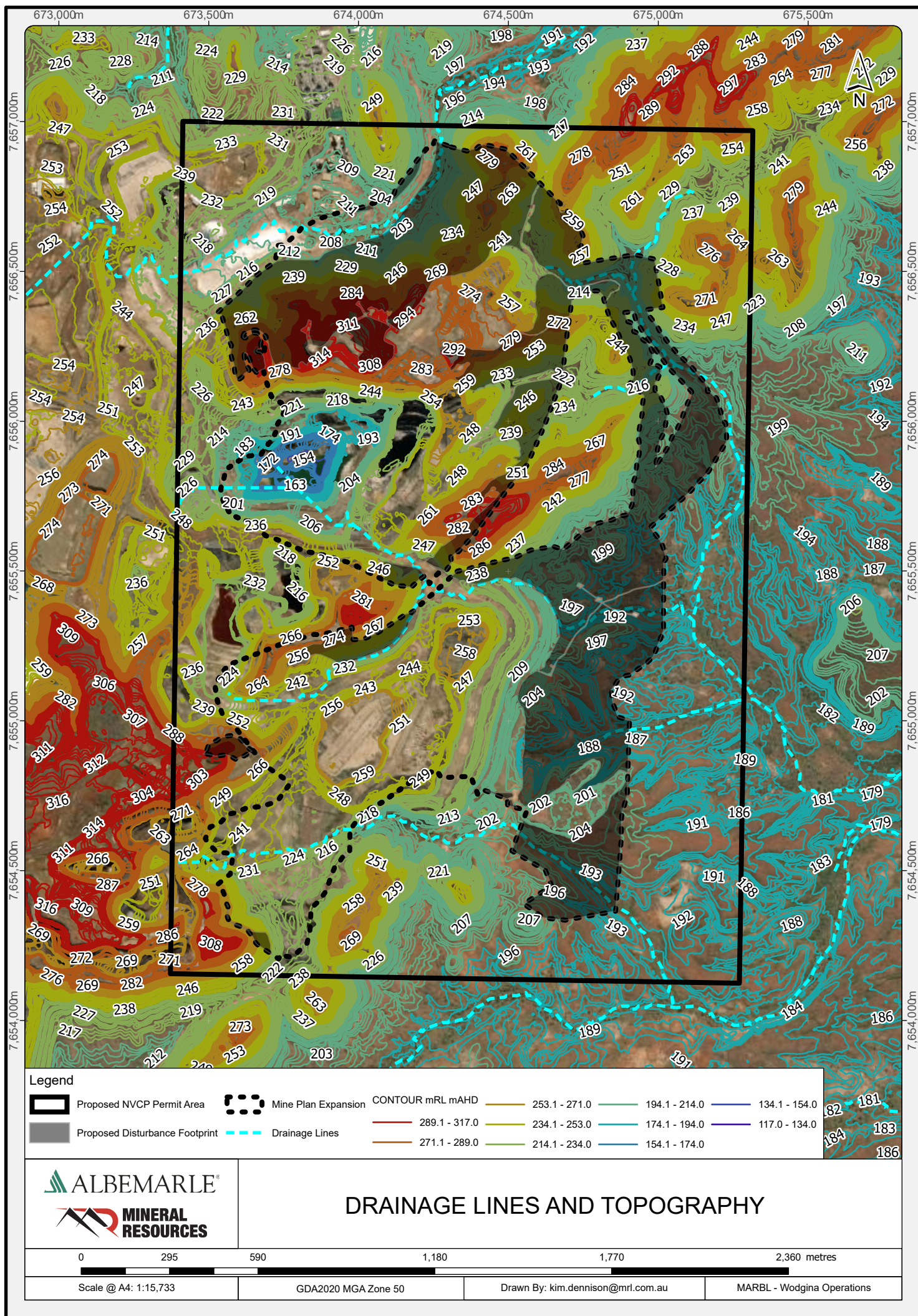
Highly ephemeral characteristics of stream and creek lines caused by sporadic rainfalls and the lack of natural permanent water features prevents the collection of reliable base line surface water characteristics. Surface water sampling conducted in 2018 and 2021 indicate quality in regional creeklines is generally fresh TDS < 500 mg/L with a neutral to basic pH (7.8 to 9) (AQ2 2022b).

### 4.6.5 Flooding

Surface water systems in the Pilbara generally only flow for a short duration immediately following larger rainfall events with extended periods of no flow through the dry season.

AQ2 (2022) have modelled the surface water environment around Wodgina and potential flood events to ensure adequate controls are implemented to maintain natural surface flows and reduce impacts during flood events. The proposed Mine Plan expansion will not significantly alter the current flood model with the exception of landform expansions reducing certain catchment areas and the proposed haul road requiring infrastructure controls to ensure surface water flows are maintained and controlled. Assessment and approval of proposed infrastructure and potential impacts to surface water will be obtained from DMIRS prior to any clearing works commencing.







#### 4.6.6 Hydrogeology

The Cassiterite Pit is located within the silicified volcanics and metasediments of the Wodgina Greenstone Belt. These rocks are generally very tight (with low bulk permeability) but with some enhanced permeability along some faults (AQ2 2022a). This supported by low yielding bore lifts and the lack of water egress into Cassiterite Pit while mining below groundwater level.

The Wodgina hydrogeological system is a fractured rock environment. Groundwater is associated with fracture zones along geological contacts of mafic and ultramafic greenstone rocks with pegmatite and quartz dykes. Zones of enhanced structural deformation, mineralisation and/or weathering within the basement are likely to provide higher permeability conduits for groundwater flow. Groundwater is found at shallow depths within the granitic peneplain owing to the thin weathering and colluvium cover. Groundwater is primarily encountered within fractures and weathered horizons of granite, pegmatite and quartz dykes (AQ2 2022a).

### 4.7 GROUNDWATER

#### 4.7.1 Public Drinking Water Source Areas

The proposed NVCP Permit Area does not occur within a Public Drinking Water Source Areas (PDWSA). The closest PDWSA is the Yule River Water Reserve (Protection Area P1) located 45 km to the North (DWER 2022a).

#### 4.7.2 Local Aquifer

The proposed NVCP Permit Area occurs within the proclaimed Groundwater Area – Pilbara, Groundwater Subarea East Pilbara. The target aquifer is the Pilbara – Fractured Rock Aquifer. The Groundwater Management Plan for the area was last updated in 2013 and documented in the Department of Water Pilbara groundwater allocation plan Report No. 055.

#### 4.7.3 Groundwater Level and Flow

Groundwater levels above the ridgelines at the Project would have naturally followed the ridgelines however they have been influenced in areas by mining activities and tailings disposal. Groundwater levels measured recently in the proposed NVCP Permit Area vary in the range of 200 to 210 mRL around Cassiterite Pit and 185 to 188 mRL near the Eastern Waste Landform.

The mining of Cassiterite Pit has created a 'cone of depression' in the local water table resulting in groundwater flow converging towards Cassiterite Pit creating a groundwater sink, while other areas such as the Eastern Waste Landform flow towards the east (AQ2 2022a).

#### 4.7.4 Groundwater Quality

The local groundwater quality around Cassiterite Pit is generally characterised by:

- Groundwater is marginal to brackish, with salinity around 3,500 mg/L TDS (i.e. EC of around 4,000 uS/cm)
- Groundwater is circum-neutral (i.e. pH ~6.5 to 7.5)
- Groundwater is dominated by sodium, magnesium, and calcium (in roughly equal proportions) and sulphate. This water type is indicative of groundwater that has undergone ion-exchange during mixing process and is not dominated by recharge (AQ2 2022a).

Groundwater levels and sampling are regularly monitored to ensure compliance with various site approval instruments and to ensure groundwater quality is not being impacted by mining activities.



## 4.8 FLORA AND VEGETATION

### 4.8.1 IBRA Bioregion

The proposed NVCP Permit Area is located within the Pilbara region and Chichester (PIL01) subregion of the Pilbara Bioregion (DAWE 2012). The Chichester subregion has undulating Archaean granite and basalt plains including significant areas of basaltic ranges. Plains support a shrub steppe characterised by *Acacia pyrifolia* over *Triodia pungens* hummock grasslands, while *Eucalyptus leucophloia* tree steppes occur on the ranges (CALM 2022).

### 4.8.2 Regional Botanical District

The proposed NVCP Permit Area is located within the Fortescue Botanical District of the Eremaran Province (Environment Australia 2000). The vegetation of this District is described by Beard (1975) as ‘tree and shrub-steppe communities, with *Eucalyptus* trees, *Acacia* shrubs, *Triodia pungens* and *Triodia wiseana*, with *Triodia* hummock grasslands, the characteristic vegetation type of the region’.

### 4.8.3 Vegetation System Association

Two Vegetation System Associations (VSA), as defined by Shepherd et al. (2002) utilising vegetation mapping completed by Beard (1975), are mapped within the proposed NVCP Permit Area (Woodman Environmental 2020). Both VSAs have over 99% of their pre-European undisturbed vegetation extent remaining (Woodman Environmental 2020) and are defined in **Table 10**.

**TABLE 10: VEGETATION SYSTEM ASSOCIATIONS WITHIN THE PROPOSED NVCP PERMIT AREA**

VSA	Description
Abydos Plain - Chichester 93	Hummock grasslands, shrub steppe; kanji over soft spinifex
Abydos Plain - Chichester 626	Hummock grasslands, shrub-steppe, kanji over soft spinifex and <i>Triodia brizoides</i>

### 4.8.4 Vegetation and Flora Assemblage

A total of 300 discrete vascular flora taxa (including 11 introduced taxa), three known hybrids and seven putative hybrids have been recorded in the Study Area. These taxa and hybrids represent 52 families and 138 genera. The most well-represented families were Fabaceae (55 taxa), three known hybrids and seven putative hybrids), Poaceae (51 taxa) and Malvaceae (26 taxa) (Woodman Environmental 2020).

### 4.8.5 Significant Vegetation

There are no Threatened Ecological Communities (TEC) or Priority Ecological Communities (PEC) within the proposed NVCP Permit Area or in proximity to the wider Wodgina area (DBCA 2021). Database searches identified the closest TEC or PEC is the PEC Gregory Land System identified (P3) located approximately 8 km North West of the Flora Study Area.

### 4.8.6 Vegetation Units

None of the VUs identified within the Flora Study Area represent State or Commonwealth listed Communities or significant vegetation otherwise defined by the EPA (2016a).

A total of 15 Vegetation Units (VU) are mapped for the Flora Study Area, and 11 VU's are mapped across the proposed NVCP Permit Area as described in **Table 11** and mapped on **Figure 10** (Umwelt 2022). Due to survey techniques and reviews of spatial mapping data there are minor discrepancies with the proposed Disturbance Footprint (based on Mine Rehab Fund spatial disturbance data) and areas designated as Cleared or Disturbed during the Flora and Vegetation survey.



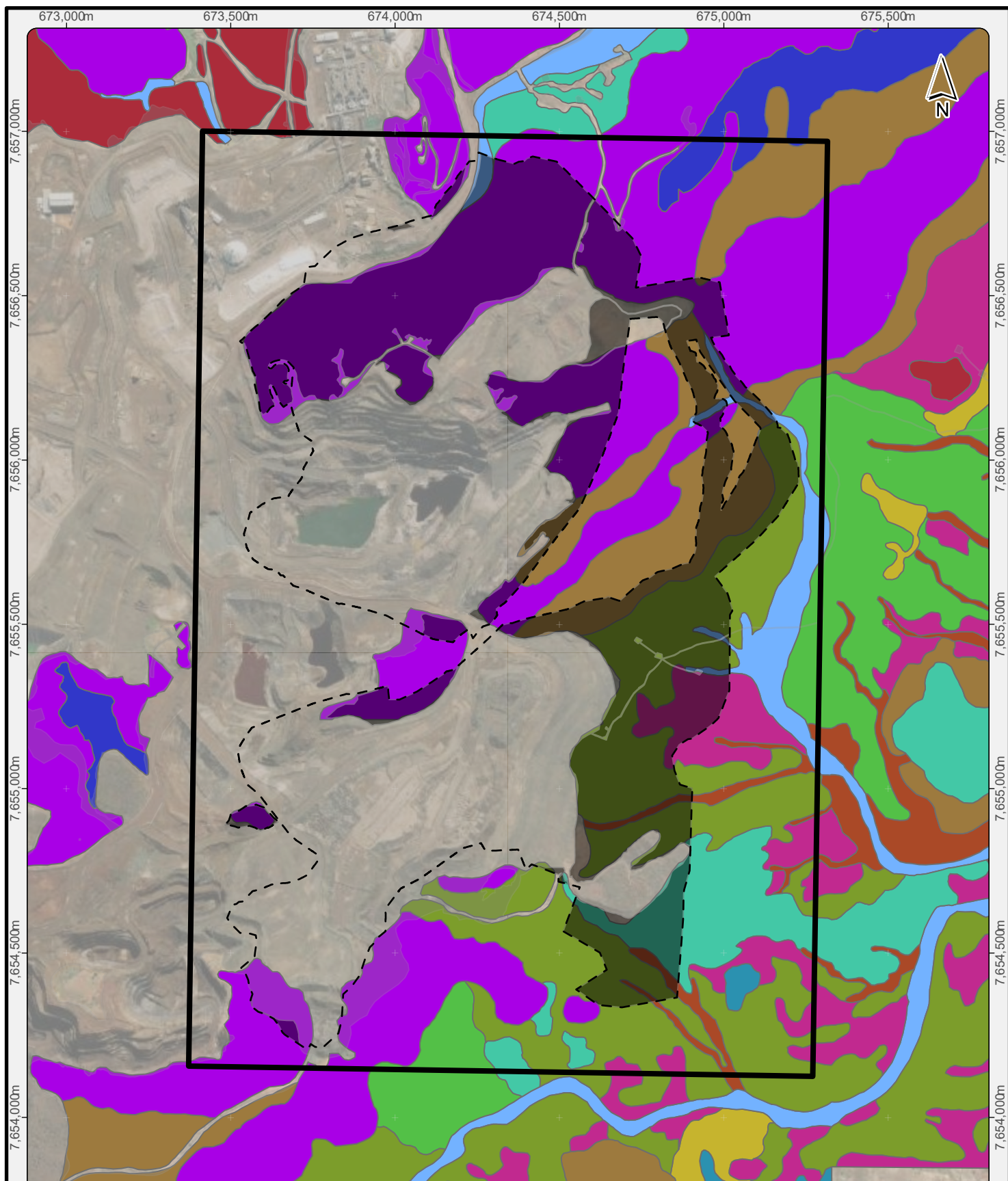
**TABLE 11: VEGETATION UNITS WITHIN THE PROPOSED NVCP PERMIT AREA**

VU #	Description
1	Tall open to sparse shrubland dominated by <i>Acacia orthocarpa</i> , <i>A. ancistrocarpa</i> and occasionally <i>A. acradenia</i> over low sparse shrubland of mixed species dominated by <i>A. stellaticeps</i> over low hummock grassland dominated by <i>Triodia lanigera</i> and occasionally <i>T. epactia</i> on red-brown clay loam with granite, quartz or ironstone stones on colluvial stone plains and low flat-topped rises.
2	Tall to mid sparse shrubland of mixed species dominated by <i>Acacia acradenia</i> , <i>A. inaequilatera</i> , <i>Grevillea wickhamii subsp. hispidula</i> and occasionally <i>A. tumida var. pilbarensis</i> and <i>A. ancistrocarpa</i> over low sparse shrubland of mixed species including <i>Indigofera monophylla</i> and <i>Goodenia stobbsiana</i> over low hummock grassland dominated by <i>Triodia epactia</i> and/or <i>T. brizoides</i> on red, brown or red-brown clay loam with metamorphic, ironstone, quartz and occasionally granite stones, occasionally with metamorphosed granite or granite outcropping, on lower slopes and colluvial outwashes of ranges and occasionally on low flat-topped rises.
3	Low open woodland to isolated trees of <i>Eucalyptus leucophloia subsp. leucophloia</i> and/or <i>Corymbia hamersleyana</i> over tall to mid sparse to open shrubland dominated by <i>Acacia acradenia</i> , <i>Grevillea wickhamii subsp. hispidula</i> and <i>A. tumida var. pilbarensis</i> over low sparse shrubland of mixed species including <i>Dampiera candidans</i> , <i>Indigofera monophylla</i> , <i>Goodenia stobbsiana</i> and <i>Triumfetta maconochieana</i> over low hummock grassland dominated by <i>Triodia epactia</i> and often <i>T. brizoides</i> or <i>T. wiseana</i> over low sparse tussock grassland dominated by <i>Eriachne mucronata</i> on red, brown or red brown clay loam with ironstone or metamorphosed granite stones over ironstone or metamorphosed granite outcropping on plateaus, crests and upper slopes of range.
4	Tall to mid sparse shrubland dominated by <i>Acacia inaequilatera</i> , <i>A. acradenia</i> and <i>Grevillea wickhamii subsp. hispidula</i> over low sparse shrubland of mixed species including <i>Corchorus parviflorus</i> and <i>Indigofera monophylla</i> over low hummock grassland dominated by <i>Triodia epactia</i> and/or <i>T. wiseana</i> , or occasionally <i>T. brizoides</i> and <i>T. chichesterensis</i> , on red, brown or red-brown clay loam with metamorphosed granite, dolerite and occasionally ironstone stones over metamorphosed granite or dolerite outcropping on mid and upper slopes of ranges, and low ridges and hills.
5	Tall to mid sparse shrubland of mixed species dominated by <i>Acacia acradenia</i> , <i>A. inaequilatera</i> and <i>A. orthocarpa</i> over low sparse shrubland of mixed species dominated by <i>Acacia spondylophylla</i> over low hummock grassland dominated by a combination of <i>Triodia chichesterensis</i> , <i>T. wiseana</i> , <i>T. epactia</i> , <i>T. brizoides</i> and <i>T. lanigera</i> on red-brown clay loam with metamorphosed granite, ironstone, dolerite, quartz and calcrete stones, occasionally over metamorphosed granite and dolerite outcropping, on lower slopes and colluvial outwashes of ranges and low flat-topped rises.
6	Does not occur in the proposed NVCP Permit Area.
7	Tall to mid sparse shrubland of mixed species including <i>Acacia inaequilatera</i> , <i>Grevillea pyramidalis subsp. leucadendron</i> and <i>A. orthocarpa</i> over low hummock grassland dominated by <i>Triodia chichesterensis</i> and/or <i>T. wiseana</i> on brown, red or red-brown clay loam with dolerite, calcrete and quartz stones, often with dolerite outcropping, on low hills.
8	Low isolated trees of <i>Corymbia hamersleyana</i> over tall to mid sparse shrubland dominated by <i>Acacia bivenosa</i> and <i>A. inaequilatera</i> over low hummock grassland dominated by <i>Triodia chichesterensis</i> and/or <i>T. wiseana</i> and <i>T. angusta</i> on brown, red-brown or grey-brown clay loam with dolerite, calcrete, ironstone and quartz stones on colluvial stony plains.
9	Low isolated trees of <i>Corymbia hamersleyana</i> over mid sparse shrubland to isolated shrubs dominated by <i>Acacia acradenia</i> , <i>A. inaequilatera</i> and <i>Grevillea wickhamii subsp. hispidula</i> over low hummock grassland dominated by <i>T. wiseana</i> , <i>T. epactia</i> and occasionally <i>T. brizoides</i> on red, brown or red-brown clay loam with ironstone, metamorphosed granite or occasionally dolerite or quartz stones over ironstone or metamorphosed granite outcropping on cliffs, ridges and crests and upper to mid slopes of ranges.
10	Does not occur in the proposed NVCP Permit Area.



VU #	Description
11	Low isolated trees of <i>Corymbia hamersleyana</i> over tall open to sparse shrubland dominated by <i>A. tumida</i> var. <i>pilbarensis</i> , <i>A. ancistrocarpa</i> and <i>A. acradenia</i> over low open to sparse shrubland of mixed species including <i>Bonamia erecta</i> , <i>Isotropis atropurpurea</i> and <i>Corchorus parviflorus</i> over low hummock and tussock grassland dominated by <i>Chrysopogon fallax</i> , <i>Triodia epactia</i> and occasionally <i>T. lanigera</i> on red, brown or red-brown sandy or clay loam with colluvial stones in minor drainage features including flats and small creeks.
12	Low open woodland of <i>Corymbia hamersleyana</i> over tall sparse shrubland dominated by <i>Acacia inaequilatera</i> over mid sparse shrubland dominated by <i>Acacia bivenosa</i> and <i>Codonocarpus cotinifolius</i> over low sparse shrubland of mixed species dominated by <i>Corchorus parviflorus</i> , <i>Indigofera monophylla</i> , <i>Heliotropium chrysocarpum</i> and <i>Heliotropium pachyphyllum</i> over low hummock grassland dominated by <i>Triodia chichesterensis</i> and occasionally <i>T. epactia</i> or <i>T. angusta</i> on red, brown or grey-brown clay loam with calcrete or quartz stones on undulating plains.
13	Does not occur in the proposed NVCP Permit Area.
14	Low open woodland to isolated trees dominated by <i>Eucalyptus victrix</i> and/or <i>Corymbia hamersleyana</i> over tall open to sparse shrubland of mixed species dominated by <i>Acacia pyrifolia</i> var. <i>pyrifolia</i> , <i>A. tumida</i> var. <i>pilbarensis</i> and <i>Melaleuca linophylla</i> over mid to low open to sparse shrubland of mixed species including <i>Cajanus pubescens</i> , <i>Indigofera monophylla</i> , <i>Tephrosia rosea</i> var. <i>clementii</i> , <i>Corchorus parviflorus</i> and <i>Jasminum didymum</i> subsp. <i>lineare</i> over low tussock and hummock grassland to open tussock and hummock grassland of mixed species dominated by <i>Triodia epactia</i> , <i>Cenchrus ciliaris</i> , <i>Chrysopogon fallax</i> , <i>Cymbopogon ambiguus</i> and <i>Eriachne tenuiculmis</i> on red or brown clay or sandy loam, usually with colluvial stones, in major creeks.
15	Does not occur in the proposed NVCP Permit Area.





# Legend

	Proposed NVCP Permit Area		Proposed Disturbance Footprint		VegCode 1		11		13		2		4		7		9
	Mine Plan Expansion		Current Disturbance (2022)		12		14		3		5		8				

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## VEGETATION UNITS

0 295 590 1,180 1,770 2,360 metres

Scale @ A4: 1:15,733

GDA2020 MGA Zone 50

Drawn By: kim.dennison@mrl.com.au

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#### 4.8.7 Vegetation Condition

Vegetation of the Flora Study Area has been mapped for vegetation condition as per the Vegetation Condition Scale adapted from Keighery 1994 and Trudgen 1988 (EPA 2016a). Majority of the proposed NVCP Permit Area is mapped as Excellent condition (Umwelt 2022). Vegetation Condition is defined for the proposed Permit Area and Disturbance Footprint in **Table 12** and **Figure 11**.

Evidence of grazing and cattle trampling, mechanical and mining disturbance, and/or the presence of weeds have reduced the condition rating in some VUs to “Good” or “Poor” (Woodman Environmental 2020).

**TABLE 12: VEGETATION CONDITION WITHIN THE PROPOSED NVCP PERMIT AREA**

Condition Category		Proposed NVCP Permit Area
		Hectares
<b>Excellent</b>	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.	274.4
<b>Very Good</b>	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.	5.0
<b>Good</b>	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.	8.1
<b>Poor</b>	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.	9.7
<b>Vegetation (Excellent to Poor)</b>		297.2
<b>Cleared</b>	Includes Completely Degraded, Degraded and areas under Rehabilitation	243.4
<b>Total Area</b>		540.6

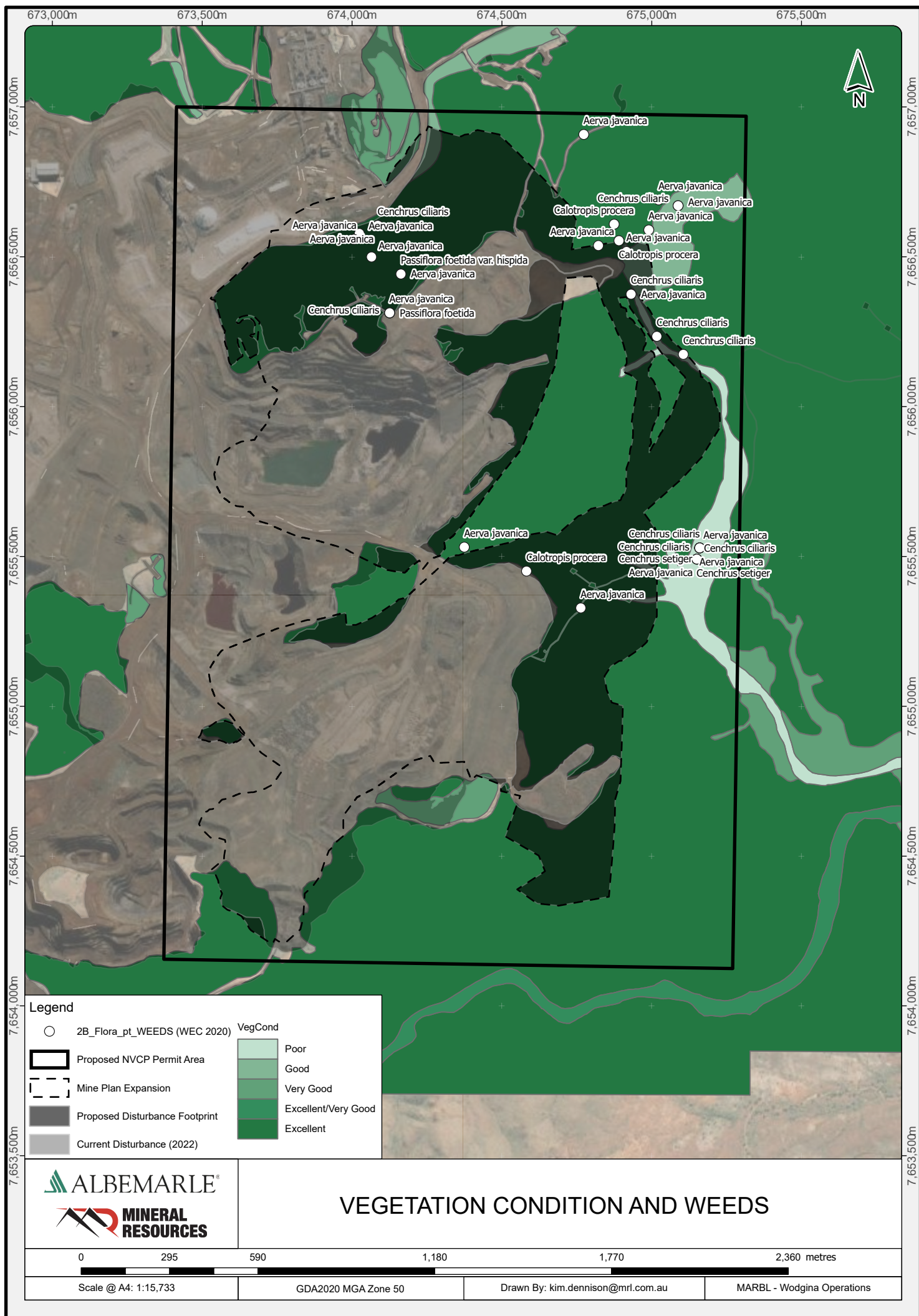
#### 4.8.8 Weeds

No Weeds of National Significance (WONS) have been recorded in the proposed NVCP Permit Area or the wider Flora Study Area. Previous flora and vegetation surveys have identified five (5) weeds within the proposed Permit Area (**Table 13** and **Figure 11**), one of which being a Declared Weed (*Calotropis procera*).

**TABLE 13: RECORDED INVASIVE FLORA (WEEDS) WITHIN THE PROPOSED NVCP PERMIT AREA**

Scientific Name	Common Name	Significance
<i>Aerva javanica</i>	Kapok	Permitted (DPIRD 2022a) Ecological impact rated High, invasiveness rated Rapid (DBCA 2014)
<i>Calotropis procera</i>	Calotrope	Declared Pest (DPIRD 2022a) Priority alert weed (DBCA 2014)
<i>Cenchrus ciliaris</i>	Buffel Grass	Permitted (DPIRD 2022a) Ecological impact rated High, invasiveness rated Rapid (DBCA 2014)
<i>Cenchrus setiger</i>	Birdwood Grass	Permitted (DPIRD 2022a) Ecological impact rated High, invasiveness rated Rapid (DBCA 2014)
<i>Passiflora foetida</i> var. <i>hispidula</i>	Stinking Passionflower	Ecological impact rated High, invasiveness rated Rapid (DBCA 2014)







#### 4.8.9 Riparian Vegetation

No riparian vegetation associated with permanent water courses or permanent pools such as the Turner River has been identified in proximity to, or within, the proposed NVCP Permit Area (Umwelt 2022).

#### 4.8.10 Groundwater Dependent Vegetation

Two VUs mapped within the wider Flora Study Area have been identified as containing Groundwater Dependent Vegetation (GDV) based on the presence of one of several phreatophytic species in the (VU 11 and VU 14).

The potential facultative phreatophyte *Melaleuca glomerata* is also known to occur at three locations in VU 14, while both *Eucalyptus victrix* (considered to be a vadophyte) and *Melaleuca linophylla* (potential facultative phreatophyte) are common in this VU. However, available evidence indicates that vegetation that is groundwater dependent is not extensive in the Study Area; it should be noted that depth to groundwater within elevated parts of Wodgina (main range) is generally at least 20 m from the surface (Golder 2018), and therefore would not be accessible to any occurrences of VU 14 in these areas (Woodman Environmental 2020).

No phreatophytic flora taxa or Groundwater Dependent Vegetation (GDV) have been identified with in, or in close proximity to, the proposed NVCP Permit Area (Woodman Environmental 2020).

The Wodgina Project has a GDV annual monitoring program to potential impacts of groundwater drawdown, as approved on GWL154570(20). The proposed NVCP Permit Area is approximately 5.7 km to the South East of the closest GDV monitoring site.

#### 4.8.11 Conservation Significant Flora

No flora taxa listed as Threatened under the EPBC Act or the *Biodiversity Conservation Act 2016* (BC Act) are known to occur at Wodgina.

A total of six (6) significant flora species are known to occur within the Flora Study Area based on previous survey effort. Three (3) of these significant flora species have been identified within the proposed NVCP Permit Area (Umwelt 2022). Significant flora recorded within the proposed NVCP Permit Area are listed in **Table 14**.

**TABLE 14: SIGNIFICANT FLORA KNOWN TO OCCUR WITHIN THE PROPOSED NVCP PERMIT AREA**

Flora Species	Conservation Status <sup>1</sup>			Preferred Habitat VUs	Within the proposed NVCP Permit Area	
	EPBC Act	BC Act	DBCA Priority		# Locations	# Individuals
<i>Euphorbia clementii</i>			3	2, 9, 10, 11	322	61,529
<i>Terminalia supranitifolia</i>			3	4, 9	1,100	2,378
<i>Triodia chichesterensis</i>			3	4, 5, 6, 7, 8, 9, 12	1,1928	2,378

Key to status: Cr = Critically Endangered, En = Endangered, Vu = Vulnerable, Mi = Migratory, OS = Other Specially Protected Fauna, Priority 1 – 4 (P1 – P4)

A further three taxa (*Abutilon aff. hannii*, *Heliotropium muticum* (P3) and *Vigna triodiophila* (P3)) have been recorded in the wider Flora Study Area (Woodman Environmental 2020) but were not recorded in the proposed NVCP Permit Area despite intensive survey effort.

Suitable habitat occurs in the proposed NVCP Permit Area for a further three significant taxa (*Eragrostis crateriformis* (P3), *Gomphrena leptophylla* (P3) and *Goodenia nuda* (P4)); however, these taxa have not been recorded at Wodgina, despite targeted survey over multiple survey events (Umwelt 2022).



***Euphorbia clementii*****Priority 3**

*Euphorbia clementii* is an erect herb growing to 0.6 m high, occurs on gravelly hillsides and stony ground, and is a fire responder. There are 32 location records of this taxon in Western Australia representing approximately 16 broad localities. The taxon was recorded in high numbers within the original Hercules survey area in 2011. As a typical fire responder, the taxon is relatively short lived. More recent surveys have recorded very low numbers of the taxon within the Study Area; no individuals were recorded during the targeted flora survey in 2019.

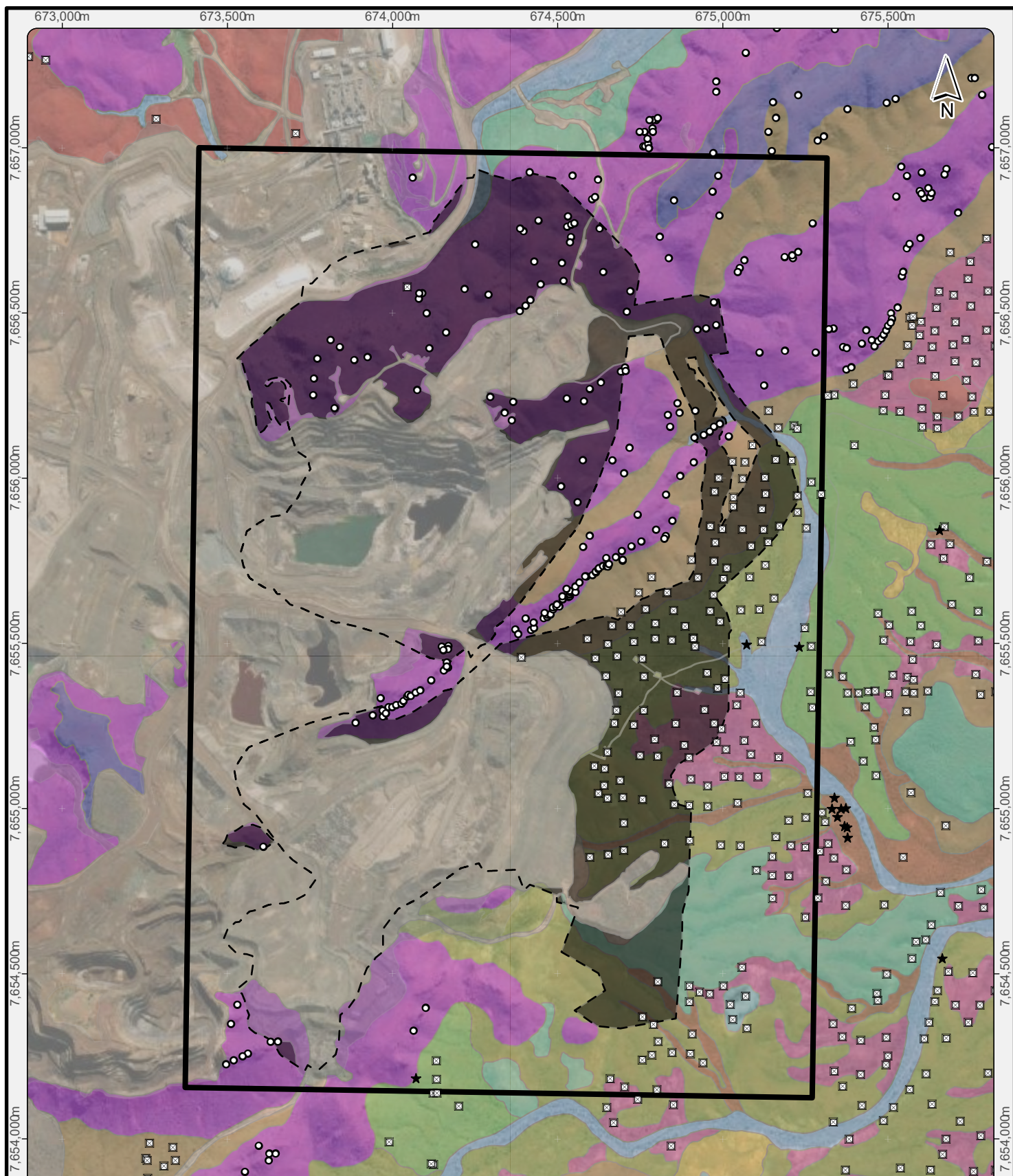
***Terminalia supranitifolia*****Priority 3**

*Terminalia supranitifolia* is a spreading tangled shrub or tree growing up to 3 m high occurring on rock outcrops, cliffs and breakaways (WA Herbarium, 2018). This taxon is endemic to Western Australia occurring over a range of approximately 275 km from Kangan Station in the east to near Pannawonica in the west (DBCA, 2007-).

***Triodia chichesterensis*****Priority 3**

*Triodia chichesterensis* is a hummock grass growing up to 0.4 m high occurring on plains and low ridges. This taxon is endemic to Western Australia occurring over a range of approximately 91 km from the north of Indee Station in the north to the east of Mungaroona Nature Reserve in the south (DBCA 2007).





#### Legend

- |                            |                           |                                |           |
|----------------------------|---------------------------|--------------------------------|-----------|
| ★ Euphorbia clementii      | Proposed NVCP Permit Area | Proposed Disturbance Footprint | VegCode   |
| ○ Terminalia supranitfolia | Mine Plan Expansion       | Current Disturbance (2022)     | 12 2 5 9  |
| ☒ Triodia chichesterensis  |                           |                                | 1 13 3 7  |
|                            |                           |                                | 11 14 4 8 |



## PRIORITY 3 FLORA SPECIES

0 295 590 1,180 1,770 2,360 metres

Scale @ A4: 1:15,733

GDA2020 MGA Zone 50

Drawn By: kim.dennison@mrl.com.au

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## 4.9 FAUNA AND HABITAT

### 4.9.1 Fauna Assemblage

Western Wildlife (2020) describe the fauna assemblage as likely to be diverse as the Study Area contains a range of habitats, though many of the species that occur are widely distributed through arid Australia. The predicted faunal assemblage includes up to ten frogs, 108 reptiles, 140 birds and 33 native mammals and eight introduced mammals. The observed assemblage thus far includes five frogs, 71 reptiles, 89 birds and 25 native mammals and six introduced mammals.

### 4.9.2 Short Range Endemics

A number of Short Range Endemic (SRE) surveys have been conducted in the Fauna Study Area since 2008. No SRE of conservation significance has been identified at Wodgina during these surveys. SRE identified during the Outback Ecology 2018 survey was consistent with SRE species identified at other regional survey locations (i.e. Mt Dove). The proposed Disturbance Footprint is therefore unlikely to impact any potential SRE.

SREs have not been considered further in this application.

### 4.9.3 Stygofauna

Stygofauna sampling in 2018 and 2019 identified a diverse stygofauna community across the Wodgina Project. A total of 37 species were identified including 11 species of copepods, nine syncarids, seven oligochaete worms, five amphipods, three ostracods one isopod and at least one species of nematode worm (Bennelongia 2020). Majority of species were identified deep within the groundwater column from sample holes located in drainage lines on the surrounding peneplanes and therefore away from any potential pit void or drawdown impacts.

Assessments have been completed to assess the potential impacts of the Project and proposed mine expansion on Stygofauna. It's been determined that the risk of significant impact to Stygofauna species is considered to be Low (Bennelongia 2020, Bennelongia 2022).

Stygofauna has not been considered further in this application.

### 4.9.4 Troglofauna

Work was completed in 2010 to assess Troglofauna presence and potential impacts around Atlas pits. No Troglofauna species were identified during the 2010 works. Generally, prospective Troglofauna habitats include larger and more abundant voids and caves than what is currently available at the Project therefore the risk of significant impacts to Troglofauna is considered to be Negligible (Outback Ecology 2011).

Troglofauna has not been considered further in this application.

### 4.9.5 Feral Animals

Six (6) invasive fauna species have been recorded across the wider Project footprint on surveys, these include the dog/dingo, fox, cat, horse, house mouse and the cow (to be expected from the overlapping pastoral lease) (Western Wildlife 2019).

### 4.9.6 Conservation Significant Fauna

The EPBC Act Protected Matters Search Tool identified seventeen (17) conservation significant species that are known to occur, or have the potential to occur, within or around the Wodgina Project. The Fauna Study Area has been extensively surveyed (Level 1, Level 2, and targeted surveys) and to date three (3) conservation significant species have been identified within the proposed NVCP Permit Area.

This section provides additional detail on conservation significant species known to occur in the wider Fauna Study Area or have a High likelihood of occurring (**Table 15**).



**TABLE 15: SIGNIFICANT FAUNA WITHIN THE PROPOSED NVCP PERMIT AREA**

Fauna Species	Conservation Status <sup>1</sup>			Likelihood of occurrence in Fauna Study Area	Record of species in the Proposed NVCP Permit Area
	EPBC Act	BC Act	DBCA Priority		
Northern Quoll <i>Dasyurus hallucatus</i>	En	En		Known to occur	Yes
Pilbara Leaf-nosed Bat <i>Rhinonictis aurantia</i>	Vu	Vu		Known to occur	Yes
Ghost Bat <i>Macroderma gigas</i>	Vu	Vu		Known to occur	Yes
Pilbara Olive Python <i>Liasis olivaceus barroni</i>	Vu	Vu		High	No
Grey Falcon <i>Falco hypoleucos</i>	Vu	Vu		High	No
Fork-tailed Swift <i>Apus pacificus</i>	Mi	Mi		High	No
Wood Sandpiper <i>Tringa glareola</i>	Mi	Mi		Known to occur	No
Common Sandpiper <i>Tringa hypoleucos</i>	Mi	Mi		Known to occur	No
Peregrine Falcon <i>Falco peregrinus</i>		OS		High	No
Spectacled Hare-wallaby <i>Lagorchestes conspicillatus</i>			P4	Known to occur	No
Long-tailed Dunnart <i>Sminthopsis longicaudata</i>			P4	Known to occur	No
Western Pebble-Mound Mouse <i>Pseudomys chapmani</i>			P4	Known to occur	Yes

Key to status: Cr = Critically Endangered, En = Endangered, Vu = Vulnerable, Mi = Migratory, OS = Other Specially Protected Fauna, Priority 1 – 4 (P1 – P4)

### **Northern Quoll (*Dasyurus hallucatus*)**

### **Endangered**

The Northern Quoll (NQ) is a small nocturnal, carnivorous marsupial with a large home range however restricted reproductive opportunities (DoE 2016). It has reddish brown fur, with its underside cream, white spots on its back and rump with the tail unspotted, and a pointy snout. The NQ is an endemic species that has undergone a rapid decline from cumulative effects of inappropriate fire regimes, predation, habitat loss and in particular, invasion of its habitat by cane toads (*Rhinella marina*). (DoE 2016).

NQ occur across a range of habitats in the Pilbara and are known to favour Rocky Ridge and Gorge Habitats as cracks, crevices and caves provide important shelter and breeding sites (Umwelt 2022). Drainage Line Habitat areas would also be utilised by the species for foraging and dispersal. The species is highly mobile and capable of dispersing over long distances. Available survey records for the NQ start in 2008 with population sizes varying between years, most likely responding to environmental factors such as rainfall and fire events (Umwelt 2022). Survey records indicate the population extends through the rocky ridgeline habitats around the proposed NVCP Permit Area.



The NQ population at the Project is defined as an ‘important population’ due to the refuge rich Rocky Range and Gorge habitat and habitat that is free of cane toads (DoE 2016). The presence of females in the population indicate the potential for breeding populations in the wider Project area however extensive survey efforts to date have not identified specific denning locations. Survey effort in 2022 of the proposed NVCP Permit Area identified NQ within the area with records indicating the local population is likely at a low density (Stantec 2022). Locations of NQ are mapped in **Figure 13**.

An assessment of the scale and risk of impacts to the NQ is detailed in **Section 5.4.2**.

***Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*)***

***Vulnerable***

The Pilbara Leaf-nosed Bat (PLNB) is a small, insectivorous cave roosting bat with orange, pale yellow, white, pale grey, or light brown fur. The PLNB is endemic to Western Australia and is known to roost all year (Bat Call WA 2021).

The PLNB requires warm, humid daytime roosts sites, none of which have been identified in the wider Wodgina Project area. Foraging habitat for the species is available throughout the wider Wodgina Project Area across Drainage Line Habitats, gorges and over water pools (Umwelt 2022). Available survey records for the PLNB start in 2009 (Western Wildlife 2020).

No breeding sites are known to occur however a single transitory diurnal roost and several nocturnal refuges have been recorded in the wider Fauna Study Area. The PLNB has been previously recorded within the proposed NVCP Permit Area in 2018 and 2019 at two mapped nocturnal refuge caves (Western Wildlife 2020). Both Caves are outside the proposed Disturbance Footprint and will be retained. Locations of PLNB are mapped in **Figure 14**.

An assessment of the scale and risk of impacts to the PLNB is detailed in **Section 5.4.2**.

***Ghost Bat (*Macroderma gigas*)***

***Vulnerable***

The Ghost Bat (GB) is the largest microchiropteran bat in Australia and only carnivorous bat. It has long ears, large eyes, no tail, and fur colour of a light to dark grey above and paler below (DoE 2015).

Available survey records for the GB start in 2008 (Western Wildlife 2020). At times the GB has been recorded in significant numbers across the Fauna Study Area with diurnal Roost Caves and a potential maternity roost being identified outside of the proposed NVCP Permit Area.

The GB has been previously recorded within the proposed NVCP Permit Area in 2009 and 2018 at a number of Nocturnal refuge caves and one diurnal roost cave **Figure 15** (Western Wildlife 2020)

An assessment of the scale and risk of impacts to the GB is detailed in **Section 5.4.2**.

***Pilbara Olive Python (*Liasis olivaceus barroni*)***

***Vulnerable***

The Pilbara Olive Python (POP) is a very large python of a dull olive-brown to pale fawn to rich brown colour with white/cream belly, pale lips finely dotted with pale grey or brown, pitted anterior scales bordering the lips and smooth scales in 55–80 rows at mid-body (DoE 2022). The species is endemic to the Pilbara region.

The POP has not been recorded in previous survey effort (Western Wildlife 2020). The POP favours rocky outcrops, such as the Rocky Ridge and Gorge habitat, close to waterholes (Umwelt 2022). Although the likelihood of the POP occurring in the Fauna Study Area is high, the lack of permanent or semi-permanent pools within the proposed NVCP Permit Area reduce the likelihood of its occurrence. While likely to occur it's unlikely the local population is important for maintaining the regional presence of the POP population (Umwelt 2022).

An assessment of the scale and risk of impacts to the POP is detailed in **Section 5.4.2**.



***Grey Falcon (*Falco hypoleucos*)******Vulnerable***

The Grey Falcon (GF) has not been recorded in the proposed NVCP Permit Area however it's highly likely one or two individuals could visit the wider Fauna Study Area as a foraging visitor (Umwelt 2022). Breeding habitat for the GF is represented by tall trees in major water courses. Given the extensive regional foraging range of the GF and lack of suitable breeding habitat the potential scale of impacts to the GF population is Very Low (Umwelt 2022).

The Grey Falcon has not been considered further in this application.

***Fork-tailed Swift (*Apus pacificus*)******Migratory***

The Fork-tailings Swift (FTS) has not been recorded in the proposed NVCP Permit Area however it's been identified in the region on government databases and is likely to overfly the wider Fauna Study Area as the species is almost entirely aerial (Umwelt 2022). The potential scale of impacts to the FTS are therefore Negligible (Umwelt 2022).

The Fork-tailed Swift has not been considered further in this application.

***Wood Sandpiper (*Tringa glareola*)******Migratory***

The Wood Sandpiper (WS) has not been recorded within the proposed NVCP Permit Area however single individuals were identified for the first time in 2019 within the wider Fauna Study Area (Western Wildlife 2020). Potentially suitable habitat within the proposed NVCP Permit Area is negligible compared to larger and more suitable habitats in the wider Pilbara region such as large water courses and coastal habitats (Umwelt 2022). The potential scale of impacts to the WS are therefore Negligible (Umwelt 2022).

The Wood Sandpiper has not been considered further in this application.

***Common Sandpiper (*Tringa hypoleucos*)******Migratory***

The Common Sandpiper (CS) has not been recorded within the proposed NVCP Permit Area however single individuals were identified for the first time in 2019 within the wider Fauna Study Area (Western Wildlife 2020). Potentially suitable habitat within the proposed NVCP Permit Area is negligible compared to larger and more suitable habitats in the wider Pilbara region such as large water courses and coastal habitats (Umwelt 2022). The potential scale of impacts to the CS are therefore Negligible (Umwelt 2022).

The Common Sandpiper has not been considered further in this application.

***Peregrine Falcon (*Falco peregrinus*)******Other Specifically Protected Fauna***

The Peregrine Falcon (PF) has not been recorded in the proposed NVCP Permit Area however is likely to visit the wider Fauna Study Area as a breeding or foraging visitor (Western Wildlife 2020). The PF has an extremely large range across Australia with suitable breeding habitat in rocky ridge outcrops and on major water courses (Umwelt 2022). The potential scale of impacts to the PF are therefore Low (Umwelt 2022).

The Peregrine Falcon has not been considered further in this application.

***Spectacled Hare-wallaby (*Lagorchestes conspicillatus*)******Priority 4***

The Spectacled Hare-wallaby (SHW) has not been recorded in the proposed NVCP Permit Area however a deceased individual was identified within the wider Fauna Study Area in 2018, and regional individuals have been identified in government databases (Western Wildlife 2020). The SHW is likely to occur in Spinifex Stony Plain habitat and prefers long un-burnt spinifex hummock for shelter (Western Wildlife 2020). A large portion of Spinifex Stony Plain habitat within the proposed NVCP Permit Area has been recently been impacts by regional bushfires and is therefore potentially unsuitable for SHW. The potential scale of impacts to the SHW are therefore Very Low (Umwelt 2022).

The Spectacled Hare-wallaby has not been considered further in this application.



***Long-tailed Dunnart (*Sminthopsis longicaudata*)******Priority 4***

The Long-tailed Dunnart (LTD) has not been recorded within the proposed NVCP Permit Area however single individuals were identified for the first time in 2009 within the wider Fauna Study Area (Western Wildlife 2020). Preferred habitat for the LTD is scree slopes however also occurs on gravel or stony plains and potentially occurs in Rocky Ridge and Gorge, Rocky Foothills and Spinifex Plain habitats (Western Wildlife 2020).

Suitable habitat for the LTD is located within the proposed Disturbance Footprint therefore the potential scale of impact to the LTD is Moderate, however this species is likely to persist in the remainder of the rocky range in the wider Fauna Study Areas and the surrounding region (Umwelt 2022). The potential scale of impacts to the LTD are therefore Low (Umwelt 2022).

The Long-tailed Dunnart has not been considered further in this application.

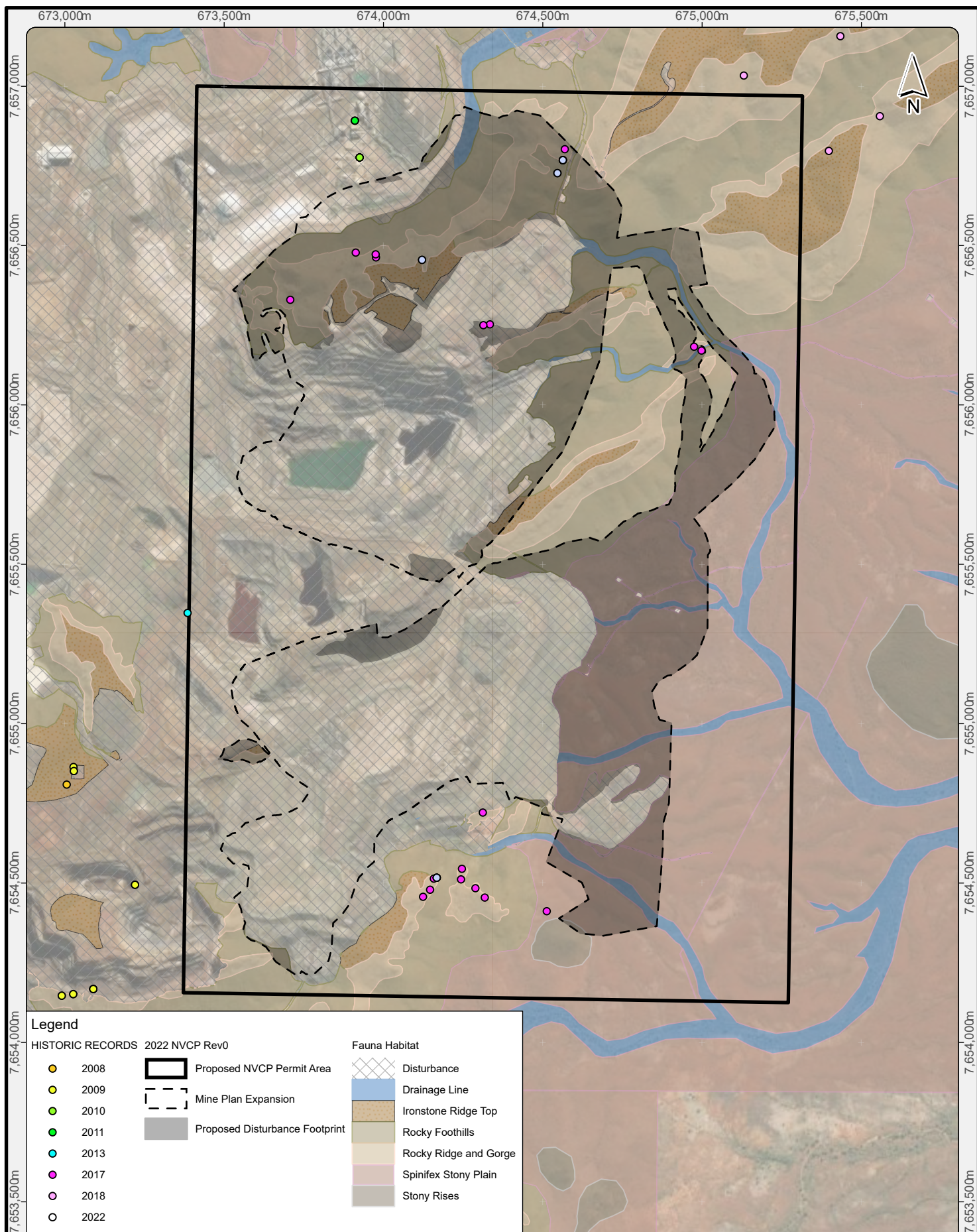
***Western Pebble-Mound Mouse (*Pseudomys chapmani*)******Priority 4***

The Western Pebble-Mound Mouse (WPMM) has been recorded within the proposed NVCP Permit Area, three records in 2017, and extensively throughout the wider Fauna Study Area (Western Wildlife 2020). Two of the three locations identified previously are within the proposed Disturbance Footprint.

The species may use some of the Ironstone Ridgetop Habitat however would preferentially be found in the Spinifex Stony Plain Habitat where suitable small stones are available for building mounds (Umwelt 2022). The WPMM has suitable stony habitat throughout the Pilbara region and it's unlikely to be regionally significant (Umwelt 2022). The potential scale of impacts to the WPMM are therefore Low (Umwelt 2022).

The Western Pebble-Mound Mouse has not been considered further in this application.





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## NORTHERN QUOLL RECORDS

0 295 590 1,180 1,770 2,360 metres

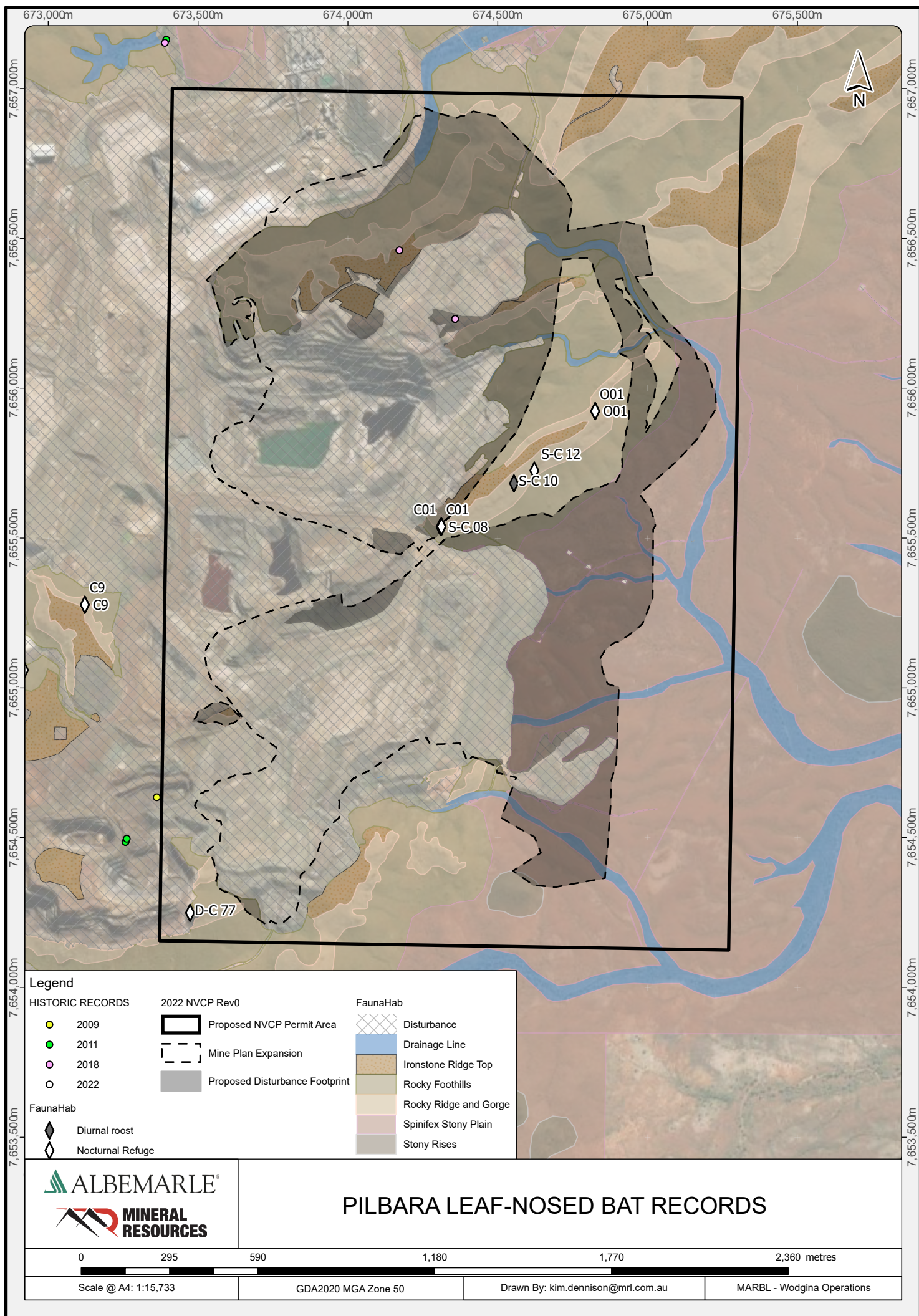
Scale @ A4: 1:15,733

GDA2020 MGA Zone 50

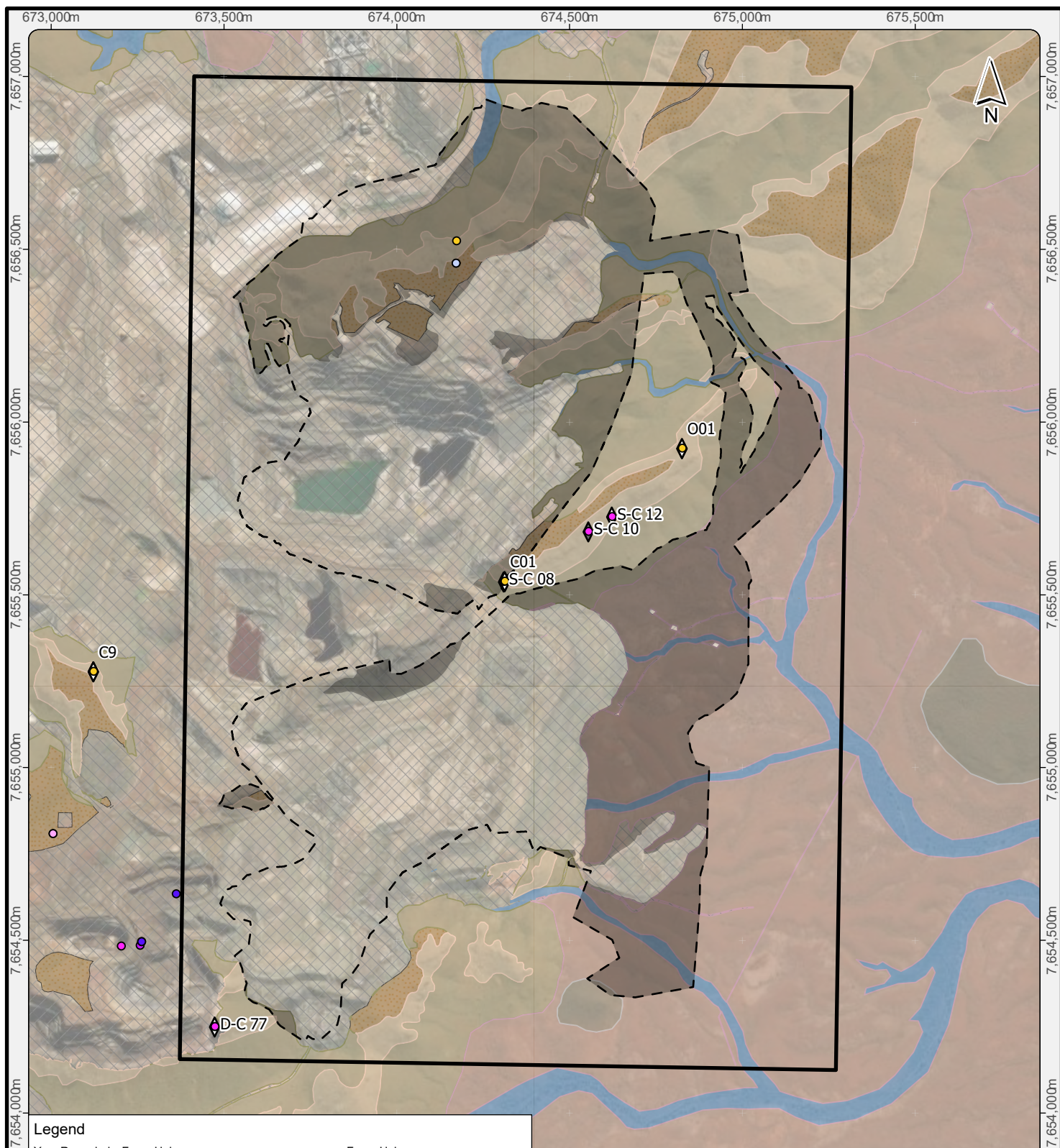
Drawn By: kim.dennison@mrl.com.au

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# Legend

Year Recorded FaunaHab

- 2008
  - 2009
  - 2010
  - 2011
  - 2018
  - 2022
- 2022 NVCP Rev0
- Proposed NVCP Permit Area
- Proposed Disturbance Footprint
- Mine Plan Expansion

FaunaHab

- Disturbance
- Drainage Line
- Ironstone Ridge Top
- Rocky Foothills
- Rocky Ridge and Gorge
- Spinifex Stony Plain
- Stony Rises

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## GHOST BAT RECORDS

0 295 590 1,180 1,770 2,360 metres

Scale @ A4: 1:15,733

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#### 4.9.7 Habitat

There are six broad fauna habitat types mapped in the Fauna Study Area and all are mapped within the proposed NVCP Permit Area (**Figure 16**). All habitat types are considered widespread in the Bioregion except for the Ironstone Ridgetop habitat and Rocky Ridge and Gorge habitat which are limited in extent (Western Wildlife 2020). Disturbance within the Fauna Study Area was limited to historic and current mining activities and Pastoral activities. Due to survey techniques and reviews of spatial mapping data there are minor discrepancies with the proposed Disturbance Footprint (based on Mine Rehab Fund spatial disturbance data) and areas designated as Disturbed during the Fauna survey. Habitats in the proposed NVCP Permit Area have been assessed for significance and detailed in **Table 17**.

**TABLE 16: HABITAT TYPES AND EXTENT IN THE PROPOSED NVCP PERMIT AREA**

Habitat	Key Elements and Microhabitats	Proposed NVCP Permit Area	
		Hectares	% in Study Area
<b>Ironstone Ridgetop</b>	Small stones suitable for Western Pebble-mound Mouse. Lack of microhabitats.	16.1	7.4%
<b>Rocky Ridge and Gorge</b>	Outcropping rocky areas and fallen boulder. Extensive microhabitats such as caves, cracks, overhangs, and rock crevices. Provides shelter, breeding, and roosting sites for a range of fauna.	47.2	11.5%
<b>Rocky Foothills</b>	Occasional rocky outcrops. Lack of microhabitats.	90.8	5.4%
<b>Stony Rise</b>	No particular elements identified. Lack of microhabitats.	2.2	0.8%
<b>Spinifex Stony Plain</b>	Many minor drainage lines (not mapped separately) provide shelter for fauna; small stones suitable for Western Pebble-mound Mouse; tree hollows.	112.0	4.0%
<b>Drainage Line</b>	May function as a corridor for fauna movement. Extensive microhabitats along drainage lines such as permanent and semi—permanent pools, riparian vegetation, tree hollows and leaf litter accumulations.	13.6	2.9%
<b>Disturbance</b>		258.8	28.9%

**TABLE 17: HABITAT SIGNIFICANCE**

Habitat	Significance
Ironstone Ridgetop	<b>Limited Significance – Limited Extent</b> - Although it provides some habitat for the Western Pebble-mound Mouse, this species uses the widespread Spinifex Stony Plain habitat. Located on the top of ridges, this habitat is relatively exposed and lacks microhabitats such as crevices and caves.
Rocky Ridge and Gorge	<b>Important – Limited Extent</b> - Supports several threatened species, including the Northern Quoll, Pilbara Leaf-nosed Bat and Ghost Bat, is limited in extent and may provide refuge from fire. The cracks, crevices and caves provide shelter for reptiles and mammals, many of which occur only in rocky habitats.
Rocky Foothills	<b>Limited Significance – Widespread</b> - Widespread and lacks microhabitats such as crevices and caves.
Stony Rise	<b>Limited Significance – Widespread</b> - Widespread and lacks microhabitats such as crevices and caves.
Spinifex Stony Plain	<b>Limited Significance – Widespread</b> - Although it provides habitat for the Western Pebble-mound Mouse, this habitat is very widespread in the region.
Drainage Line	<b>Important – Widespread</b> - This habitat provides foraging habitat for threatened bats, is likely to support a greater diversity and abundance of fauna compared to surrounding habitats and may provide a corridor for fauna movement. Semi-permanent and permanent water pools provide water sources for fauna in surrounding habitats.



#### 4.9.8 Important Habitat

Of the five (5) identified habitat types the Rocky Ridge and Gorge habitat (**Section 4.9.7**) is considered the most important for the Project as it provides Important Habitat for conservation significant species and is limited in extent in the wider region (Western Wildlife 2020).

The Rocky Ridge and Gorge habitat is limited in the bioregion. The habitat, due to underlying geology, supports an extensive range of microhabitats in the form of caves, cracks, crevices, and overhangs. This habitat is known to provide shelter and breeding habitat for a number of species. Surveys at Wodgina have identified conservation significant species that utilise this habitat are the Northern Quoll, Pilbara Leaf-nosed Bat and Ghost Bat. The habitat also has the potential to support the Pilbara Olive Python however the species has not been identified during surveys (Umwelt 2022). Caves important for breeding activities are generally deep humid caves with water sources, none of which have been identified in the proposed NVCP Permit Area. A number of small nocturnal refuge caves and diurnal roosting caves have been identified in the proposed NVCP Permit Area.

The Drainage Line habitat is also an important habitat however more widespread throughout the Region. The habitat provides important functions to a number of fauna species and support a diverse faunal assemblage. Drainage lines act as dispersal corridors between other habitat types. The presence of water, both permanent and semi-permanent, encourage foraging and hunting for a number of species (Umwelt 2022). No semi-permanent or permanent pools existing within the proposed NVCP Permit Area (Western Wildlife 2020).

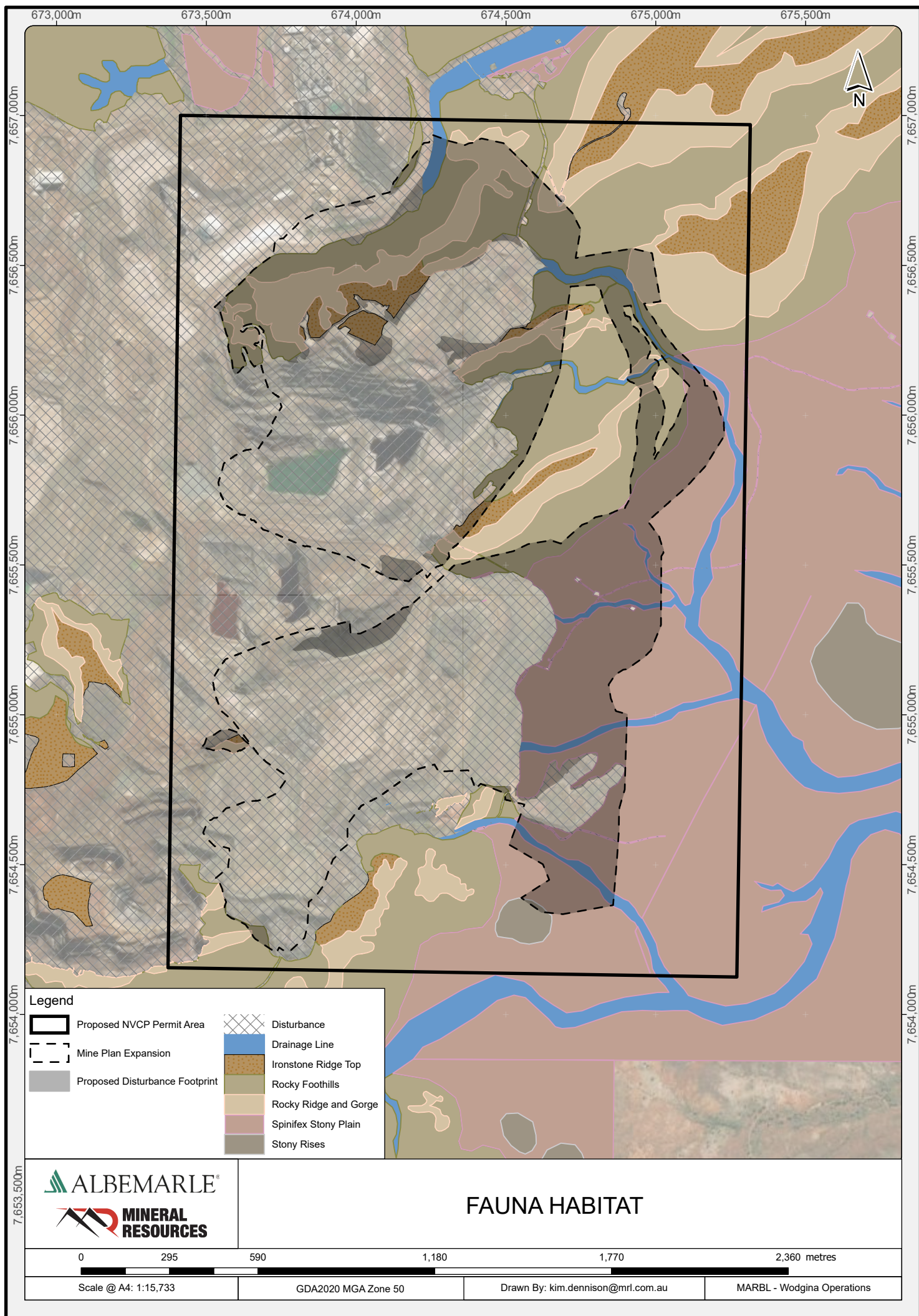
Foraging and dispersal habitats for the Northern Quoll are not well understood therefore potential foraging habitat is defined by the EPBC Act referral guidelines as all vegetation within 1 km of shelter habitat or fauna records (**Figure 16**).

Extensive survey effort across the wider Project footprint have identified a number of key habitat elements and the potential activity of conservation significant species, these are listed in **Table 18**.

**TABLE 18: IMPORTANT HABITAT FOR CONSERVATION SIGNIFICANT FAUNA IN THE FAUNA STUDY AREA**

Fauna Species	Habitat Elements	
	Rocky Ridge and Gorge	Drainage Line
Northern Quoll <i>Dasyurus hallucatus</i>	Breeding (no denning sites identified during survey efforts) Foraging Shelter Dispersal	Foraging Dispersal
Pilbara Leaf-nosed Bat <i>Rhinonicteris aurantia</i>	No permanent diurnal roosts (1) Transitory diurnal roost Nocturnal refuges Foraging	Foraging
Ghost Bat <i>Macroderma gigas</i>	Regionally significant diurnal roost Potential maternity roost Diurnal roosts Nocturnal refuges Foraging	
Pilbara Olive Python <i>Liasis olivaceus barroni</i>	Foraging Shelter	Hunting Dispersal





**Legend**

	Proposed NVCP Permit Area		Disturbance
	Mine Plan Expansion		Drainage Line
	Proposed Disturbance Footprint		Ironstone Ridge Top
			Rocky Foothills
			Rocky Ridge and Gorge
			Spinifex Stony Plain
			Stony Rises



## FAUNA HABITAT

0 295 590 1,180 1,770 2,360 metres

Scale @ A4: 1:15,733

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## 5. IMPACT ASSESSMENT SUMMARY AND RISK OF SIGNIFICANT IMPACTS

This section provides an overview and summary of potential impacts from the proposed NVCP Application.

The Umwelt Impact Assessment focuses on assessing potential impacts to key flora and fauna environmental aspects (Umwelt 2022). Full methodologies and impact assessment details are available in **Attachment 7**.

Impact levels discussed in this section are outlined below.

<b>Direct Impacts</b>	The immediate impact of the proposed Disturbance Footprint.
<b>Cumulative Impacts</b>	The cumulative impact of the proposed Disturbance Footprint and existing Wodgina Disturbance based on data available from Pre-Atlas DSO Project surveys in 2009. Prior to this there is no survey data to indicate impacts prior to 2009.
<b>Indirect Impacts</b>	Indirect impacts are detailed in Attachment 7 and summarised in this Section.
<b>Regional Impacts</b>	Potential impacts the proposed Disturbance Footprint on the wider region.

### 5.1 LAND DEGRADATION – IMPACTS SUMMARY

Land degradation caused by land clearing and associated activities can cause changes in soil health and landscape functionality including salinity, erosion, acidification, and contamination. This has the potential to ultimately alter the fundamental ability of the land to support biodiversity, ecological processes, conservation significant species, as well as cultural values, anthropogenic uses, and economic growth (EPA 2007). The land characteristics are summarised below:

- The land proposed to be cleared under this NVCP Application has a very high capability to be utilised for the final land use of mining and associated activities with a low risk to land degradation.
- The proposed Disturbance Footprint is optimised and restricted to areas required for the Mine Plan expansion. Staged clearing will ensure open areas are minimised.
- The physical and chemical characteristics of soils and shallow geology across the proposed NVCP Permit Area identified in **Section 4.5** indicates the following:
- Soil characteristics provide stability against wind and water erosion and have a reduced water storage capacity.
- Hard geology close to surface provides stability and reduces the risk of deep soil compaction and/or water logging.
- Soil samples indicated on average natural levels of soil acidity, alkalinity, and salinity.
- Specific recommendations and rehabilitation targets for different soil types will ensure the most successful revegetation outcomes. Areas that are cleared will be undertaken in a staged approach to ensure development of the area occurs immediately reducing the potential for any wind or water erosion impacts. Due to cleared areas being completed developed and utilised there will be no open soil resources to potentially lead to areas of acidification or salinity.
- Surface water flood modelling has been undertaken to ensure that ephemeral streams through the NVCP Permit Area can be maintained. Drainage controls will be implemented as required.

The risk of significant impact to the existing land condition is therefore Low.



## 5.2 HYDROLOGICAL – IMPACTS SUMMARY

Clearing can alter the local hydrological regime of an area through direct and indirect impacts. Disturbance to existing water courses or wetlands can significantly reduce the biodiversity and ecological functions of the landscape while triggered changes to groundwater levels and potential impacts to vegetation dependent on groundwater levels. The hydrological environment is summarised below:

- The very tight geology and low permeability in the geology at the Project, and the depth to groundwater in the ridgeline areas, indicate that small influences such as clearing will not impact the groundwater environment. Clearing is not anticipated to cause fluctuations in the water table level. Refer to **Section 4.6.6** for additional information on the hydrological environment of the proposed NVCP Application.
- There are several ephemeral drainage lines running through the proposed Permit Area and in areas these will be cleared and developed. Surface water flood modelling has been undertaken to ensure that ephemeral streams through the NVCP Permit Area can be maintained. Drainage controls will be implemented as required.
- There are no wetlands, water courses or riparian vegetation within, or in proximity to the proposed NVCP Permit Area.

The risk of significant impact to the existing hydrological landscape is therefore Low.

## 5.3 FLORA AND VEGETATION – IMPACTS SUMMARY

Land clearing is recognised as a key threatening process under the EPBC Act and results in the permanent loss of native flora and vegetation. An assessment of impacts from the proposed NVCP Application for key flora and vegetation values has been undertaken by Umwelt (2022). In consultation with the Environmental Protection Authority Services Unit (previously Office of the EPA) and DBCA (previously Department of Environment and Conservation) Umwelt have developed a comprehensive methodology for assessing the scale and significance of impacts for proposed clearing activities (Umwelt 2022).

This section will review key impacts to flora and vegetation and summarise Umwelt's 2022 Impact Assessment findings with regards to scale and significance of impacts at multiple impact levels. Refer to **Attachment 7** for full details on the methodology implemented and assessment process.

### 5.3.1 Vegetation System Associations

Two vegetation systems are mapped within the proposed NVCP Permit Area and will be directly impacted by clearing activities. The percentage of the pre-European extent after impact is presented in **Table 19**. The proposed NVCP Permit Area will not reduce the extent of regional Vegetation Systems Associations to below the 30% pre-European extent threshold (EPA 2008).

**TABLE 19: DIRECT AND REGIONAL IMPACTS - VEGETATION SYSTEM ASSOCIATIONS**

Vegetation System	Pre-European Extent	Current Extant Area	Proposed Disturbance Footprint	Percentage of pre-European Extent Remaining
	Hectares	Hectares	Hectares	%
Abydos Plain - Chichester 93: Hummock grasslands, shrub steppe; kanji over soft spinifex	2,476,377.6	2,473,007	51.1	99.9
Abydos Plain - Chichester 626: Hummock grasslands, shrub-steppe, kanji over soft spinifex and <i>Triodia brizoides</i>	117,724.4	117,198.1	62.7	99.5



### 5.3.2 Vegetation Units

An assessment of direct impacts from the proposed NVCP Permit Area and proposed Disturbance Footprint for VUs has been undertaken and tabulated in **Table 20**.

The VUs within the proposed NVCP Permit Area have been defined as having a Low, Low-Moderate, Moderate, or Moderate-High local conservation significance.

VU 12 is mapped within the proposed NVCP Permit Area and covers less than 1% of the wider Vegetation Study Area. Although VU 12 is not well represented locally the VU is otherwise not of a conservation significance (Umwelt 2022).

**TABLE 20: DIRECT IMPACTS - VEGETATION UNITS**

VU #	Flora Study Area	Proposed NVCP Permit Area	Proposed Disturbance Footprint		Significance of Local Impact
	Hectares	Hectares	Hectares	%*	
1	297.9	9.8	0.0	0.0%	Nil
2	831.1	18.4	4.3	0.5%	Low
3	243.3	3.1	0.0	0.0%	Nil
4	325.7	40.1	15.3	4.7%	Low
5	373.0	70.3	30.5	8.2%	Low
7	362.9	0.7	0.0	0.0%	Nil
8	134.0	16.0	4.3	3.2%	Low
9	1,374.8	122.0	55.7	4.1%	Low
11	182.7	5.2	1.5	0.8%	Low
12	59.6	1.1	0.0	0.0%	Nil
14	207.1	10.6	2.1	1.0%	Low

\* Percentage of Flora Study Area

### 5.3.3 Significant Vegetation

No impacts are anticipated to TECs, PECs or significant vegetation.



### 5.3.4 Vegetation Condition

The proposed Disturbance Footprint will remove 1.92% of native vegetation mapped within the wider Flora Study Area including the removal of 1.86% or 109.6 hectares of vegetation with a condition rating of Excellent.

**TABLE 21: DIRECT IMPACT - VEGETATION CONDITION**

Condition Category	Vegetation Study Area		Proposed NVCP Permit Area		Proposed Disturbance Footprint	
	Hectares	%	Hectares	% of Vegetation Mapped Condition	Hectares	% of Mapped Condition
Excellent	5,720.1	96.9%	274.4	4.8%	109.6	1.9%
Excellent / Very Good	15.9	0.3%	0.0	0.0%	0.0	0.0%
Very Good	43.4	0.7%	5.0	11.5%	0.4	0.0%
Good	82.1	1.4%	8.1	9.9%	2.2	0.0%
Good/Poor	21.4	0.4%	0.0	0.0%	0.0	0.0%
Poor	19.6	0.3%	9.7	49.4%	1.40	0.0%
Cleared <sup>1</sup>	842.8	-	243.4	29.0%	0.2	0.0%
Native Vegetation (Excellent to Poor)	5,902.3	-	297.2	5.1%	113.5	1.9%
Total Area	6745.1	-	540.6	-	113.8	-

<sup>1</sup> Includes Completely Degraded, Degraded and areas under Rehabilitation

### 5.3.5 Weeds

Weed management as per **Section 7** will ensure impacts due to weeds are minimised.

### 5.3.6 Groundwater Dependent Vegetation

No impacts are anticipated to riparian vegetation or GDV.

### 5.3.7 Conservation Significant Flora

The most immediate and direct impact the proposed NVCP Application will have on Conservation Significant Flora is the removal of individuals, locations, and habitat through the land clearing process. An assessment of direct impacts from the proposed NVCP Permit Area and proposed Disturbance Footprint for significant flora (individuals, locations and habitat) has been undertaken by Umwelt (2022) and summarised below in **Table 22**, **Table 23** and **Table 24**.

**TABLE 22: DIRECT IMPACTS - PRIORITY 3 FLORA INDIVIDUALS**

Priority Flora Species	Flora Study area	Proposed NVCP Permit Area		Proposed Disturbance Footprint	
	#	#	% *	#	% *
<i>Euphorbia clementii</i>	61,529	20	0.0%	0	0.0%
<i>Terminalia supranitifolia</i>	2,378	340	14.3%	125	5.3%
<i>Triodia chichesterensis</i>	1,951,574	127,870	6.6%	64,740	3.3%

\* Percentage of Flora Study Area



**TABLE 23: DIRECT IMPACTS - PRIORITY 3 FLORA LOCATIONS**

Priority Flora Species	Flora Study area	Proposed NVCP Permit Area		Proposed Disturbance Footprint	
	#	#	%	#	%
<i>Euphorbia clementii</i>	322	3	0.93	0	0
<i>Terminalia supranitifolia</i>	1,100	186	16.71	71	6.45
<i>Triodia chichesterensis</i>	1,928	163	8.45	80	4.15

**TABLE 24: DIRECT IMPACTS - PRIORITY 3 FLORA HABITATS**

Priority Flora Species	Preferred Habitat VUs	Total Habitat	Proposed NVCP Permit Area		Proposed Disturbance Footprint	
		Hectares	Hectares	%	Hectares	%
<i>Euphorbia clementii</i>	VU 2, VU 9 and VU 11	3,618.15	145.58	4.02	61.46	1.70
<i>Terminalia supranitifolia</i>	VU 4 and VU 9	1,700.50	162.12	9.53	71.00	4.18
<i>Triodia chichesterensis</i>	VU 4, VU 5, VU 7, VU 8, VU 9 and VU 12	2,838.46	250.21	8.81	105.71	3.72

### 5.3.8 Scale and Significance of Impact

Impacts to vegetation and significance of impact at different scales are summarised in **Table 25**. Refer to Attachment 7 for full details on the methodology implemented and assessment process. Overall potential significance of impact to VUs is Low.

**TABLE 25: SUMMARY OF IMPACTS AND SIGNIFICANCE OF IMPACT – VEGETATION UNITS**

Scale	Summary of Impacts	Impact
Direct Local	No flora species are listed Declared Rare or part of a TEC or PEC. The local direct impacts to VUs have been ranked as Low due to <25% of the mapped VU being impacted by the proposed Disturbance Footprint within the Flora Study Area proposed. Some VUs will not be impacted by the proposed Disturbance Footprint.	<b>Low</b>
Indirect Local	The local indirect impacts to VUs have been ranked as Low due to <25% of the mapped VU being impacted by the proposed Disturbance Footprint within the Flora Study Area proposed. Some VUs will not be impacted by the proposed Disturbance Footprint	<b>Low</b>
Regional	There is very limited regional mapping of vegetation units to allow an assessment of regional impacts to be undertaken. No significant vegetation in Flora Study Area.	<b>Low</b>
Fragmentation	The potential for significant cumulative impact on mapped VUs has been ranked Low or Nil. There are no TECs or PECs within the proposed NVCP Permit Area therefore the significance of local impact is Low, and the regional impact will also be Low.	<b>Low</b>
Cumulative Local	The cumulative impacts to all VUs have been ranked as Low due to <25% of the mapped VU being impacted by the proposed Disturbance Footprint within the Flora Study Area proposed. Assessment of the cumulative impacts and VUs conservation significance is also Low. Full historical cumulative assessments are not possible for VUs due to the lack of flora studies prior to older areas of the mine being developed.	<b>Low</b>
Cumulative Regional	As above.	<b>Low</b>



Impacts to conservation signification flora (P3 species) and the significance of impact at different scales is summarised in **Table 26**. Refer to **Attachment 7** for full details on the methodology implemented and assessment process. Overall potential significance of impact to P3 Flora species is Low.

**TABLE 26: SUMMARY OF IMPACTS AND SIGNIFICANCE OF IMPACT – EUPHORBIA CLEMENTII**

Scale	Summary
Direct Local	<b>Low</b> - Proposed Disturbance Footprint will impact 0.00% of individuals and 1.7% of preferred VU habitats within the Flora Study Area.
Indirect	<b>Low</b> - Proposed Disturbance Footprint will indirectly impact 0.0% of individuals in the Flora Study Area. Potential indirect impacts to <i>Euphorbia clementii</i> or preferred habitat is minor in relation to direct impacts.
Regional	<b>Low</b> - <i>Euphorbia clementii</i> has a relatively wide distribution. The overall range of the P3 is extensive. Large populations with a large spatial distribution. Low regional significance.
Fragmentation	<b>Low</b> - The proposed Disturbance Envelope and subsequent fragmentation is not considered to be a significant impact.
Cumulative Local	<b>Low</b> - Cumulative local impacts to <i>Euphorbia clementii</i> will not be significantly increased by the proposed Disturbance Footprint. This P3 has been minimally impacted in the past as mining activities doesn't seem to be associated with preferred habitats.
Cumulative Regional	<b>Low</b> - The overall range of <i>Euphorbia clementii</i> is extensive although it's not known in conservation estate. At a regional level the Wodgina populations are considered of a Low significance. Regional areas of <i>Euphorbia clementii</i> are considered of Low significance and have been minimally impacted by clearing activities. Cumulative regional impacts to the P3 will not be significantly increased by the proposed Disturbance Footprint.

**TABLE 27: SUMMARY OF IMPACTS AND SIGNIFICANCE OF IMPACT – TERMINALIA SUPRANITIFOLIA**

Scale	Impacts
Direct Local	<b>Low</b> - Proposed Disturbance Footprint will impact 5.3% of individuals and 4.2% of preferred VU habitats within the Flora Study Area.
Indirect	<b>Low</b> - Proposed Disturbance Footprint will indirectly impact 0.8% of individuals in the Flora Study Area. Potential indirect impacts to <i>Terminalia supranitifolia</i> or preferred habitat is minor in relation to the extent of direct impacts.
Regional	<b>Low</b> - <i>Terminalia supranitifolia</i> has a wide distribution with some populations in conservation estate. It's restricted to certain landforms (rocky mesas and escarpments). This P3 is long lived with few seedlings observed and re-sprouting after fire events. The Wodgina population is 190 km from other populations and not held in conservation. Moderate regional significance however the anticipated impacts are Low.
Fragmentation	<b>Low</b> - The proposed Disturbance Envelope will be fragmenting an existing subpopulation of <i>Terminalia supranitifolia</i> . Given the known locations of the P3 species within and around the Flora Study Area the long term reproductive viability of the population is unlikely to be impacted.
Cumulative Local	<b>Low</b> - Cumulative impacts to <i>Terminalia supranitifolia</i> will impact an Eastern subpopulation within the Flora Study Area that was potentially impacted by historical mining in nearby areas. Impacts to Locations is considered Moderate as they are given a higher significance in term of population longevity, while impacts to Individuals and Habitats remains Low.
Cumulative Regional	<b>Low</b> - Regional significance of <i>Terminalia supranitifolia</i> has been ranked as Moderate however the significant impact of the proposed Disturbance Footprint at a regional scale is Low. This P3 has been identified around the periphery of mine areas at Hercules therefore it's likely proposed impacts will extend from original disturbance therefore impacts to this species is potentially higher than other P3 species. The cumulative regional impact to P3 Locations is ranked as moderate and impacts to P3 Individuals and habitats are ranked Low.



**TABLE 28: SUMMARY OF IMPACTS AND SIGNIFICANCE OF IMPACT – TRIODIA CHICHESTERENSIS**

Scale	Impacts
Direct Local	<b>Low</b> - Proposed Disturbance Footprint will impact 3.32% of individuals and 3.72% of preferred VU habitats within the Flora Study Area.
Indirect	<b>Low</b> - Proposed Disturbance Footprint will indirectly impact 0.63% of individuals in the Flora Study Area. Potential indirect impacts to <i>Terminalia supranitifolia</i> or preferred habitat is minor in relation to the extent of direct impacts.
Regional	<b>Low</b> - <i>Triodia chichesterensis</i> is currently restricted to four known broad localities over a ~91 km range within the central Chichester region. Data suggests that the Wodgina population is the largest population however data suggests the P3 is dominant and grows densely where it grows. Moderate regional significance.
Fragmentation	<b>Low</b> - The proposed Disturbance Envelope will separate an existing subpopulation of <i>Triodia chichesterensis</i> however long term impact is not considered significant due to proximity to other subpopulations.
Cumulative Local	<b>Low</b> - Proposed Disturbance Footprint combined with historic impacts will not be significant due to the widespread populations, number of known records and suitable habitat available. Cumulative local impacts to locations, individuals and habitat are ranked Low.
Cumulative Regional	<b>Low</b> - Regional significance of <i>Triodia chichesterensis</i> has been ranked as Moderate however the significant impact of the proposed Disturbance Footprint at a regional scale is Low. Cumulative regional impacts to locations, individuals and habitat are ranked Low.

## 5.4 FAUNA AND HABITAT – IMPACT ASSESSMENT

In consultation with the Environmental Protection Authority Services Unit (previously Office of the EPA) and DBCA (previously Department of Environment and Conservation) Umwelt have developed a comprehensive methodology for assessing the scale and significance of impacts for proposed clearing activities (Umwelt 2022).

This section will review key impacts to fauna and habitat and summarise Umwelt's 2022 Impact Assessment findings with regards to scale and significance of impacts at multiple impact levels.

Refer to **Attachment 7** for full details on the methodology implemented and assessment process.

### 5.4.1 Feral Animals

Feral animal management as per **Section 7** will ensure impacts due to feral animals are minimised.

### 5.4.2 Conservation Significant Fauna

Local impacts to conservation significant species are generally triggered through the loss of habitat however other indirect impacts can lead to species loss. A summary of local impacts on each conservation significant species is detailed in **Table 29**.

The full assessment of potential impacts is available in **Attachment 7**.



**TABLE 29: SUMMARY OF LOCAL IMPACTS ON CONSERVATION SIGNIFICANT FAUNA**

Species	Local Impacts
<p>Northern Quoll <i>Dasyurus hallucatus</i></p>	<p>Clearing of habitat critical to the survival of the Northern Quoll is likely to be the driver of the greatest potential impact on this species. The Rocky Ridge and Gorge habitat represents critical habitat that is important for shelter and breeding. Reducing the area of this habitat is likely to result in a long-term decrease in the carrying capacity of the site and thus the total population size that can be supported locally. All habitat within 1 km of the Rocky Ridge and Gorge habitat, or within 1 km of northern quoll records, is potential foraging and dispersal habitat (Figure 5.2).</p> <p>Fragmentation of Rocky Ridge and Gorge habitat, resulting in increasing isolation of populations in the eastern parts of the range.</p> <p>Increase in vehicle mortalities, particularly at night or in areas adjacent to shelter habitat (Rocky Ridge and Gorge).</p> <p>Increase in the frequency or intensity of fire in Northern Quoll habitat.</p> <p>Increase in feral cats and dogs leading to increased predation on Northern Quolls.</p> <p>Direct mortality during clearing of shelter habitat (Rocky Ridge and Gorge) or by entrapment of individuals in bins or skips.</p> <p>Altered hydrological regimes changing the amount of water available in Drainage Lines or changing water quality.</p>
<p>Pilbara Leaf-nosed Bat <i>Rhinonicteris aurantia</i></p>	<p>Loss of habitat. Rocky Ridge and Gorge habitat potentially contains caves that may be used as nocturnal refuges while foraging, however, no significant roosts (transitory, non-permanent or permanent diurnal roosts) were found to occur in the proposed NVCP boundary area during a targeted survey (Stantec 2018a). Drainage Lines are likely to be important foraging habitat.</p> <p>Human disturbance at roost sites.</p> <p>Mortality of individuals in barbed wire fencing.</p> <p>Road mortalities of individuals foraging close to the ground at night.</p> <p>Disturbance to roost sites or important foraging areas from artificial lighting.</p> <p>Altered hydrological regimes may change the amount of water available in Drainage Lines, impacting foraging habitat quality or the internal humidity of roosting caves.</p>
<p>Ghost Bat <i>Macroderma gigas</i></p>	<p>Loss of habitat. Rocky Ridge and Gorge habitat contains caves and overhangs that may be used as nocturnal refuge; however, no significant roosts (permanent diurnal roosts, maternity roosts) were found to occur during a targeted survey (Stantec 2018a). A single diurnal roost with many scats and 2 bats was recorded in 2009 (Outback Ecology 2009).</p> <p>Human disturbance at roost sites.</p> <p>Mortality of individuals in barbed wire fencing.</p> <p>Accidental introduction of cane toads, brought into site on trucks or in freight.</p>
<p>Pilbara Olive Python <i>Liasis olivaceus barroni</i></p>	<p>Loss of habitat. Rocky Ridge and Gorge habitat is likely to be the most important for this species, and Drainage Line habitats, particularly in close proximity to the rocky range, may be dispersal and foraging habitat.</p> <p>As a large, slow-moving snake this species is vulnerable to road mortalities.</p> <p>Altered hydrological regimes may lead to downstream changes in the availability of water pools for foraging.</p> <p>Increased numbers of feral cats may result in increased predation on juvenile pythons.</p> <p>Direct mortality of pythons sheltering in rock crevices during land clearing.</p>



**Northern Quoll (*Dasyurus hallucatus*)****Endangered**

The NQ has been recorded at the Project since before 2008 in areas close to Rocky Ridge and Gorge or Drainage Line Habitat. Early survey records for the NQ suggested the species was locally abundant (11 female and three (3) male captures) with annual survey records dropping in 2014 and 2016 after widespread bushfires. Low capture rates continued in 2015 and 2016 with only one female trapped in 2017 and seven (7) individuals captured in 2018 (Western Wildlife 2020). Combined survey effort in 2018 recorded the NQ on 24 occasions however a number of these may have been from the same animal (two motion cameras and 22 scat records) (**Figure 13**).

The lifespan of the NQ can vary between 12 months and three years old (Threatened Species Scientific Committee 2005). The home range of the NQ averages 35 hectares with the potential for overlapping of female foraging habitat when the population is in high density, however overlapping is unlikely in lower density populations (Oakwood 2022).

Although it's understood that the NQ is highly mobile and capable of dispersing up to 3.5 km, little is known about foraging and dispersal habitats (Western Wildlife 2020). The EPBC Act referral guidelines define a 1 km native vegetation buffer around identified shelter habitat or quoll records for potential foraging and dispersal habitats (Commonwealth of Australia 2016).

Survey effort to date has not identified any denning sites within the proposed NVCP Permit Area. The presence of females in the population indicates the potential for breeding within the Fauna Study Area.

Targeted survey effort within the proposed NVCP Permit Area in 2022 identified six (6) Northern Quoll records from ten (10) cameras over a survey detection rate of 72 trap nights (8.3%), as per the 2016 DoE guidelines, it's likely the population is currently at a low density. At the end of 2021 there was an extensive bushfire through the surrounding areas of the Project therefore it's possible the population is recovering from bushfire impacts.

**Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*)****Vulnerable**

The PLNB has been recorded at the Project since 2009 with all locations being in close proximity to Rocky Ridge and Gorge Habitat and/or Drainage Line Habitat.

For permanent diurnal roosts the PLNB requires warm humid conditions all year round within deep caves with a water source (Western Wildlife 2020). No such caves have been identified within the Fauna Study Area however three (3) have been identified in the region (roughly 25 km away towards the Turner and Yule Rivers). One transitory diurnal roost has been identified along the western ridgeline (of the Fauna Study Area) and will not be impacted by the proposed NVCP Application. Such roosts are important for long-distance dispersal of the species. A number of nocturnal refuges have been identified across the Fauna Study Area, including within the proposed NVCP Permit Area. Nocturnal refuges are not critical habitat however are important for foraging at night and potentially as refuge or rest locations (Western Wildlife 2020) (**Figure 14**).

Survey effort since 2010 indicates that previous mining activities and current operations have not significantly impacted the use of local caves by bats where the cave is protected with a 100 meter buffer (Stantec 2017, Biologic 2018b).

Targeted survey effort within the proposed NVCP Permit Area in 2022 recorded a number of PLNB bat calls over a 7 day period however echolocation recordings and cave assessments indicated low numbers of foraging PLNB (Stantec 2022).



***Ghost Bat (*Macroderma gigas*)******Vulnerable***

The GB has been recorded at the Project since 2008 with all locations being in close proximity to Rocky Ridge and Gorge Habitat and/or Drainage Line Habitat.

The GB uses the proposed NVCP Permit Area for foraging, while it utilises the wider Fauna Study Area for foraging and roosting. Although not recorded on the October 2019 fauna survey and recorded in low numbers on occasion the GB population is likely to move between caves within the Fauna Study Area and in the wider region (Western Wildlife 2020). GB populations have previously been recorded in numbers up to 65 bats in the identified regionally significant roost (outside the proposed NVCP Permit Area) and 60 bats in regional caves approximately 4 km south of the Fauna Study Area. Roosts of such sizes represent a large proportion of the wider Chichester region population (Western Wildlife 2020). The Fauna Study Area has three (3) potential maternity roosts, one (1) regionally significant diurnal roost, two (2) diurnal roosts and a number of nocturnal refuges. To the south of the Fauna Study Area a number of diurnal roosts and regionally significant diurnal roosts have been identified.

Survey effort since 2010 indicates that previous mining activities and current operations have not significantly impacted the use of local caves by bats where the cave is protected with a 100 meter buffer (Stantec 2017, Biologic 2018b). The identified Diurnal roost within the proposed NVCP Permit Area is not within the proposed Disturbance Footprint and will be retained with a 100 meter buffer.

Targeted survey effort within the proposed NVCP Permit Area in 2022 recorded two (2) GB calls over an 8 day period however echolocation recordings and cave assessments indicated low numbers of foraging GB (Stantec 2022).

***Pilbara Olive Python (*Liasis olivaceus barroni*)******Vulnerable***

The POP occurs throughout the Pilbara region in ridgeline and gorge habitats in close proximity to water holes for hunting (DEWHA 2008). Preferred habitat for the POP would be the Rocky Ridge and Gorge Habitat however there are no semi-permanent or permanent water sources within the proposed NVCP Permit Area. Pools are also limited in the wider For a Study Area with only a small number being identified in isolated areas.

Despite suitable Rocky Ridge and Gorge habitat being available within the Fauna Study Area the POP has not been recorded during site surveys. While likely to be present, the lack of historic records indicates the population is unlikely to be large or important to the region (Umwelt 2022).



### 5.4.3 Habitat

Habitat loss is the key threat to vertebrate fauna (Umwelt 2022). For Matters of National Significance, the importance of populations and available habitat was assessed by Umwelt (2022) and summarised in **Table 30**.

Direct and cumulative habitat impacts have been assessed and summarised in **Table 31**.

The proposed NVCP Application is not anticipated to impact the hydrological regime therefore no direct or indirect impacts are anticipated to downstream permanent and semi-permanent pools.

**TABLE 30: ASSESSMENT OF POPULATION AND HABITAT SIGNIFICANCE TO CONSERVATION SIGNIFICANT FAUNA**

Species	Population Significance	Habitat Significance	
		Proposed NVCP Permit Area	Proposed Disturbance Footprint
Northern Quoll <i>Dasyurus hallucatus</i>	<b>Important Population</b> - The population is defined as an 'Important Population' due to: <ul style="list-style-type: none"> <li>Refuge rich habitat</li> <li>Habitat free of cane-toads</li> </ul>	<b>Critical Habitat</b> - Habitat defined as 'habitat critical to the survival of the species' exists within the proposed NVCP Permit Area and includes: <ul style="list-style-type: none"> <li>Rocky habitats</li> <li>Dispersal and foraging habitats</li> </ul>	<b>Critical Habitat</b> - Habitat defined as 'habitat critical to the survival of the species' exists within the proposed Disturbance Footprint and includes: <ul style="list-style-type: none"> <li>Rocky habitats</li> <li>Dispersal and foraging habitats</li> </ul>
Pilbara Leaf-nosed Bat <i>Rhinonicteris aurantia</i>	<b>Important Population</b> – The population is defined as an 'Important Population' as the population across the Pilbara is considered a single population and the population at the Project may be important for gene flow between larger colonies.	<b>Important Habitat</b> – Habitat defined as Important exists within the proposed NVCP Permit Area as it contains Nocturnal Refuges. No critical habitat exists within the proposed NVCP Permit Area (permanent diurnal roosts, non-permanent diurnal roosts, or transitory diurnal roosts).	<b>No Important Habitat</b> – Habitat defined as Important (nocturnal refuges) do not exist within the proposed Disturbance Footprint.
Ghost Bat <i>Macroderma gigas</i>	<b>Important Population</b> – The population is defined as an 'Important Population' due to the wider Chichester population is small and the population at the Project will be important for gene flow.	<b>Critical Habitat</b> – Habitat defined as 'habitat critical to the survival of the species' exists within the proposed NVCP Permit Boundary and a defined by diurnal roost. Maternity roosts are the most significant, to date no maternity roosts have been identified within the proposed NVCP Area.	<b>No Critical Habitat</b> – Habitat defined as Critical (diurnal refuges and maternity roosts) do not exist within the proposed Disturbance Footprint.
Pilbara Olive Python <i>Liasis olivaceus barroni</i>	<b>Unlikely Important</b> – Due to the lack of records at the Project it's unlikely the population to be a large source population.	<b>No Critical Habitat</b> – Habitat within the proposed NVCP Permit Area lacks permanent or semi-permanent pools therefore is not identified as Critical Habitat.	<b>No Critical Habitat</b> – Habitat within the proposed Disturbance Footprint.

No habitat mapping is available prior to the Atlas DSO project in 2009 to allow a comprehensive, cumulative assessment of habitat impacts from clearing activities. Woodman Environmental (2020) collated all historical data available including the vegetation and habitat mapping over the Atlas DSO Project footprint. Cumulative impacts are therefore based on a Post Atlas DSO 2009 dataset.

An assessment of potential impacts to habitat types was completed by Umwelt (2022) and updated to include the additional habitat survey effort completed by Western Wildlife in April 2019 (2020). Additional survey work undertaken in October, in areas with no historic disturbance were added to the below table as part of this application.



The proposed Disturbance Footprint for this NVCP Application was assessed for cumulative impacts by Umwelt (2022) with the results of the Western Wildlife Version 5 surveys will involve the clearing of 18.0 hectares of Rocky Ridge and Gorge Habitat which equates to 0.3 % of the Fauna Study Area or 4% of the pre-Atlas DSO 2009 habitat footprint. The cumulative assessment indicates that the total clearance of Rocky Ride habitat will be 55.8 hectares or 12 % of the -re-Atlas DSO 2009 habitat. Full assessment details in a

**TABLE 31: DIRECT AND CUMULATIVE (PRE-2009 HABITAT) IMPACTS - HABITAT TYPES**

Habitat	Fauna Study Area				Extent Cleared to-date		Proposed NVCP Disturbance Footprint			
	Pre-Atlas DSO 2009		Current State 2022		Disturbed Post-Atlas DSO 2009-2022		Disturbance within NVCP		Cumulative Disturbance within Fauna Study Area	
	Hectares	%	Hectares	%	Hectares	%	Hectares	%*	Hectares	%*
<b>Ironstone Ridgetop</b>	351.79	5.2%	218.68	3.2%	133.11	39.2	<b>5.17</b>	<b>1.5</b>	<b>138.28</b>	<b>39.3</b>
<b>Rocky Ridge and Gorge</b>	448.04	6.6%	410.21	6.1%	37.83	9.4	<b>17.97</b>	<b>4.0</b>	<b>55.8</b>	<b>12.5</b>
<b>Rocky Foothills</b>	1,808.48	26.6%	1,679.32	24.8%	129.16	9.1	<b>35.16</b>	<b>1.9</b>	<b>164.32</b>	<b>9.1</b>
<b>Stony Rise</b>	270.36	4.0%	269.55	4.0%	0.81	0.5	<b>0.11</b>	<b>0.0</b>	<b>0.92</b>	<b>0.3</b>
<b>Spinifex Stony Plain</b>	2,913.50	42.9%	2,824.54	41.8%	88.96	2.6	<b>49.99</b>	<b>1.7</b>	<b>138.95</b>	<b>4.8</b>
<b>Drainage Line</b>	473.74	7.0%	463.53	6.9%	10.21	3.1	<b>5.63</b>	<b>1.2</b>	<b>15.84</b>	<b>3.3</b>
<b>Disturbed Areas</b>	525.67	7.7%	896.87	13.3%	-	-	-	-	-	-

\* Percentage of pre-Atlas DSO habitat footprint.

#### 5.4.4 Scale and Significance of Impact

When the scale of impact on the local fauna population is assessed as Negligible, Very Low or Low, then it is considered that there is unlikely to be a regional impact. Where the scale of impact on the local fauna population is assessed as Moderate, High, or Extreme, then there is the possibility of a regional impact.

The local scale of impact for the Northern Quoll is considered to be Moderate due to the permanent loss of Important habitat (Rocky Ridge and Gorge), while the scale of local impact on the Pilbara Leaf-nosed Bat, Ghost Bat and Pilbara Olive Python is considered Low (**Table 32**).

The determination on the risk of a 'significant' impact was undertaken with reference to 'Matters of National Environmental Significance: Significant Impact Guidelines 1.1' (DoE 2013). Additional guidance on what constitutes a significant impact was obtained from the 'EPBC Act referral guideline for the endangered northern quoll *Dasyurus hallucatus*' (DoE 2016), 'Conservation listing advice for *Macroderma gigas* Ghost Bat (TSSC 2016a) and 'Conservation listing advice for *Rhynonictis aurantia* (Pilbara form) Pilbara leaf-nosed Bat' (TSSC 2016c).

Although the DoE guidelines for the NQ identify the potential impacts as being Moderate and Likely, the results of survey effort to date indicate that the NQ population size is small and in a state of fluctuation. No dens have been identified during survey effort to date.

The full assessment of potential regional impacts is available in **Attachment 7**, summary provided in **Table 33**.



**TABLE 32: SCALE OF LOCAL IMPACTS ON CONSERVATION SIGNIFICANT FAUNA**

Species	Significance of Impacts
Northern Quoll <i>Dasyurus hallucatus</i>	<b>Moderate</b> - Loss of 18.0 ha of Rocky Ridge and Gorge shelter. The loss of shelter and breeding habitat is likely to be permanent, as it is difficult to re-create with rehabilitation. There may also be a temporary impact on individuals through direct mortality of individuals sheltering in rocky habitats during clearing and/or road mortalities during night shift operations. However, the reduction in population size is unlikely to prevent the long-term persistence of the species in the rocky range at Wodgina.
Pilbara Leaf-nosed Bat <i>Rhinonictis aurantia</i>	<b>Low</b> - Although 18.0 ha of Rocky Ridge and Gorge habitat will be cleared, this area has been subject to targeted survey and no diurnal roosting caves were found or considered likely to occur inside the NVCP boundary area (Stantec 2018a). No habitat 'critical to the survival of the species' is recorded in the proposed NVCP Permit Area (TSSC 2016b).  The nearest known transitory diurnal roost at cave C2 is located approximately 1.6 km to the west of the NVCP boundary area. Despite being located near the Wodgina DSO disturbance footprint, bat activity at this cave has been consistent during monitoring 2012 – 2018 (Biologic 2018b). Loss of 5.6 ha of Drainage Line foraging habitat, and road mortalities may have a temporary impact on the local foraging population.
Ghost Bat <i>Macroderma gigas</i>	<b>Low</b> - A total of 18.0 ha of Rocky Ridge and Gorge habitat will be lost, however, no known roost sites will be lost. The closest diurnal roost, where two bats were recorded in 2009, is located 100 m from the disturbance footprint (Figure 5.4). The relative importance of this roost site to the local colony of Ghost Bats is unknown. A Regionally significant roost at cave C2 is located approximately 1.6 km from the NVCP boundary area. Loss of 105.03 ha of foraging habitat. Although this species is not specific in its foraging habitat requirements, the foraging habitat lost is within 3 km of known diurnal roost sites. There may also be some temporary population decline due to loss of individuals to vehicle mortalities.
Pilbara Olive Python <i>Liasis olivaceus barroni</i>	<b>Low</b> - Loss of 18.0 ha of Rocky Ridge and Gorge habitat will permanently reduce the total area of habitat available to support this species, however, this species has yet to be recorded in the Fauna Study Area. Possible downstream impacts to water pools on drainage lines may impact the ability of these habitats to support this species.

**TABLE 33: SUMMARY OF REGIONAL SCALE POTENTIAL IMPACTS ON CONSERVATION SIGNIFICANT FAUNA**

Triggers of the Significant Impact Criteria (Guideline 1.1)	Northern Quoll	Pilbara Leaf-nosed Bat	Ghost Bat	Pilbara Olive Python
Lead to a long-term decrease in the size of a population	Likely	Unlikely	Unlikely	Unlikely
Reduce the area of occupancy of the species	Likely	Unlikely	Unlikely	Unlikely
Fragment an existing population into two or more populations	Unlikely	Unlikely	Unlikely	Unlikely
Adversely affect habitat critical to the survival of a species	Likely	Unlikely	Unlikely	Unlikely
Disrupt the breeding cycle of a population	Unlikely	Unlikely	Unlikely	Unlikely
Modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely	Unlikely	Unlikely	Unlikely
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Unlikely	Unlikely	Unlikely	Unlikely
Introduce disease that may cause the species to decline	Unlikely	Unlikely	Unlikely	Unlikely
Interfere with the recovery of the species	Unlikely	Unlikely	Unlikely	Unlikely



## 6. VARIANCE OF PROPOSED NVCP WITH CLEARING PRINCIPLES

An assessment has been completed to evaluate the potential impacts, and therefore variance, of the proposed NVCP Application against the clearing principles as defined in *A guide to the assessment of applications to clear native vegetation* (DWER 2014).

In summary, the proposed NVCP Application is **not at variance** or **not likely to be at variance** (green) with all Clearing Principles with the exception of Principle (b) to which the proposed NVCP Application **may be at variance** (orange). A full assessment of the proposed NVCP Application against Clearing Principles is shown in **Table 34**.

**TABLE 34: ASSESSMENT OF VARIANCE WITH CLEARING PRINCIPLES**

Clearing Principle	Variance
<b>Principle (a) - Native vegetation should not be cleared if it comprises a high level of biological diversity</b>	<b>Not likely to be at variance</b>
<p>Summary of key information submitted in this NVCP Application to support the assessment against Clearing Principle A:</p> <ul style="list-style-type: none"> <li>✓ The proposed NVCP Permit Area falls within the Capricorn and Platform land and soil system (DPIRD 2022)</li> <li>✓ There are no Environmentally Sensitive Areas (ESAs) or DBCA managed reserves or conservation areas within the proposed NVCP Permit Area or in proximity to the Wodgina Project. The closed DBCA managed Nature Reserve is the Mungaroona Range Natural Reserve (DWER 2021). The Reserve is 'class A' and covers approximately 105,842 ha is located 50 km to the South West of the Project (DEC 2011).</li> <li>✓ No Threatened Ecological Communities (TEC) or Priority Ecological Communities (PEC) have been identified within the proposed NVCP Permit Area or wider Wodgina footprint.</li> <li>✓ No Declared Rare Flora has been identified within the proposed NVCP Permit Area or wider Wodgina footprint.</li> <li>✓ No Wild Rivers or Wetlands of conservation significance (locally or nationally) are within the proposed NVCP Area or in proximity to the Wodgina Project.</li> <li>✓ No GDV or riparian vegetation occur within the NVCP Permit Area.</li> <li>✓ Extensive survey effort has been undertaken across the proposed Disturbance Footprint to identify potential conservation significant species.</li> <li>✓ Three (3) P3 species are located within the proposed NVCP Area however they are also mapped extensively in the wider Flora Study Area (<i>Euphorbia clementii</i>, <i>Terminalia supranitfolia</i>, and <i>Triodia chichesterensis</i>).</li> <li>✓ 11 VUs are mapped within the proposed NVCP Area, none represent State or Commonwealth listed significant vegetation.</li> <li>✓ A total of 300 discrete vascular flora taxa (including 11 introduced taxa), three known hybrids and seven putative hybrids have been recorded in the Study Area. These taxa and hybrids represent 52 families and 138 genera. The most well-represented families were Fabaceae (55 taxa), three known hybrids and seven putative hybrids), Poaceae (51 taxa) and Malvaceae (26 taxa) (Woodman Environmental 2020).</li> <li>✓ Vegetation condition mapping indicates 274.4 hectares of vegetation within the proposed NVCP Permit Area is Excellent, followed by 5.0 hectares of Very Good, 8.1 hectares of Good and 9.7 hectares Poor Vegetation Condition.</li> <li>✓ Five (5) weed species have been identified in the proposed NVCP Permit Area including Declared Weed <i>Calotropis procera</i>.</li> <li>✓ The fauna assemblage as likely to be diverse as the Study Area contains a range of habitats, though many of the species that occur are widely distributed through arid Australia. The predicted faunal assemblage includes up to ten frogs, 108 reptiles, 140 birds and 33 native mammals and eight introduced mammals. The observed assemblage thus far includes five frogs, 71 reptiles, 89 birds and 25 native mammals and six introduced mammals (Western Wildlife 2020).</li> <li>✓ No anticipated impacts to stygofauna, troglafauna or SRE.</li> </ul>	



Clearing Principle	Variance
<p>✓ Twelve (12) conservation significant fauna species are known to occur within the wider Fauna Study Area or are Highly likely to occur. Four (4) of which are known to occur within the proposed NVCP Permit Area and one (1) is highly likely to occur. Refer to Principle (b) for more information.</p> <p>✓ No Significant impacts are anticipated on conservation significant species.</p> <p>Given the above information, and management measures outlined in <b>Section 7</b>, the proposed NVCP Application is expected to be of minimal risk to biodiversity values and therefore is not likely to be at variance to this Principle.</p>	
<b>Principle (b) - Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia</b>	<b>May be at variance</b>
<p>Summary of key information submitted in this NVCP Application to support the assessment against Clearing Principle B:</p> <p>✓ Twelve (12) conservation significant fauna species are known to occur within the wider Fauna Study Area or are Highly likely to occur. Four (4) of which are known to occur within the proposed NVCP Permit Area and one (1) is highly likely to occur.</p> <ul style="list-style-type: none"> <li>Western Pebble-Mound Mouse (<i>Pseudomys chapmani</i>) – the potential impact to the WPMM is considered Low due to their high population numbers in the surrounding areas and available habitat.</li> <li>Pilbara Olive Python (<i>Liasis olivaceus barroni</i>) – the potential impact to the POP is considered Low as the species is yet to be recorded in the proposed NVCP Permit Area and due to the preference for habitat with pools. The proposed NVCP Permit Area does not include “Critical” habitat and the population is unlikely to be an “Important” population. Potential of significant impacts to the POP are considered Unlikely.</li> <li>Pilbara Leaf-nosed Bat (<i>Rhinonictis aurantia</i>) – the potential impact to the PLNB is considered Low although the population is potentially “Important” due to gene flow in the region. No permanent diurnal roosts or transitory diurnal roosts have been identified within the proposed NVCP Permit Area, two nocturnal refuges have been identified however they are outside the proposed Disturbance Footprint and will be retained. No significant groundwater impacts are anticipated from the proposed activities therefore potential impacts to humid caves in the wider Project area are considered negligible. Recent survey effort (Stantec 2022) recorded PLNB a small number of bats utilising the area for foraging. Caves in the proposed Disturbance Footprint are not suitable for roosting. The proposed NVCP Permit Area and surrounding Fauna Study Area have a number of nocturnal refuges that will not be retained for the PLNB.</li> <li>Ghost Bat (<i>Macroderma gigas</i>) – the potential impact to the GB is considered to be Low. No permanent or non-permanent diurnal roosts are identified within the proposed NVCP Permit Area, one (1) diurnal roost is within the proposed NVCP Permit Area and will be protected with a 100 m buffer. Five (5) nocturnal refuges exist within the proposed NVCP Permit Area. No significant groundwater impacts are anticipated from the proposed activities therefore potential impacts to humid caves in the wider Project area are considered negligible. Caves in the proposed Disturbance Footprint are not suitable for roosting. The proposed NVCP Permit Area and surrounding Fauna Study Area have a number of maternity roosts, diurnal roosts, nocturnal refuges and one regionally significant diurnal roost that will be retained for the GB. Previous survey efforts have fluctuated with GB being recorded in high numbers during certain surveys and not recorded the following year. The identification of a number of diurnal and regionally significant roosts outside of the Fauna Study Area indicate the GB population moves around the region. Recent survey effort (Stantec 2022) recorded GB a small number of bats utilising the area for foraging.</li> <li>Northern Quoll (<i>Dasyurus hallucatus</i>) - the potential impact to the NQ is assessed to be Moderate due to the presence of the population at the Project being defined as an ‘Important population’ by DoE guidelines (2016) regardless of low population numbers and/or the lack of denning evidence. Habitat for the NQ is the Rocky Ridge and Gorge Habitat which is “refuge-dense” and cane-toad free habitat. Such habitat is defined as ‘habitat critical to the survival of the species’ by DoE (2016) due to it containing rocky habitats, dispersal and foraging habitats.</li> </ul> <p>Please note the following points based on site survey and technical information to support the assessment of impacts to the NQ population:</p> <ul style="list-style-type: none"> <li>Extensive survey effort has occurred over the Rocky Ridge and Gorge habitat within the proposed NVCP Permit Area.</li> </ul>	



Clearing Principle	Variance
<ul style="list-style-type: none"> <li>- No denning sites have been identified in past surveys (however the entirety of the Rocky Ridge and Gorge habitat is treated as potential denning habitat). The designation of the Habitat as 'habitat critical to the survival of the species' is therefore based on the guideline triggers and not due to the identification of denning sites and breeding activities in the proposed NVCP Permit Area.</li> <li>- Populations numbers have fluctuated over the years. Survey effort in 2022 focused on the proposed NVCP Permit Area and identified six (6) instances of NQ (unable to determine how many individuals) indicating the population as a Low density (Stantec 2022).</li> <li>- Lifecycles of the NQ are generally short with individuals only surviving one or two breeding seasons.</li> <li>- The NQ is highly mobile and capable of dispersing over long distances (up to 3.5 km). Home ranges are documented to cover around 3.5 km with female foraging habitat unlikely to be overlapping (in low density populations).</li> <li>- The proposed Rocky Ridge and Gorge habitat to be removed is in close proximity to existing operational mine areas. The main ridgeline is surrounded on three sides by disturbance and mining activities (to the north, west and south, and also on top of the ridgeline). The area of ridgeline proposed to be cleared is the western-most extent of a range of landforms extending to the north east away from active mining areas. Therefore, clearing activities will not result in the isolation of a population or fragmentation of the regional population.</li> <li>- A small section of Rocky Ridge and Gorge habitat will be isolated due to construction of a haul road however NQ have only been recorded in proximity to this location in 2018 and were near the edge of the proposed disturbance. The fauna record is also near a drainage line suggesting the NQ was potentially foraging in the area. Retaining this area of Rocky Ridge and Gorge Habitat is important as it contains nocturnal refuges and a diurnal roost for the Ghost Bat.</li> </ul> <p>Given the above information, and management measures outlined in <b>Section 7</b>, the proposed NVCP Application is expected to be of minimal risk to significant habitat values however due to the DoE guidelines for an 'Important' population or 'Critical' habitat therefore and <b>may be at variance</b> to this Principle.</p>	
<b>Principle (c) - Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora</b>	<b>Not at Variance</b>
<p>Summary of key information submitted in this NVCP Application to support the assessment against Clearing Principle C:</p> <p>✓ No Declared Rare Flora has been identified within the proposed NVCP Permit Area or wider Flora Study Area.</p> <p>Given the above information, and management measures outlined in <b>Section 7</b>, the proposed NVCP Application is expected to be of no risk to rare flora values and therefore is not at variance to this Principle.</p>	
<b>Principle (d) - Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community</b>	<b>Not at Variance</b>
<p>Summary of key information submitted in this NVCP Application to support the assessment against Clearing Principle D:</p> <p>✓ The proposed NVCP Permit Area falls within the Abydos Plan Chichester 93 and 626 vegetation system associations, both of which are relatively intact and widespread with over 99% Pre-European Extent remaining (Shepherd <i>et al</i> 2022). The proposed Disturbance Footprint will not reduce the percentage of Pre-European Extent below 99% remaining.</p> <p>✓ The vegetation assemblage of the Flora Study Area is described as including 300 discrete vascular flora taxa (including 11 introduced taxa), three known hybrids and seven putative hybrids representing 52 families and 138 genera.</p> <p>✓ A total of 15 Vegetation Units (VU) were identified across the Flora Study Area, and 11 VUs within the proposed NVCP Permit Area, none of which represent State or Commonwealth listed Communities or significant vegetation otherwise defined by the EPA (EPA 2016a).</p> <p>✓ There are no Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs) within the proposed NVCP Permit Area, or within the wider Flora Study Area.</p> <p>✓ The closest significant vegetation unit is the PEC Gregory Land System identified (P3) located approximately 8 km North West, the proposed NVCP Permit Area and Disturbance Footprint will not impact this PEC.</p>	



Clearing Principle	Variance
Given the above information, and management measures outlined in <b>Section 7</b> , the proposed NVCP Application is expected to be of minimal risk to threatened ecological community values and therefore is <b>not at variance</b> to this Principle.	
<b>Principle (e) - Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared</b>	<b>Not likely to be at Variance</b>
<p>Summary of key information submitted in this NVCP Application to support the assessment against Clearing Principle E:</p> <ul style="list-style-type: none"> <li>✓ The proposed NVCP Permit Area falls within the Abydos Plan Chichester 93 and 626 vegetation system associations, both of which are relatively intact and widespread with over 99% Pre-European Extent remaining (Shepherd <i>et al</i> 2022).</li> <li>✓ The proposed Disturbance Footprint will not reduce the percentage of the pre-European Extent of Vegetation Systems Abydos Plan Chichester 93 and 626 below 99%.</li> <li>✓ A total of 15 Vegetation Units (VU) were identified across the Flora Study Area, and 11 VUs within the proposed NVCP Permit Area, none of which represent State or Commonwealth listed Communities or significant vegetation otherwise defined by the EPA (EPA 2016a). The largest area of VU being cleared by the proposed Disturbance Footprint is VU5 equal to 8.2% of the area mapped within the Flora Study Area.</li> <li>✓ Vegetation condition mapping indicates 274.4 hectares of vegetation within the proposed NVCP Permit Area is Excellent, followed by 5.0 hectares of Very Good, 8.1 hectares of Good and 9.7 hectares Poor Vegetation Condition.</li> <li>✓ Mine development is focused on existing cleared areas and, where necessary, clearing of vegetation in the immediate surrounding areas to reduce unnecessary clearing and/or impacts.</li> </ul> <p>Given the above information, and management measures outlined in <b>Section 7</b>, the proposed NVCP Application is expected to be of minimal risk to remnant vegetation values and therefore is <b>not likely to be at variance</b> to this Principle.</p>	
<b>Principle (f) - Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland</b>	<b>Not likely to be at Variance</b>
<p>Summary of key information submitted in this NVCP Application to support the assessment against Clearing Principle F:</p> <ul style="list-style-type: none"> <li>✓ The proposed NVCP Permit Area, nor the wider Wodgina Project, does not fall within a RAMSAR or nationally significant mapped wetland.</li> <li>✓ The wider Wodgina Project does fall within the Wild River Catchment identified as the Upper Yule River however this catchment has been downgraded due to the catchment and waterway being assessed as not in near pristine condition.</li> <li>✓ No riparian vegetation associated with permanent water courses or permanent pools such as the Turner River has been identified in proximity to, or within , the proposed NVCP Permit Area (Umwelt 2022).</li> <li>✓ No phreatophytic flora taxa or Groundwater Dependent Vegetation (GDV) have been identified with in, or in close proximity to, the proposed NVCP Permit Area (Woodman Environmental 2020).</li> <li>✓ The closest major river is the Turner River (over 4.5 km to the east) and is not anticipated to be impacted by this proposed NVCP Application.</li> <li>✓ Ephemeral water sources defined by the Drainage line habitat will be managed as required through surface water and flood modelling, and the implementation of adequate surface water controls.</li> </ul> <p>Given the above information, and management measures outlined in <b>Section 7</b>, the proposed NVCP Application is expected to be of minimal risk to biodiversity values and therefore is <b>not likely to be at variance</b> to this Principle.</p>	
<b>Principle (g) - Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation</b>	<b>Not likely to be at Variance</b>
Summary of key information submitted in this NVCP Application to support the assessment against Clearing Principle G:	



Clearing Principle	Variance
<ul style="list-style-type: none"> <li>✓ The landscape of the proposed Disturbance Footprint is comprised by rocky outcrops, and soils characterised by stony lag cover and gravel components of the soil strata providing stability for future rehabilitation works.</li> <li>✓ Some dispersive material is identified within the proposed Disturbance Footprint and this material will be stockpiled to ensure minimal wind or water erosion.</li> <li>✓ Soils generally have a low water storage capacity reducing the changes of water logging.</li> <li>✓ Soils ((on average) have natural levels of acidity, alkalinity, and salinity.</li> <li>✓ Flood modelling work across ephemeral drainage lines will indicate where surface water controls need to be implemented to reduce potential erosion.</li> <li>✓ Proposed Disturbance Footprint is restricted to the smallest and optimised design to ensure no over clearing occurs.</li> <li>✓ Staged clearing will ensure open areas are developed into the final land use as soon as possible and reduce open areas.</li> </ul> <p>Given the above information, and management measures outlined in <b>Section 7</b>, the proposed NVCP Application is expected to be of minimal risk to biodiversity values and therefore is <b>not likely to be at variance</b> to this Principle.</p>	
<b>Principle (h) - Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area</b>	<b>Not at Variance</b>
<p>Summary of key information submitted in this NVCP Application to support the assessment against Clearing Principle H:</p> <ul style="list-style-type: none"> <li>✓ There are no Environmentally Sensitive Areas (ESAs) within or in proximity to the proposed NVCP Permit Area.</li> <li>✓ The closest DBCA managed Nature Reserve is the Mungaroona Range Natural Reserve. The Reserve is 'class A' and covers approximately 105,842 ha is located 50 km to the South West of the Project.</li> <li>✓ There are no Schedule 1 areas as defined by the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 within or in proximity to the proposed NVCP Permit Area.</li> <li>✓ The proposed NVCP Application does not fall within, or in proximity to, an active Wild Rivers catchment.</li> <li>✓ No RAMSAR, EPA Redbook or nationally significant watercourses or wetlands within or in proximity to the proposed NVCP Permit Area.</li> <li>✓ No Threatened Ecological Communities (TEC) or Priority Ecological Communities (PEC) within the proposed NVCP Permit Area.</li> </ul> <p>Given the above information, and management measures outlined in <b>Section 7</b>, the proposed NVCP Application is expected to be of minimal risk to biodiversity values and therefore is <b>not at variance</b> to this Principle.</p>	
<b>Principle (i) - Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water</b>	<b>Not likely to be at Variance</b>
<p>Summary of key information submitted in this NVCP Application to support the assessment against Clearing Principle I:</p> <ul style="list-style-type: none"> <li>✓ The proposed NVCP Permit Area does not occur within a PDWSA.</li> <li>✓ The proposed NVCP Permit Area does not intersect any significant or permanent watercourses.</li> <li>✓ The proposed NVCP Permit Area does not fall within any wetlands.</li> <li>✓ Erosion of the proposed Disturbance Footprint is not anticipated therefore risk of downstream sedimentation of ephemeral drainage line is low.</li> <li>✓ Any potential contamination from mining activities will be appropriately managed through spill response procedures and remediation (where required).</li> </ul>	



Clearing Principle	Variance
<ul style="list-style-type: none"> <li>✓ Disturbance footprints for mining activities will be confined to the proposed Disturbance Footprint and delineated from areas native vegetation via windrows and other hard controls.</li> <li>✓ Groundwater quality is generally circum-neutral and of a marginal to brackish salinity.</li> <li>✓ Bedrock geology is very tight around the ridgeline bedrock and surrounding areas therefore potential impacts to groundwater systems is expected to be low due to reduced, and very slow, groundwater movement.</li> <li>✓ Surface water flows are ephemeral and only occur after periods of extended rainfall, generally in the wet season therefore potential for contamination is Low.</li> <li>✓ Flood modelling work across ephemeral drainage lines will indicate where surface water controls need to be implemented to reduce potential quality deterioration.</li> </ul> <p>Given the above information, and management measures outlined in <b>Section 7</b>, the proposed NVCP Application is expected to be of minimal risk to biodiversity values and therefore is <b>not likely to be at variance</b> to this Principle.</p>	
<b>Principle (j) - Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding</b>	<b>Not likely to be at Variance</b>
<p>Summary of key information submitted in this NVCP Application to support the assessment against Clearing Principle J:</p> <ul style="list-style-type: none"> <li>✓ A portion of the proposed NVCP Application is located on a peneplain downstream from an extensive ridgeline with a number of ephemeral drainage lines.</li> <li>✓ Soil types are unlikely to become waterlogged.</li> <li>✓ Typically, flash flooding events after short intense rain events is matched by quick infiltration rates due to typical hot dry conditions and soil types.</li> <li>✓ Flood modelling work across ephemeral drainage lines will indicate where surface water controls need to be implemented to reduce potential quality deterioration.</li> <li>✓ Modelling of the 1% AEP demonstrate some expected ponding against landforms however no significant changes to natural flood modelling of the region.</li> </ul> <p>Given the above information, and management measures outlined in <b>Section 7</b>, the proposed NVCP Application is expected to be of minimal risk to biodiversity values and therefore is <b>not likely to be at variance</b> to this Principle.</p>	



## 7. MANAGEMENT OF POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

Potential environmental and social impacts will be managed through the implementation of the Wodgina Environmental Management System (EMS). The EMS is consistent with the ISO 14001 EMS standard and is progressively reviewed to ensure operational risks are captured and potential impacts are managed and minimised.

The EMS includes a number of Management Plans and Procedures that are implemented to ensure onsite works are consistent with regulatory approvals and legislation. Below is a summary list of key EMS documents and environmental outcomes/conditions applicable to this NVCP.

- **Land Clearing Procedure and Site Disturbance Permit Procedure**

Internal process (and hold point) to obtain sign off from key internal stakeholders prior to any clearing activities commencing. Sign-offs from the environment, heritage and land access teams are required. This process is a verification step to ensure the proposed works are compliant with site approvals and that the necessary stakeholder engagement has been undertaken. Specific conditions are placed on Site Disturbance Permits to ensure the operational team understand compliance and EMS requirements associated with the work, plus to outline any specific limitations or requirements. For example, the Site Disturbance Permit may detail surface water drainage infrastructure that need to be constructed.

The procedure includes the pegging out of approved Site Disturbance Permit areas and additional controls to ensure disturbance activities are restricted to approved footprints and avoid any approval boundaries or exclusion zones.

These procedures also outline the recovery of soil resources for the purposes of stockpiling for progressive rehabilitation activities onsite. A minimum depth of 100 mm soil recovery is required across all clearing footprints with the expectation that, where possible, deeper soil resources and/or stony lag resources will be recovered.

- **Waste Management Plan**

Ensure waste management onsite is consistent with approvals and legislation (for example the Part V Operational Licence L4328/1989/10).

Outline waste types onsite and approved disposal methods.

Ensure departments have adequate bin types and resources with lids to reduce windblown waste and fauna interactions.

- **Fauna Management Plan**

Information on conservation significant fauna and habitat types including any applicable approvals and exclusion areas. Any details for clearing limitations, such as clearing during day shift only or.

Details on the proposed annual conservation significant fauna monitoring program including sample locations, target species, survey techniques, plus any opportunities and limitations.

Fauna clearance surveys shall be completed by a qualified fauna specialist (with the necessary Licences) when clearing of Rocky Ridge and Gorge habitat is undertaken.

Fauna egress requirements for site infrastructure.

Guidance for fauna handling and relocation, plus required reporting, and incident management.

Feral animal management and controls.



- **Weed Management Plan and Weed Hygiene and Control Procedure**

Framework for managing invasive flora species (weeds) at the Project to prevent the introduction of weeds and/or the spread of weeds onsite. Includes annual weed surveys and control activities.

Process for ensuring ground engaging equipment and heavy vehicles are decontaminated of any weeds, soil and/or organic matter prior to exiting/entering site.

- **Hydrocarbon and Chemical Management Plan**

Ensuring that hydrocarbon and chemical storage, transport, use, and disposal is compliant with relevant approvals and relevant legislation.

Correct segregation of hydrocarbons and chemicals.

Adequate bunding available for hydrocarbon and chemical containers and tanks.

Details for correct spill response and disposal of contaminated materials.

- **Other Site Controls**

Mine planning and maintenance schedules ensure that all mobile and fixed plant and equipment onsite is regularly serviced and any potential issues are immediately escalated and repaired. This ensures the necessary controls for noise, vibration and dust are operational and minimising emissions from the Project.

Controls in place to reduce the potential for bushfires from operational activities such as Permits and controls for Hot Works and designated smoking areas. An Emergency Response Team is also onsite and regularly training to respond to potential fires.

Traffic Management Plan and access controls (such as witches hats and positive communications) to ensure only approved tracks and areas are accessed by onsite staff. The Traffic Management Plan will also designate speed limits to reduce dust generation and potential fauna hits, as well as restrict personnel and vehicle access to mine areas.

- **Cultural Heritage Controls**

All identified heritage sites are managed and protected by MARBL in compliance with the AH Act and ACH Act with strict internal procedures and processes (refer to **Section 4.2**). Measures implemented to reduce impacts on Aboriginal Heritage sites include, but are not limited to:

- Avoidance of known heritage sites.
- Internal reviews and approvals prior to any new disturbance.
- Cultural awareness training and inclusion into site inductions.
- Demarcation of heritage sites in proximity to operational areas.
- Investigation of any unauthorised tracks or disturbance.
- Ongoing engagement and heritage surveys.
- Development of Cultural Heritage Management Plan(s).



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Department of Water and Environmental Regulation



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## **ATTACHMENT 1 - MARBL LITHIUM OPERATIONS PTY LTD ASIC COMPANY EXTRACT**



**ASIC**

Australian Securities &amp; Investments Commission

**Forms Manager**

Company Officeholders

**Company:** MARBL LITHIUM OPERATIONS PTY LTD ACN 637 077 608**Company details**

Date company registered 28-10-2019  
Company next review date 28-10-2022  
Company type Australian Proprietary Company  
Company status Registered  
Home unit company No  
Superannuation trustee company No  
Non profit company No

**Registered office**

MILLS OAKLEY, LEVEL 7 , 135-151 CLARENCE STREET , SYDNEY NSW 2000

**Principal place of business**

20 WALTERS DRIVE , OSBORNE PARK WA 6017

**Ultimate holding company**

ALBEMARLE CORPORATION

607171504

Incorporated in UNITED STATES

**Officeholders**

WILSON, MARK GREGORY

Born 03-08-1967 at SYDNEY NSW

50 ROSSELLO LANE , SUBIACO WA 6008

Office(s) held: Director, appointed 28-10-2019

ELLISON, CHRISTOPHER JAMES

Born 26-06-1957 at DUNEDIN NEW ZEALAND

43 SAUNDERS STREET , MOSMAN PARK WA 6012

Office(s) held: Director, appointed 28-10-2019

ZAUNER, MATHEW SHANE

Born 09-11-1972 at ALBURY NSW

5 ATTADALE COURT , ELANORA QLD 4221

Office(s) held:  
Secretary, appointed 01-11-2019

NARWOLD, KAREN GOLDTHWAITE

Born 29-01-1960 at CONNECTICUT UNITED STATES

334 MOONTIDE LANE , KIAWAH ISLAND , SOUTH CAROLINA 29455 , UNITED STATES

Office(s) held:  
Secretary, appointed 01-11-2019

WILSON, JACOB

Born 22-09-1975 at INDIANA UNITED STATES



4330 TOTTENHAM ROAD , CHARLOTTE , NORTH CAROLINA 28226 , UNITED STATES

Office(s) held: Director, appointed 22-04-2021

TOZIER, SCOTT ALLEN

Born 12-12-1965 at MILLINOCKET, MAINE UNITED STATES

502 HIDEAWAY RIDGE COURT , MATTHEWS , NORTH CAROLINA 28105 , UNITED STATES

Office(s) held: Director, appointed 01-11-2019

NORRIS, ERIC WALTON

Born 15-11-1966 at FALL CHURCH, VIRGINIA UNITED STATES

1519 AUDUBON ROAD , CHARLOTTE , NORTH CAROLINA 28211 , UNITED STATES

Office(s) held: Director, appointed 01-11-2019

## Company share structure

Share class	Share description	Number issued	Total amount paid	Total amount unpaid
ORD	ORDINARY SHARES	100	100.00	0.00

## Members

WODGINA LITHIUM PTY LTD 20 WALTERS DRIVE , OSBORNE PARK WA 6017

Share class	Total number held	Fully paid	Beneficially held
ORD	40	Yes	Yes

ALBEMARLE WODGINA PTY LTD LEVEL 7 , 135-151 CLARENCE STREET , SYDNEY NSW 2000

Share class	Total number held	Fully paid	Beneficially held
ORD	60	Yes	Yes

## Document history

These are the documents most recently received by ASIC from this organisation.

Received	Number	Form	Description	Status
26-07-2022	7EBU78126	484	CHANGE TO COMPANY DETAILS	Processed and imaged
17-12-2021	7EBO33964	492	REQUEST FOR CORRECTION	Processed and imaged
02-12-2021	7EBN87852	484	CHANGE TO COMPANY DETAILS	Processed and imaged

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## **ATTACHMENT 2 - MINING TENEMENT SUMMARY REPORTS**





## MINING TENEMENT SUMMARY REPORT

**MINING LEASE 45/50**

Status: Live

### TENEMENT SUMMARY

**Area:** 364.50000 HA      **Death Reason :**  
**Mark Out :** 13/12/1983 11:50:00      **Death Date :**  
**Received :** 15/12/1983 09:30:00      **Commence :** 04/07/1984  
**Term Granted :** 21 Years (Renewed)

### CURRENT HOLDER DETAILS

**Name and Address**

WODGINA LITHIUM PTY LTD

C/- TENEMENT DEPARTMENT, PO BOX 1095, CANNING BRIDGE, APPLECROSS, WA, 6153

ALBEMARLE WODGINA PTY LTD

C/- MARBL LITHIUM OPERATIONS PTY LTD, 1 SLEAT ROAD, APPLECROSS, WA, 6153

### DESCRIPTION

**Locality:** WODGINA  
**Datum:** DATUM AT NORTH WEST CORNER PEG OF  
SURVEYED MINERAL CLAIM 109  
**Boundary:** THENCE 500 METRES BEARING 188 DEGREES  
ALONG NORTH BOUNDARY OF MINERAL CLAIM  
109 800 METRES BEARING 098 DEGREES ALONG  
SOUTHERN BOUNDARY OF MINERAL CLAIM 109  
450 METRES BEARING 210 DEGREES ALONG  
NORTH BOUNDARY OF MINERAL CLAIM 820  
800 METRES BEARING 110 DEGREES ALONG  
SOUTHERN BOUNDARY OF MINERAL CLAIM 820  
1150 METRES BEARING 030 DEGREES ALONG  
EASTERN BOUNDARY OF MINERAL CLAIM 820 900  
METRES BEARING 290 DEGREES ALONG NORTH  
BOUNDARY OF MINERAL CLAIM 820 650 METRES  
BEARING 360 DEGREES ALONG EAST BOUNDARY  
OF MINERAL CLAIM 107 425 METRES BEARING 090  
DEGREES ALONG SOUTH BOUNDARY OF MINERAL  
CLAIM 105 250 METRES BEARING 360 DEGREES  
ALONG EAST BOUNDARY OF MINERAL CLAIM  
305 085 METRES BEARING 090 DEGREES ALONG  
NORTH BOUNDARY OF MINERAL CLAIM 8686 450  
METRES BEARING 024 DEGREES ALONG EAST  
BOUNDARY OF MINERAL CLAIM 8440 020 METRES  
BEARING 105 DEGREES 1609 METRES NORTH  
EASTERLY & NORTH WESTERLY FOLLOWING  
CREEK (DC 554) 1550 METRES NORTH EASTERLY  
161 METRES NORTH WESTERLY 2861 METRES  
SOUTH WESTERLY FOLLOWING GREEK (DC 553)  
161 METRES SOUTH EASTERLY 800 METRES  
NORTHERLY TO NORTH WEST PEG OF MINERAL



CLAIM 554 1500 METRES SOUTH EASTERLY & SOUTHERLY TO MINERAL CLAIM 8440 BOUNDARY 350 METRES BEARING 285 DEGREES 400 METRES BEARING 010 DEGREES 750 METRES BEARING 271 DEGREES ALONG NORTH BOUNDARY OF MINERAL CLAIM 8440 & 139 550 METRES BEARING 180 DEGREES ALONG NORTH BOUNDARY OF MINERAL CLAIM 139 150 METRES BEARING 270 DEGREES ALONG NORTH BOUNDARY OF MINERAL CLAIM 107 100 METRES BEARING 180 DEGREES 400 METRES BEARING 270 DEGREES ALONG NORTH BOUNDARY OF MINERAL CLAIM 314 250 METRES BEARING 180 DEGREES ALONG NORTH BOUNDARY OF MINERAL CLAIM 314 400 METRES BEARING 090 DEGREES ALONG SOUTH BOUNDARY OF MINERAL CLAIM 314 850 METRES BEARING 180 DEGREES ALONG NORTH BOUNDARY OF MINERAL CLAIM 107 400 METRES BEARING 280 DEGREES BACK TO DATUM.

Area :	Type	Dealing No	Start Date	Area
	Surveyed		30/05/1986	364.50000 HA
	Granted		04/07/1984	386.99000 HA
	Applied For		13/12/1983	386.99000 HA

<b>SHIRE DETAILS</b>
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Shire	Shire No	Start	End	Area
PORT HEDLAND TOWN	7280	13/12/1983		364.50000 HA





## MINING TENEMENT SUMMARY REPORT

**MINING LEASE 45/353**

Status: Live

### TENEMENT SUMMARY

**Area:** 35.39500 HA      **Death Reason :**  
**Mark Out :** 14/12/1987 17:25:00      **Death Date :**  
**Received :** 18/12/1987 13:20:00      **Commence :** 19/05/1988  
**Term Granted :** 21 Years (Renewed)

### CURRENT HOLDER DETAILS

**Name and Address**

WODGINA LITHIUM PTY LTD

C/- TENEMENT DEPARTMENT, PO BOX 1095, CANNING BRIDGE, APPLECROSS, WA, 6153

ALBEMARLE WODGINA PTY LTD

C/- MARBL LITHIUM OPERATIONS PTY LTD, 1 SLEAT ROAD, APPLECROSS, WA, 6153

### DESCRIPTION

**Locality:** WODGINA  
**Datum:** DATUM PEG SITUATED AT THE SOUTH WEST  
CORNER OF LATE SURVEYED MC 109, THENCE 804  
METRES BEARING 97 DEGREES 31 MINUTES ALONG  
THE SOUTHERN BOUNDARY OF LATE SURVEYED  
MC 109  
**Boundary:** THENCE: 476 METRES BEARING 209 DEGREES 32  
MINUTES ALONG WESTERN BOUNDARY OF LATE  
SURVEYED MC 820 TO SURVEY TRIG STATION (MT  
TINSTONE) 805 METRES BEARING 277 DEGREES  
30 MINUTES ALONG NORTHERN BOUNDARY OF  
M 45/255 476 METRES BEARING 29 DEGREES 30  
MINUTES BACK TO DATUM

Area :	Type	Dealing No	Start Date	Area
	Surveyed		17/09/1990	35.39500 HA
	Granted		19/05/1988	35.60000 HA
	Applied For		14/12/1987	35.60000 HA

### SHIRE DETAILS

Shire	Shire No	Start	End	Area
PORT HEDLAND TOWN	7280	14/12/1987		35.39500 HA





## MINING TENEMENT SUMMARY REPORT

**MINING LEASE 45/365**

Status: Live

### TENEMENT SUMMARY

**Area:** 206.60000 HA      **Death Reason :**  
**Mark Out :** 08/01/1988 09:00:00      **Death Date :**  
**Received :** 14/01/1988 10:15:00      **Commence :** 10/10/1988  
**Term Granted :** 21 Years (Renewed)

### CURRENT HOLDER DETAILS

**Name and Address**

WODGINA LITHIUM PTY LTD

C/- TENEMENT DEPARTMENT, PO BOX 1095, CANNING BRIDGE, APPLECROSS, WA, 6153

ALBEMARLE WODGINA PTY LTD

C/- MARBL LITHIUM OPERATIONS PTY LTD, 1 SLEAT ROAD, APPLECROSS, WA, 6153

### DESCRIPTION

**Locality:** WODGINA

**Datum:** DATUM PEG SITUATED 4550 METRES BEARING 15 DEGREES FROM MT TINSTONE

**Boundary:** THENCE: 1750 METRES BEARING 145 DEGREES 800 METRES BEARING 187 DEGREES 1500 METRES BEARING 180 DEGREES 800 METRES BEARING 270 DEGREES NORTH WEST AND NORTH ALONG EAST BOUNDARY OF M 45/50 BACK TO DATUM IDENTICAL TO P'S 45/673, 675, 611 AND 1153

Area :	Type	Dealing No	Start Date	Area
	Surveyed		10/03/2010	206.60000 HA
	Dealing	Partial Surrender - Voluntary 108H/923	16/07/1992	206.64000 HA
	Surveyed		07/10/1990	371.30000 HA
	Granted		10/10/1988	367.60000 HA
	Applied For		08/01/1988	367.60000 HA

### SHIRE DETAILS

Shire	Shire No	Start	End	Area
PORT HEDLAND TOWN	7280	08/01/1988		206.60000 HA





## MINING TENEMENT SUMMARY REPORT

**MINING LEASE 45/381**

Status: Live

### TENEMENT SUMMARY

**Area:** 287.65000 HA      **Death Reason :**  
**Mark Out :** 16/02/1988 08:30:00      **Death Date :**  
**Received :** 22/02/1988 12:55:00      **Commence :** 12/07/1988  
**Term Granted :** 21 Years (Renewed)

### CURRENT HOLDER DETAILS

**Name and Address**

WODGINA LITHIUM PTY LTD

C/- TENEMENT DEPARTMENT, PO BOX 1095, CANNING BRIDGE, APPLECROSS, WA, 6153

ALBEMARLE WODGINA PTY LTD

C/- MARBL LITHIUM OPERATIONS PTY LTD, 1 SLEAT ROAD, APPLECROSS, WA, 6153

### DESCRIPTION

**Locality:** WODGINA  
**Datum:** DATUMPEG SITUATED AT THE MOST EASTERLY  
CORNER OF LATE SURVEYED MC 45/976  
**Boundary:** THENCE: BOUNDARIES IDENTICAL TO LATE  
SURVEYED MC'S 45/976-979 ALSO IDENTICAL TO P'S  
45/562-565

Area :	Type	Dealing No	Start Date	Area
	Surveyed		15/08/1988	287.65000 HA
	Granted		12/07/1988	289.71000 HA
	Applied For		16/02/1988	289.71000 HA

### SHIRE DETAILS

Shire	Shire No	Start	End	Area
PORT HEDLAND TOWN	7280	16/02/1988		287.65000 HA





## MINING TENEMENT SUMMARY REPORT

**MINING LEASE 45/383**

Status: Live

### TENEMENT SUMMARY

**Area:** 110.60000 HA      **Death Reason :**  
**Mark Out :** 17/02/1988 09:00:00      **Death Date :**  
**Received :** 22/02/1988 12:55:00      **Commence :** 12/07/1988  
**Term Granted :** 21 Years (Renewed)

### CURRENT HOLDER DETAILS

**Name and Address**

WODGINA LITHIUM PTY LTD

C/- TENEMENT MANAGER, PO BOX 1095, CANNING BRIDGE LPO, APPLECROSS, WA, 6153

ALBEMARLE WODGINA PTY LTD

C/- MARBL LITHIUM OPERATIONS PTY LTD, 1 SLEAT ROAD, APPLECROSS, WA, 6153

### DESCRIPTION

**Locality:** WODGINA  
**Datum:** DATUM PEG SITUATED AT THE SOUTH EAST  
CORNER OF SURVEYED M 45/50  
**Boundary:** THENCE: 2700 METRES BEARING 180 DEGREES  
ALONG WEST BOUNDARY OF M 45/256 800 METRES  
BEARING 270 DEGREES 1700 METRES BEARING  
ZERO DEGREES 600 METRES BEARING 280  
DEGREES ALONG SOUTH BOUNDARIES OF ML'S  
374 AND 373 400 METRES BEARING 10 DEGREES  
ALONG WEST BOUNDARY OF ML 373 550 METRES  
BEARING 100 DEGREES ALONG NORTH BOUNDARY  
OF ML 373-374 800 METRES BEARING ZERO  
DEGREES ALONG EAST BOUNDARY M 45/255 850  
METRES BEARING 110 DEGREES ALONG SOUTH  
BOUNDARY M 45/50 BACK TO DATUM IDENTICAL TO  
P 45/566-567 AND 571-572

Area :	Type	Dealing No	Start Date	Area
	Surveyed		05/12/2001	110.60000 HA
	Dealing	Partial Surrender - Voluntary 110H/923	16/07/1992	110.06000 HA
	Surveyed		24/09/1990	266.90000 HA
	Granted		12/07/1988	247.30000 HA
	Applied For		17/02/1988	247.30000 HA

### SHIRE DETAILS

Shire	Shire No	Start	End	Area
PORT HEDLAND TOWN	7280	17/02/1988		110.60000 HA





## MINING TENEMENT SUMMARY REPORT

**MINING LEASE 45/887**

Status: Live

### TENEMENT SUMMARY

<b>Area:</b> 30.57500 HA	<b>Death Reason :</b>
<b>Mark Out :</b> 29/01/1999 09:30:00	<b>Death Date :</b>
<b>Received :</b> 05/02/1999 16:00:00	<b>Commence :</b> 22/03/2001
<b>Term Granted :</b> 21 Years (Renewed)	

### CURRENT HOLDER DETAILS

**Name and Address**

WODGINA LITHIUM PTY LTD

C/- TENEMENT MANAGER, PO BOX 1095, CANNING BRIDGE LPO, APPLECROSS, WA, 6153

ALBEMARLE WODGINA PTY LTD

C/- MARBL LITHIUM OPERATIONS PTY LTD, 1 SLEAT ROAD, APPLECROSS, WA, 6153

### DESCRIPTION

**Locality:** Mt Cassiterite  
**Datum:** Situated at 7655220.640N: 673657.061E  
**Boundary:** THENCE: 673638.657 Easting: 7654792.620 Northing  
673001.662 Easting: 7654799.356 Northing 673007.111  
Easting: 7655317.264 Northing BACK TO DATUM  
NOTE: Conversion of Exploration Licence 45/1722 under  
Section 67

Area :	Type	Dealing No	Start Date	Area
	Surveyed		05/12/2001	30.57500 HA
	Granted		22/03/2001	30.49600 HA
	Applied For		29/01/1999	30.49600 HA

### SHIRE DETAILS

Shire	Shire No	Start	End	Area
PORT HEDLAND TOWN	7280	29/01/1999		30.57500 HA





## MINING TENEMENT SUMMARY REPORT

**MINING LEASE 45/888**

Status: Live

### TENEMENT SUMMARY

**Area:** 12.75500 HA      **Death Reason :**  
**Mark Out :** 29/01/1999 10:00:00      **Death Date :**  
**Received :** 05/02/1999 16:00:00      **Commence :** 22/03/2001  
**Term Granted :** 21 Years (Renewed)

### CURRENT HOLDER DETAILS

**Name and Address**

WODGINA LITHIUM PTY LTD

C/- TENEMENT MANAGER, PO BOX 1095, CANNING BRIDGE LPO, APPLECROSS, WA, 6153

ALBEMARLE WODGINA PTY LTD

C/- MARBL LITHIUM OPERATIONS PTY LTD, 1 SLEAT ROAD, APPLECROSS, WA, 6153

### DESCRIPTION

**Locality:** Mt Cassiterite  
**Datum:** Situated at Zone 50: 674425.979 Easting: 7654938.869  
Northing  
**Boundary:** THENCE: 674739.237 Easting: 7655457.686 Northing  
674732.047 Easting: 7654781.057 Northing 674424.421  
Easting: 7654784.310 Northing BACK TO DATUM  
NOTE: Conversion of Exploration Licence 45/1722 Under  
Section 67

Area :	Type	Dealing No	Start Date	Area
	Surveyed		01/07/2016	12.75500 HA
	Granted		22/03/2001	12.78900 HA
	Applied For		29/01/1999	12.78900 HA

### SHIRE DETAILS

Shire	Shire No	Start	End	Area
PORT HEDLAND TOWN	7280	29/01/1999		12.75500 HA





## MINING TENEMENT SUMMARY REPORT

**MINING LEASE 45/923**

Status: Live

### TENEMENT SUMMARY

**Area:** 723.25000 HA      **Death Reason :**  
**Mark Out :** 21/10/1999 10:30:00      **Death Date :**  
**Received :** 28/10/1999 15:20:00      **Commence :** 26/03/2001  
**Term Granted :** 21 Years (Renewed)

### CURRENT HOLDER DETAILS

**Name and Address**

GLOBAL ADVANCED METALS WODGINA PTY LTD  
MINERAL RESOURCES LIMITED, C/- TENEMENT MANAGER, PO BOX 1095, CANNING BRIDGE LPO,  
APPLECROSS, WA, 6153, xxxxxxxxxxxx@mineralresources.com.au, xxxxxxxxxxxx600

### DESCRIPTION

**Locality:** WODGINA  
**Datum:** SITUATED AT ZONE 50: AMG: CO-ORDINATES:  
673017 EASTING: 7656259 NORTHING  
**Boundary:** THENCE; 618 metres bearing 177 degrees 350 metres  
bearing 210 degrees 148 metres bearing 98 degrees  
518 metres bearing 180 degrees 637 metres bearing 90  
degrees 1086 metres bearing 182 degrees 3230 metres  
bearing 279 degrees to South East corner of M45/351  
4524 metres bearing 12 degrees 708 metres bearing 109  
degrees 1009 metres bearing 148 degrees 79 metres  
bearing 62 degrees 1350 metres bearing 179 degrees  
338 metres bearing 89 degrees BACK TO DATUM

Area :	Type	Dealing No	Start Date	Area
	Surveyed		30/06/2016	723.25000 HA
	Cond. Part. Surrender	Cond Partial Surrender Area Change 483779	23/03/2016	723.00000 HA
	Surveyed		05/12/2001	917.00000 HA
	Granted		26/03/2001	916.00000 HA
	Applied For		21/10/1999	916.00000 HA

### SHIRE DETAILS

Shire	Shire No	Start	End	Area
PORT HEDLAND TOWN	7280	21/10/1999		723.25000 HA





## MINING TENEMENT SUMMARY REPORT

**MINING LEASE 45/924**

Status: Live

### TENEMENT SUMMARY

**Area:** 520.10000 HA      **Death Reason :**  
**Mark Out :** 21/10/1999 12:30:00      **Death Date :**  
**Received :** 28/10/1999 15:20:00      **Commence :** 26/03/2001  
**Term Granted :** 21 Years (Renewed)

### CURRENT HOLDER DETAILS

**Name and Address**

WODGINA LITHIUM PTY LTD

C/- TENEMENT MANAGER, PO BOX 1095, CANNING BRIDGE LPO, APPLECROSS, WA, 6153

ALBEMARLE WODGINA PTY LTD

C/- MARBL LITHIUM OPERATIONS PTY LTD, 1 SLEAT ROAD, APPLECROSS, WA, 6153

### DESCRIPTION

**Locality:** WODGINA

**Datum:** SITUATED AT ZONE 50: AMG COORDINATES: 676450  
EASTING: 7653677 NORTHING

**Boundary:** THENCE; 2037 metres bearing 270 degrees 1085 metres bearing zero degrees 308 metres bearing 90 degrees 677 metres bearing zero degrees 540 metres bearing 30 degrees 741 metres bearing 90 degrees 1452 metres bearing 1 degree 690 metres bearing 90 degrees 3683 metres bearing 180 degrees BACK TO DATUM

Area :	Type	Dealing No	Start Date	Area
	Surveyed		01/07/2016	520.10000 HA
	Granted		26/03/2001	514.00000 HA
	Applied For		21/10/1999	514.00000 HA

### SHIRE DETAILS

Shire	Shire No	Start	End	Area
PORT HEDLAND TOWN	7280	21/10/1999		520.10000 HA





## MINING TENEMENT SUMMARY REPORT

**MINING LEASE 45/1252**

Status: Live

### TENEMENT SUMMARY

**Area:** 193.80000 HA      **Death Reason :**  
**Mark Out :** 13/02/2015 11:00:00      **Death Date :**  
**Received :** 19/02/2015 11:30:00      **Commence :** 23/03/2016  
**Term Granted :** 21 Years

### CURRENT HOLDER DETAILS

**Name and Address**

ATLAS IRON PTY LTD  
MCMAHON MINING TITLE SERVICES PTY LTD, C/- MCMAHON MINING TITLE SERVICES PTY LTD, PO BOX  
592, MAYLANDS, WA, 6931, xxxx@mmts.net.au, xxxxx997

### DESCRIPTION

**Locality:** Wodgina  
**Datum:** 7655160.2N; 672796.1E  
**Boundary:** 7654904.3N; 673131.6E 7654810.9N; 673129 E  
7654770.9N 673215.3E 7654790.7N; 673349.7E  
7654865.4N; 673363.5E 7654852.4N; 673420.3E  
7654723.8N; 673560.1E 7654636.3N; 673561.6E  
7654487.6N; 673494.4E 7654371.2N; 673676.4E  
7654276.6N; 673750.3E 7653849.6N; 673731.7E  
7654258 N; 671425 E 7654680.5N; 671702 E  
7654994.8N; 671746 E 7655149.3N; 672154.6E  
7655013.7N; 674428.5E 7655127.4N; 672549.1E BACK  
TO DATUM

Area :	Type	Dealing No	Start Date	Area
	Surveyed		30/06/2016	193.80000 HA
	Granted		23/03/2016	194.00000 HA
	Applied For		13/02/2015	194.00000 HA

### SHIRE DETAILS

Shire	Shire No	Start	End	Area
PORT HEDLAND TOWN	7280	19/02/2015		193.80000 HA



## **ATTACHMENT 3 - ACCESS AGREEMENTS WITH GAMW (M 45/923) AND ATLAS (M 45/1252)**



27 September 2018

Department of Mines, Industry Regulation and Safety  
100 Plain Street  
EAST PERTH WA 6004

Dear Sir

**Appointment of Agent – Wodgina Lithium Pty Ltd; Mineral Resources Limited and Process Minerals International Pty Ltd on behalf of Global Advanced Metals Wodgina Pty Ltd**

This letter is to advise that Wodgina Lithium Pty Ltd (ACN 611 488 932) and its agents Mineral Resources Limited (ACN 118 549 910) and Process Minerals International Pty Ltd (ACN 063 988 894) (collectively referred to as the **Agents**) act as agent for, and on behalf of, Global Advanced Metals Wodgina Pty Ltd (ACN 125 585 239) (**Company**) in respect to all matters concerning and connected to the tenements set out in Annexure A (**Tenements**).

In that capacity, the Company authorises the Agents to act on behalf of the Company in relation to the Tenements with respect to compliance with the following legislation, their subsidiary legislation and any superseding / amending legislation:

1. *Aboriginal Heritage Act 1972* (WA)
2. *Duties Act 2008* (WA)
3. *Environmental Protection Act 1986* (WA)
4. *Mines Safety and Inspection Act 1994* (WA)
5. *Mining Act 1978* (WA)
6. *Mining Rehabilitation Fund Act 2012* (WA)
7. *Native Title Act 1993* (Cth)
8. *Rights in Water and Irrigation Act 1914* (WA)

Such authority extends to (not exclusively) registering for online systems, receiving all correspondence and notices on behalf of the Company, acting with respect to dealings, lodgement of applications (including Clearing Permits, Mining Proposals, Mine Closure Plans, Works Approvals, Programme of Works and reporting) and making general enquiries.


Further, this consent also authorises the Agents to carry out mining activities on the Tenements in accordance with section 118A of the *Mining Act 1978*. This includes the authority to access the Tenements and clear land the subject of any Native Vegetation Clearing Permit application.



Thank you for your time and consideration of this matter and for the assistance provided to the Agents in relation to this matter.

Please do not hesitate to contact me should you require any further authorisation.

Yours faithfully



**Max E. McGarvie**

Director

Global Advanced Metals Wodgina Pty Ltd

[mmcgarvie@globaladvancedmetals.com](mailto:mmcgarvie@globaladvancedmetals.com)



## ANNEXURE A

ITEM	TENEMENT
1	M45/0351
2	M45/0923
3	M45/1252





Monday, 20 December 2021

Department of Mines, Industry Regulation and Safety  
First Floor, Mineral House  
100 Plain Street  
EAST PERTH WA 6004

Dear Sir/Madam

**AUTHORISATION TO CONDUCT CTIVITIES ON MINING LEASE 45/1252**

Atlas Iron Pty Ltd is the registered holder of Mining Lease 45/1252 (M45/1252) under the *Mining Act 1978* (WA) (Tenement).

Wodgina Lithium Pty Ltd (**Wodgina Lithium**) and Atlas Iron Pty Ltd (**Atlas**) have entered into to a sale and purchase agreement involving Mining Lease 45/1252 with Wodgina Lithium being beneficial owner of the tenement. Under the terms of the Agreement Wodgina Lithium will undertake exploration activities over the tenement and all relevant activities required to keep the tenement in good standing including the lodgment of programs of work).

As registered holder for Mining Lease 45/1252, Atlas gives consent for Wodgina Lithium to submit the Programs of Work related to the Tenement and undertake the activities set out in the proposals.

Yours sincerely,

Alison Llewellyn

Senior Advisor – Land Access and Tenure

Level 17, Raine Square  
300 Murray Street  
Perth WA 6000

T +61 8 6228 8000

E [atlas@atlasiron.com.au](mailto:atlas@atlasiron.com.au)  
W [atlasiron.com.au](http://atlasiron.com.au)



## **ATTACHMENT 4 - WODGINA LITHIUM PROJECT DETAILED FLORA AND VEGETATION ASSESSMENT (WOODMAN ENVIRONMENTAL APRIL 2020)**



# WODGINA LITHIUM PROJECT:

## Detailed Flora and Vegetation Assessment

MARBL LITHIUM OPERATIONS PTY LTD

APRIL 2020



**WOODMAN**  
ENVIRONMENTAL

TEL. (08) 9315 4688  
office@woodmanenv.com.au  
PO Box 50, Applecross WA 6953  
www.woodmanenv.com.au



**Changes to Wodgina Minesite Operations - Detailed Flora and Vegetation Assessment**

Prepared for: MARBL Lithium Operations Pty Ltd  
Job Number: MRL19-19  
Report Number: MRL19-19-04  
Cover Photograph: Quadrat WDM018 (Woodman Environmental 2019)

**DOCUMENT REVISION AND STATUS**

Revision	Status	Originator	Internal Reviewer	Internal Review Date	Client Reviewer	Client Review Date
A	Draft Report	LF/MS/DC	CG/DC	19/11/2019	DTS	16/3/2020
0	Final Report	LF/MS/DC	CG/DC/AS	3/4/2020		

**DISCLAIMER**

This document is prepared in accordance with and subject to an agreement between Woodman Environmental Consulting Pty Ltd ("Woodman Environmental") and the client for whom it has been prepared ("Mineral Resources Limited") and is restricted to those issues that have been raised by the Client in its engagement of Woodman Environmental and prepared using the standard of skill and care ordinarily exercised by Environmental Scientists in the preparation of such Documents.

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## EXECUTIVE SUMMARY

The MARBL Lithium Joint Venture (MARBL JV) owns and operates the Wodgina mine, located 90 km south of Port Hedland in the Pilbara region of Western Australia.

The Wodgina mining area has been the location for a number of mining projects in the preceding decades, and therefore several flora and vegetation assessments of differing scopes have been undertaken across portions of the project area to support environmental approvals for these projects.

Woodman Environmental Consulting Pty Ltd (Woodman Environmental) were commissioned to review the findings of previous flora and vegetation assessments conducted in the Wodgina mining area, conduct a flora and vegetation assessment of unsurveyed areas potentially relevant to the Project, and produce a consolidated detailed flora and vegetation assessment that builds upon the results of previous assessments by incorporating new data.

Ortho-rectified aerial photography was interpreted to determine preliminary vegetation patterns present within the Study Area, with survey quadrats allocated based on these patterns. A minimum of three quadrats were allocated to each major discernible vegetation pattern where possible. Since 2011, there has been considerable survey effort within the Study Area with regard to vegetation quadrat sampling. Quadrat allocation for the June 2019 survey generally did not consider areas that had previously been surveyed using quadrats however, the data from these quadrats were utilised for floristic analysis and for building a taxon inventory for the Study Area.

All field surveys were undertaken during the post-wet season during 2018 and 2019, as outlined below:

- 26<sup>th</sup> June – 3<sup>rd</sup> July 2018 – detailed flora and vegetation survey – quadrats and opportunistic significant flora searching;
- 3<sup>rd</sup> – 9<sup>th</sup> April 2019 – targeted significant flora survey; and
- 17<sup>th</sup> – 25<sup>th</sup> June 2019 detailed flora and vegetation survey and targeted significant flora survey – quadrats and targeted significant flora searching.

A total of 170 non-permanent flora survey quadrats were established and surveyed within the Study Area during the 2018/2019 field surveys: 94 quadrats were established in 2018 and 76 quadrats were established in 2019. A further 13 quadrats previously established in the Study Area were re-visited in June 2019 to clarify identification issues associated with very recent fire during the previous survey. Data from a further 79 quadrats previously established in the Study Area were utilised for the purposes of floristic analysis.

Targeted survey for significant flora occurred at numerous locations within the Study Area, including those that may host future infrastructure. All suitable habitat for all significant taxa known to occur or potentially occurring within the Study Area within these areas (with



the exception of *Terminalia supranitifolia* (P3)) was surveyed regardless of previous searching efforts.

*Terminalia supranitifolia* (P3) is a large, distinctive species recorded by previous surveys within the Study Area, and significant survey effort has been invested in recording individuals of this taxon across its rocky hill habitat. Therefore, suitable habitat for *Terminalia supranitifolia* (P3) within the 2019 Targeted Significant Flora Survey Areas that had been previously surveyed (primarily the Hercules area) was not re-surveyed. However, all remaining suitable habitat not previously surveyed was covered by the targeted surveys in 2019. Further targeted searching specifically for *Terminalia supranitifolia* (P3) and *Triodia chichesterensis* (P3) was also undertaken in other areas of suitable habitat within and immediately adjacent to the Study Area, to provide additional context for distribution and population size of these taxa.

A total of 267 discrete vascular flora taxa (including eight introduced taxa), two known hybrids and five putative hybrids were recorded during the 2018/2019 surveys within the Study Area. The taxa and hybrids represent 51 families and 130 genera. A total of 300 discrete vascular flora taxa (including 11 introduced taxa), three known hybrids and seven putative hybrids have been recorded in the Study Area from this and all other relevant previous surveys within the Study Area. These taxa and hybrids represent 52 families and 138 genera. The most well-represented families were Fabaceae (55 taxa, three known hybrids and seven putative hybrids), Poaceae (51 taxa) and Malvaceae (26 taxa).

A total of six significant flora taxa have been recorded from the Study Area by all surveys, comprising five Priority flora taxa (*Euphorbia clementii* (P3), *Heliotropium muticum* (P3), *Terminalia supranitifolia* (P3), *Triodia chichesterensis* (P3) and *Vigna triodiophila* (P3)) and one taxon considered significant for other reasons as per EPA (2016a; 2016b) (*Abutilon* aff. *hannii*). No Threatened flora taxa have been recorded from any survey within the Study Area.

A total of 15 vegetation units (VUs) were defined and mapped based on the results of the floristic classification analysis and subsequent examination of quadrat data. The 15 VUs defined represent four broad groups of vegetation, based on soils and topography:

- Group 1: Shrublands over hummock grasslands on steep to moderate crests and slopes to stony outwash plains influenced by granite, ironstone and/or dolerite (VU 1, 2, 3, 4, 5, 6, 7, 8, 9).
- Group 2: Low woodlands and shrublands over hummock and occasionally tussock grasslands on low, undulating to flat plains and minor drainage lines with sandy to clay loams with granite or quartz stones (VU 10, 11, 12, 13).
- Group 3: Low woodlands and shrublands over hummock and tussock grassland on clay to sandy loams on major drainage lines (VU 14).
- Group 4: Shrublands over hummock grasslands on stony plains with saline influence (VU 15).

No listed significant vegetation is known to occur in or within the vicinity of the Study Area. None of the VUs mapped within the Study Area are considered to represent any formally



listed Threatened or Priority Ecological Communities, nor are they considered to be significant for reasons other than formal listing. Although VUs 12, 13 and 15 are locally restricted, all VUs mapped in the Study Area are either known to, or are considered likely to, extend outside the Study Area to some extent.



# 1. INTRODUCTION

## 1.1 Project Overview

The MARBL Lithium Joint Venture (MARBL JV) owns and operates the Wodgina mine, located 90 km south of Port Hedland in the Pilbara region of Western Australia. The Wodgina mining area has been the location for a number of mining projects in the preceding decades, and therefore several flora and vegetation assessments of differing scopes have been undertaken over portions of the project area to support environmental approvals for these projects.

MARBL JV intends to expand operations at Wodgina (referred to as 'the Project') in the future. Woodman Environmental Consulting Pty Ltd (Woodman Environmental) were commissioned to review the findings of previous flora and vegetation assessments conducted in the Wodgina mining area, conduct a flora and vegetation assessment of unsurveyed areas potentially relevant to the Project, and produce a consolidated detailed flora and vegetation assessment that builds upon the results of previous assessments by incorporating new data.

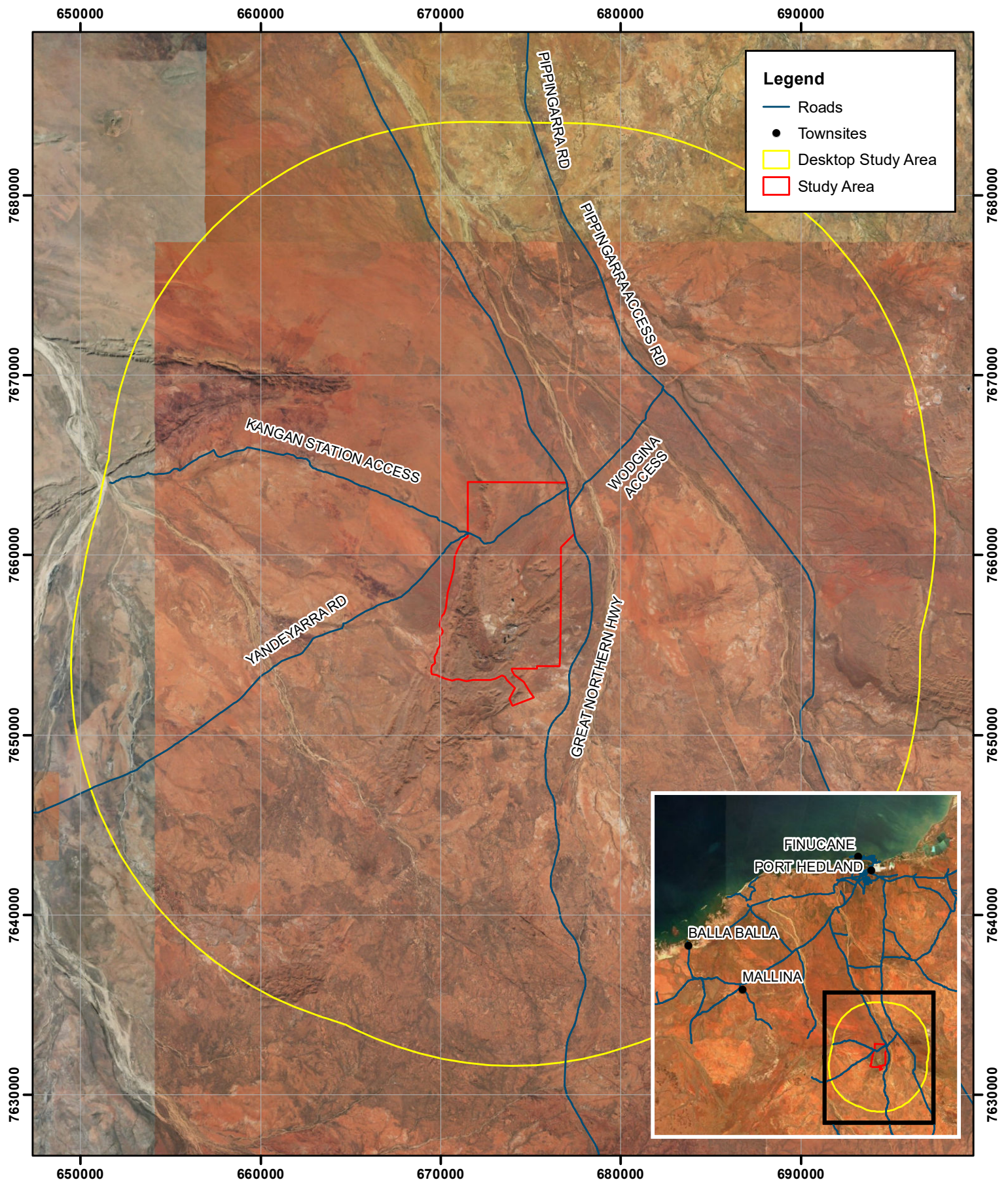
It should be noted that Woodman Environmental have recently reported on the results of initial flora and vegetation assessments conducted for the Project in 2018 and 2019 (Woodman Environmental 2019a, b). These survey reports included vegetation mapping of a portion of the Study Area not previously mapped, as well as targeted survey for significant flora taxa over several areas. This current report includes all methods and findings from these reports, as well as presenting updated floristic analysis of quadrat data and vegetation mapping; therefore, these previous reports are no longer considered current.



## 1.2 Study Area Definition

The Project Study Area (Study Area), within which vegetation mapping and targeted significant flora searches were undertaken during 2018 and 2019 is shown on Figure 1. The Study Area encompasses 6,745 ha, and is located in the Shire of Port Hedland, approximately 90 km south of the town of Port Hedland and immediately west of Great Northern Highway.

A Desktop Study Area was also defined for the purpose of elements of the desktop study for the Project, including interrogation of databases and searches for relevant literature. The Desktop Study Area, encompasses the Study Area with a 20 km buffer, as shown on Figure 1.





Study Area and Desktop Study Area Location	Author: David Coultas	
	WEC Ref: MRL19-19-04	
 <b>WOODMAN</b> ENVIRONMENTAL  This map should only be used in conjunction with WEC report MRL19-19-04.	Filename: MRL19-19-04-f01.mxd	<b>Figure</b>  <b>1</b>
	Scale: 1:275,000 (A4)	
	Projection: GDA 1994 MGA Zone 50	
	Revision: 0 - 4 April 2020	



### 1.3 Aim and Objectives

The aim of the survey is to provide relevant botanical information to support the approvals process for the Project. The flora and vegetation survey of the Study Area was conducted in accordance with current EPA technical guidance (EPA 2016a).

The overall objectives of the assessment were to:

- Review and consolidate findings of previous flora and vegetation assessments conducted within the Study Area.
- Compile an inventory of vascular flora taxa that occur in the Study Area;
- Identify locations of vascular flora taxa occurring within the Study Area that are one of the following (hereafter referred to as significant flora taxa):
  - Listed Threatened Species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Commonwealth);
  - Threatened Flora (T) under the *Biodiversity Conservation Act 2016* (BC Act) (WA);
  - Priority Flora taxa as classified by the Western Australian Department of Biodiversity, Conservation and Attractions (DBCA); and
  - Other significant flora taxa as defined by the Environmental Protection Authority (EPA) (2016a; b);
- Identify locations of introduced vascular flora taxa;
- Identify, map and describe Vegetation Units (VUs) that occur within the Study Area;
- Identify, map and describe vegetation that occurs within Study Area that is one of the following (hereafter referred to as significant vegetation):
  - Listed Threatened Ecological Communities (TECs) under the EPBC Act;
  - TEC under the BC Act;
  - Priority Ecological Communities (PECs) as classified by DBCA;
  - Other significant vegetation as defined by EPA (2016a; b); and
  - Wetland or riparian vegetation that is ground or surface water-dependent;
- Map the condition of the vegetation in accordance with EPA (2016a).

Definitions of Threatened and Priority Flora taxa, and TECs and PECs are provided in Appendices A and B respectively.

The survey and reporting works comply with the following documents:

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



## 1.4 Level of Assessment

The flora and vegetation survey of the Study Area conformed to the requirements of a Detailed Survey as defined in Section 4.3 of the *Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016a). This is considered appropriate for the Project, which is located in an area (the Pilbara) that is known to support a moderate diversity of flora and vegetation relative to other areas of the state, including significant flora taxa and vegetation types (EPA 2016a).

This report presents the results of both the desktop study and field survey of the Study Area. The results of the desktop study, which include a review of known information relevant to the Study Area through all sources of literature available, are presented in Section 5.1. The results of the field survey of the Study Area are presented in Section 5.2, which includes findings from previous flora and vegetation assessments undertaken in the Study Area.



## 2. BACKGROUND

### 2.1 Climate

The Study Area is located within the Pilbara region (Beard 1990). The climate is classified as arid tropical, with precipitation received mainly over the summer months. Average annual precipitation is 250-300 mm, which is generally slightly higher than most of the Eremaean Province of Western Australia due to the influence of relatively frequent tropical cyclones that occur from November to April (Beard 1990; Bureau of Meteorology 2019a).

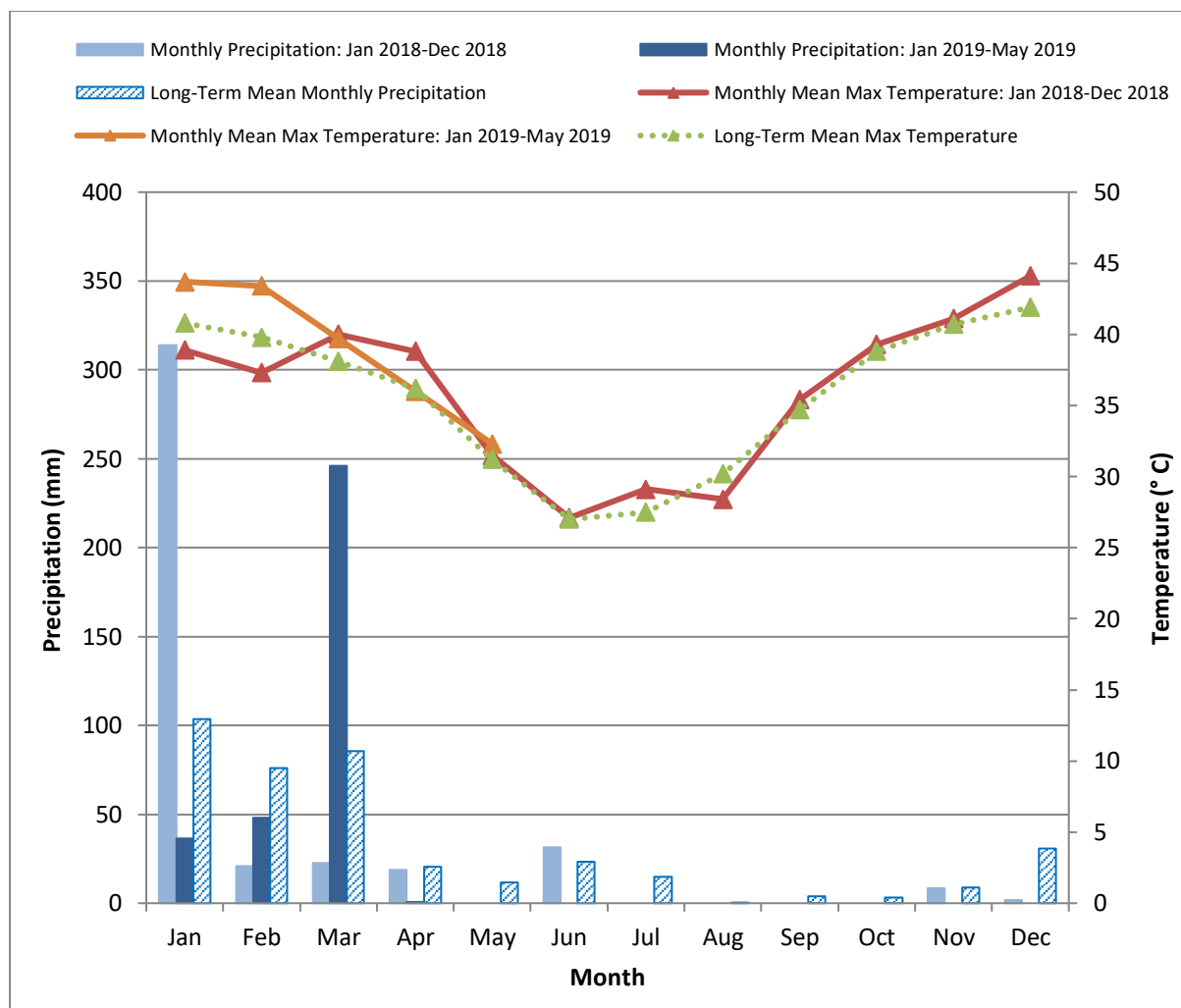
Figure 2 presents the average maximum temperature and average monthly precipitation for the preceding months up until the 2018/2019 field survey dates (January 2018-May 2019) as well as long-term average monthly maximum temperature and long-term average monthly precipitation data (2000-2019) for Marble Bar, the most relevant meteorological station to the Study Area (Bureau of Meteorology 2019b).

The precipitation in the 6 months preceding the 2018 field survey (January-June 2018) was above the long-term average (total of 408 mm received), compared to the long-term average for this period (321 mm) (Figure 2). This was the result of a tropical cyclone in January 2018 delivering 314 mm of rainfall, 210 mm above the long-term average precipitation for this month. However, precipitation in the months of February, March, April and May 2018 were all below-average (62 mm received), 131 mm below the average for this period (Figure 2).

The precipitation in the 6 months preceding the April 2019 field survey (October 2018-March 2019) was above the long-term average (total of 340 mm received), compared to the long-term average for this period (308 mm) (Figure 2). This was the result of a tropical cyclone in March 2019 delivering 246 mm of rainfall, 160 mm above the long-term average for this month. Wodgina is likely to have received more rainfall than this given Indee Station (35 km north of Wodgina) received 657 mm of rainfall in March 2019 (Bureau of Meteorology 2019a). However, precipitation in the months of October 2018 to February 2019 were below-average (94 mm received), 128 mm below the average for this period (Figure 2).

The precipitation in the 6 months preceding the June 2019 field survey (December 2018-May 2019) was only slightly above the long-term average for this period (total of 333 mm received), compared to the long-term average for this period (328 mm) (Figure 2). As aforementioned, the cyclone in March 2019 delivered above-average rainfall for this month, with below-average rainfall received during the other five months preceding the June 2019 survey.





**Figure 2: Temperature and Precipitation for Marble Bar (Bureau of Meteorology 2019b)**

## 2.2 Geology, Landforms and Soils

The Study Area is located in the Pilbara region (Fortescue Botanical District) as defined by Beard (1975; 1990). This is equivalent to the Pilbara Interim Biogeographic Regionalisation for Australia (IBRA) region (Commonwealth of Australia 2012). The Pilbara region is formed of a basement of Archaean granite and volcanics, overlain by massive deposits of Proterozoic sediments and volcanics (Beard 1990). This region is generally mountainous, rising to 1250 m, with hard alkaline red soils on plains and pediments, and shallow and skeletal soils on ranges. The Study Area traverses one physiographic region as defined by Beard (1975), being the Abydos Plain, and occurs within the geological province of the Wodgina Greenstone Belt.

The Abydos Plain is alluvial in origin near the coast while further inland is of Archaean granite origin. It consists of a variety of features including alluvial plains, pediplains, low stony hills and dissected pediments, low granite outcrops and tors, and basic dykes. It is divided into a number of isolated sections by the Gorge Ranges. The main soils are hard alkaline red soils, with some areas of coarse-textured A horizons to 45 cm thick, while other

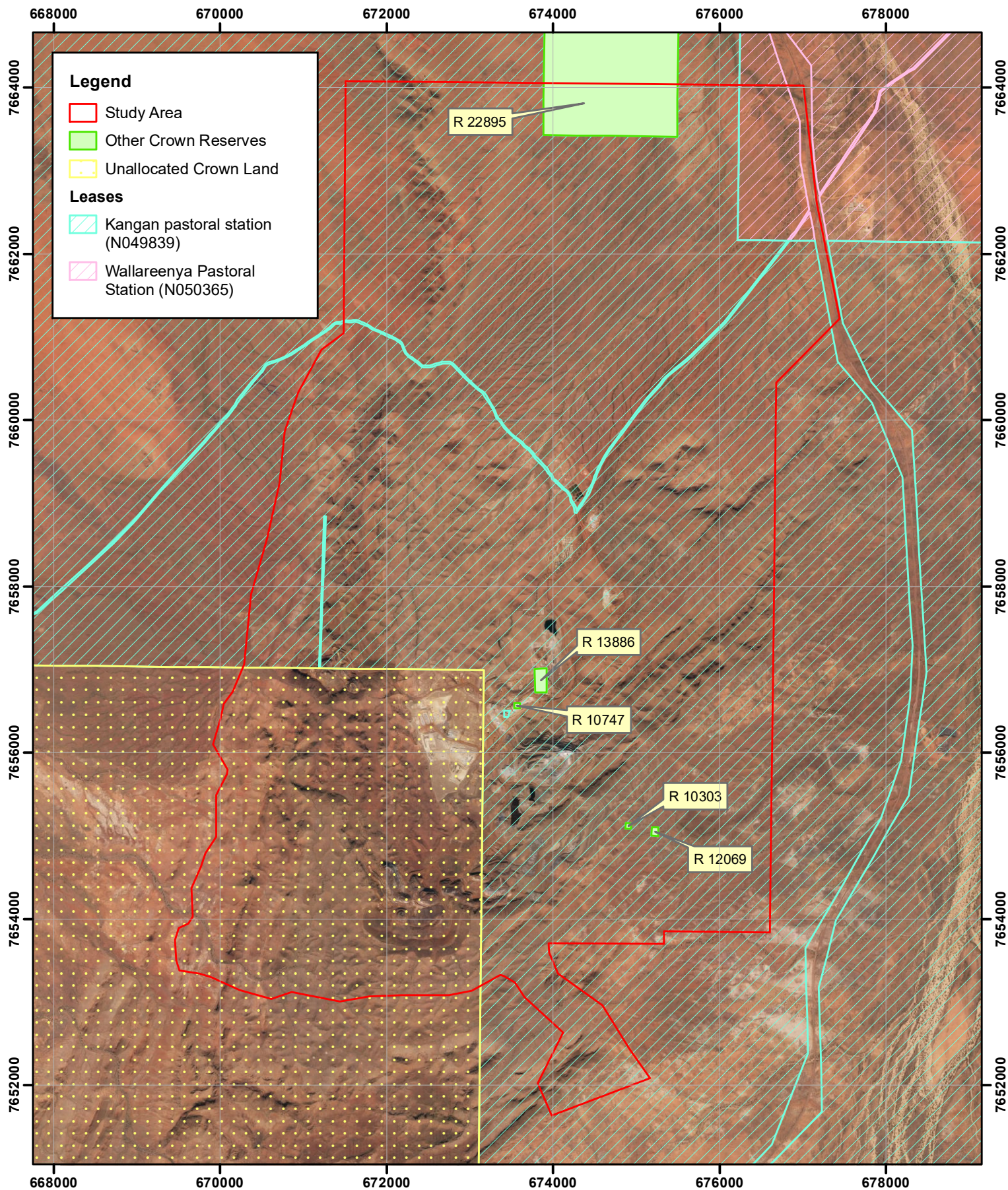




areas have shallow stony A horizons. Patches of calcrete also occur. On the eastern part of the plain near the De Grey River, the soils are chiefly neutral and acidic red earths, while on the inland plains behind the Gorge Ranges, chief soils are earthy loams and coarse sands overlying granite within 90 cm of the soil surface. The alluvial plains along the coast generally consist of red earthy sands with extensive areas of red earths, and hard red soils along creek lines. Deep cracking clays occur in the vicinity of residuals of basic and ultrabasic rocks in the Roebourne area (Beard 1975).

## **2.3 Land Tenure**

The Study Area is located on the Kangan and Wallareenya pastoral stations, Unallocated Crown Land (UCL) and Other Crown Reserves (R13886, R10303, R10747, R12069 and R22895) (Figure 3). There are extensive areas of both UCL and pastoral lease that surround the Study Area (DBCA 2007-). The nearest DBCA-reserved land, Mungaroona Range Nature Reserve, is located approximately 35 km south-west of the Study Area.





Land Tenure	Author: David Coultas	
	WEC Ref: MRL19-19-04	
 <b>WOODMAN</b> ENVIRONMENTAL  This map should only be used in conjunction with WEC report MRL19-19-04.	Filename: MRL19-19-04-f03mxd	<b>Figure</b>  <b>3</b>
	Scale: 1:60,000 (A4)	
	Projection: GDA 1994 MGA Zone 50	
	Revision: 0 - 4 April 2020	



### 3. METHODS

#### 3.1 Desktop Study Methods

Prior to commencement of the field survey, a review of all publicly available flora and vegetation data relevant to the Study Area was undertaken. This included interrogation of relevant regional databases and other sources as listed in Table 1, as well as obtaining and reviewing copies of reports of previous biological surveys undertaken within the vicinity of the Study Area (where available), including interrogation of the IBSA website.

**Table 1: Searches Undertaken for the Desktop Study**

Source	Search Attributes	Search Purpose
DBCA TEC and PEC Database (DBCA 2019c)	Database interrogated using Desktop Study Area boundary	Obtain records of DBCA-classified TECs and/or DBCA-classified PECs within the Desktop Study Area
DBCA TEC and PEC lists (DBCA 2018; DBCA 2019a)	Review of current DBCA TEC and PEC lists	Identify whether there are any DBCA listed TECs or PECs that could occur within the Desktop Study Area
DBCA Significant Flora Databases (WA Herbarium specimen database and Threatened and Priority Flora (TPFL) database) (DBCA 2019d)	Database interrogated using Desktop Study Area boundary	Obtain records of listed significant flora within the Desktop Study Area
Department of the Environment and Energy (DoEE) Species Profile and Threats (SPRAT) Database (interrogated using the Protected Matters Search Tool) (DoEE 2019)	Database interrogated using approximate Desktop Study Area boundary (exact boundary cannot be used); search included 20km surrounding a central point (21° 10' 32" S, 118° 39' 41" E); search performed prior to survey, updated 15/08/2019	Identify Matters of National Environmental Significance (MNES), including Threatened flora and TECs listed under the EPBC Act, that occur or have the potential to occur within the Desktop Study Area
DBCA <i>NatureMap</i> (WA Herbarium and Threatened and TPFL records) (DBCA 2007-)	Database interrogated using approximate Desktop Study Area boundary (exact boundary cannot be used); search included 20km surrounding a central point (21° 10' 32" S, 118° 39' 41" E); search performed prior to survey, updated 15/08/2019	Obtain records of listed significant flora and introduced flora within the Desktop Study Area
2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Government of Western Australia 2019)	Study Area	Identify extent of Vegetation System Associations within the Study Area

#### 3.2 Personnel and Licensing

Table 2 lists the personnel involved in both fieldwork and plant identifications for the field assessment of the Study Area. The Project Managers and personnel undertaking plant identifications have had extensive previous experience (> 10 years) in conducting similar flora surveys in the Pilbara bioregion. All plant material was collected under either the



scientific licences pursuant to the *Wildlife Conservation Act* 1950 (WC Act) Section 23C or under the *Flora Taking (Biological Assessment) licences and Authorisation to Take or Disturb Threatened Species* pursuant to the *Biodiversity Conservation Act* 2016, sections 40, 274 and 275, as listed in Table 2.

**Table 2: Personnel and Licensing Information**

Personnel	Flora Collecting Permit (BC Act/WC Act)	Survey	Role
David Coultas BSc (Environmental Biology) (Hons)	SL012319 144-1718	June-July 2018	Field survey Plant identifications Reporting
	FB62000051 TFL23-1819	April 2019	Project Manager Field survey (team leader) Plant identifications
		June 2019	Project Manager field survey (team leader) Plant identifications
Leah Firth BSc (Conservation Biology)	FB62000055	April 2019	Field survey
		June 2019	Field survey
Bethea Loudon BSc (Biology)	SL012318 143-1718	June-July 2018	Project manager Feld survey Reporting
Emalyn Loudon BAg (Hons)	--	June-July 2018	Field survey
		June 2019	Field survey
Kelli McCreery MSc (Environmental Management)	SL012488	April 2019	Field survey
		June 2019	Field survey (team leader)
Marco Pratisoli PostGrad. Dip. Sc. (Environmental Biology and Management)	FB62000057	June 2019	Field survey
Marlee Starceovich BSc (Environmental Science) (Hons)	SL012321	June-July	Field survey
	FB62000056 TFL23-1819	April 2019	Field survey (team leader)
		June 2019	Field survey (team leader)
Sharnya Thompson	NA	June-July 2018	Plant identifications

### 3.3 Aerial Photography Interpretation and Survey Design

Initial interpretation of ortho-rectified aerial photography at a scale of 1:10,000 was conducted to determine preliminary vegetation patterns present within the Study Area, with quadrats allocated based on these patterns. A minimum of three quadrats were allocated to each major discernible vegetation pattern where possible. For smaller patterns, fewer quadrats were allocated based on the size of the pattern.

The Study Area has received considerable historical survey effort with regard to vegetation quadrat sampling, including the following historical survey areas:

- Turner River Hub (TRH): Level 2 vegetation and flora survey for Atlas Iron Ltd, survey work undertaken in 2011, partially within the Study Area (Woodman Environmental 2011a);



- Hercules: Level 2 vegetation and flora survey for Atlas Iron Ltd, survey work undertaken in 2012 entirely within the Study Area (Hercules Study Area forms a component of the Study Area) (Woodman Environmental 2012c; 2013a);
- Great Northern Highway (GNH) Upgrade: Level 2 vegetation mapping and targeted flora survey for Atlas Iron Ltd, survey work undertaken in May 2013, partially within the Study Area (Woodman Environmental 2013c).
- Wodgina Iron Ore Project 2018 Rehabilitation Monitoring: monitoring included the establishment of a number of baseline quadrats in remnant vegetation, entirely within the Study Area Wodgina Iron Ore Project 2018 Rehabilitation Monitoring.

Quadrat allocation for this current survey did not consider areas previously surveyed by Woodman Environmental; however, data from these quadrats was utilised for floristic analysis (see Section 3.6) and for building a taxon inventory for the Study Area (see Section 5.2.1.1). The exception was those quadrats sampled by the TRH survey; this was because the vegetation had been very recently burnt prior to that survey, and the resulting data was therefore problematic in terms of plant identifications in a number of instances. These quadrats were therefore denoted as requiring re-survey during the quadrat allocation process and were subsequently re-visited to locate specific taxa that were incompletely identified during the previous survey (see Section 3.4.2)

Whilst other historical consultant survey data and reports from within the Study Area were reviewed during the desktop study (see Section 5.1.3), quadrat data from these surveys was not used for floristic analysis purposes, and areas covered by such surveys were allocated quadrats by Woodman Environmental during 2018 – 2019.

The above-listed surveys, as well as a number of other surveys, also included targeted significant flora survey. However, because of the timing of some of these surveys, and the fact that a number of significant flora taxa have only been taxonomically recognised subsequent to these surveys being undertaken, previously surveyed areas were re-assessed as part of this current survey. However, some areas that were previously surveyed for *Terminalia supranitifolia* (P3) and were considered habitat for only this taxon in a significant flora context were not re-assessed; this is discussed further in Section 3.4.3.

## 3.4 Field Survey Methods

### 3.4.1 Survey Timing

The field flora and vegetation survey was undertaken over several survey periods, as outlined below:

- 26<sup>th</sup> June – 3<sup>rd</sup> July 2018 – detailed flora and vegetation survey – quadrats and opportunistic significant flora searching;
- 3<sup>rd</sup> – 9<sup>th</sup> April 2019 – targeted significant flora survey; and
- 17<sup>th</sup> – 25<sup>th</sup> June 2019 detailed flora and vegetation survey and targeted significant flora survey – quadrats and targeted significant flora searching.

The 2018 and 2019 surveys focussed on different areas within the Study Area, as ; this is indicated on Figure 4.



### 3.4.2 Detailed Flora and Vegetation Surveys Methods

The Study Area was accessed by vehicle using existing access tracks and via foot transects. A total of 170 non-permanent flora survey quadrats were established and surveyed within the Study Area during the 2018/2019 field surveys: 94 quadrats were established in 2018, with 76 established in 2019. All quadrats had a total area of 2500 m<sup>2</sup>; most measured 50 m x 50 m, however occasionally quadrats measuring 100 m x 25 m were established in narrower vegetation patterns such as those along creek lines.

The quadrat size used is the indicative size for flora and vegetation surveys in the Pilbara IBRA Bioregion, as outlined in Table 1 of the Technical Guidance (EPA 2016a). Quadrat locations were selected to ensure that at least three quadrats (where possible) were surveyed within each vegetation pattern initially identified from aerial photography interpretation (as per Section 3.3).

All vascular flora taxa that were visually identifiable within each quadrat were recorded. At least one reference specimen of most taxa encountered (excluding common, distinctive taxa) was collected for verification and identification purposes. The following information was recorded at each quadrat:

- Personnel;
- Unique quadrat number;
- Date of survey;
- GPS (Global Positioning System) coordinates at start corner of quadrat;
- Site photograph, taken diagonally into quadrat from start corner;
- Compass bearing for two sides of quadrat that commence at start corner of quadrat;
- Topography (including landform type and aspect);
- Soil colour and type (including the presence of any rock outcropping and surface stones);
- Vegetation condition (EPA 2016a, adapted from Trudgen (1988); scale presented in Appendix C);
- Approximate time since fire;
- Presence and type of disturbance (if any);
- Percentage foliage cover (for each vascular plant taxon, including cover within the quadrat of individuals rooted outside of the quadrat);
- Height (m) (average for each taxon, excluding climbers/aerial shrubs); and
- Additional flora taxa present immediately outside of the quadrat.

Notes on vegetation pattern boundaries and distribution were also taken while traversing the Study Area, including a GPS location at the point where the notes were taken, a brief description of the vegetation including dominant and characteristic taxa, and a photograph. These notes were used to aid in the mapping of polygons of vegetation patterns that were not allocated quadrats. Not all vegetation pattern polygons received quadrats due to time constraints; however, many polygons could be confidently allocated to a final VU using a combination of mapping notes and aerial photograph interpretation. Additional flora taxa were also recorded opportunistically in the Study Area during traverses on foot between quadrats, with GPS locations of such taxa recorded. Locations of any significant flora and

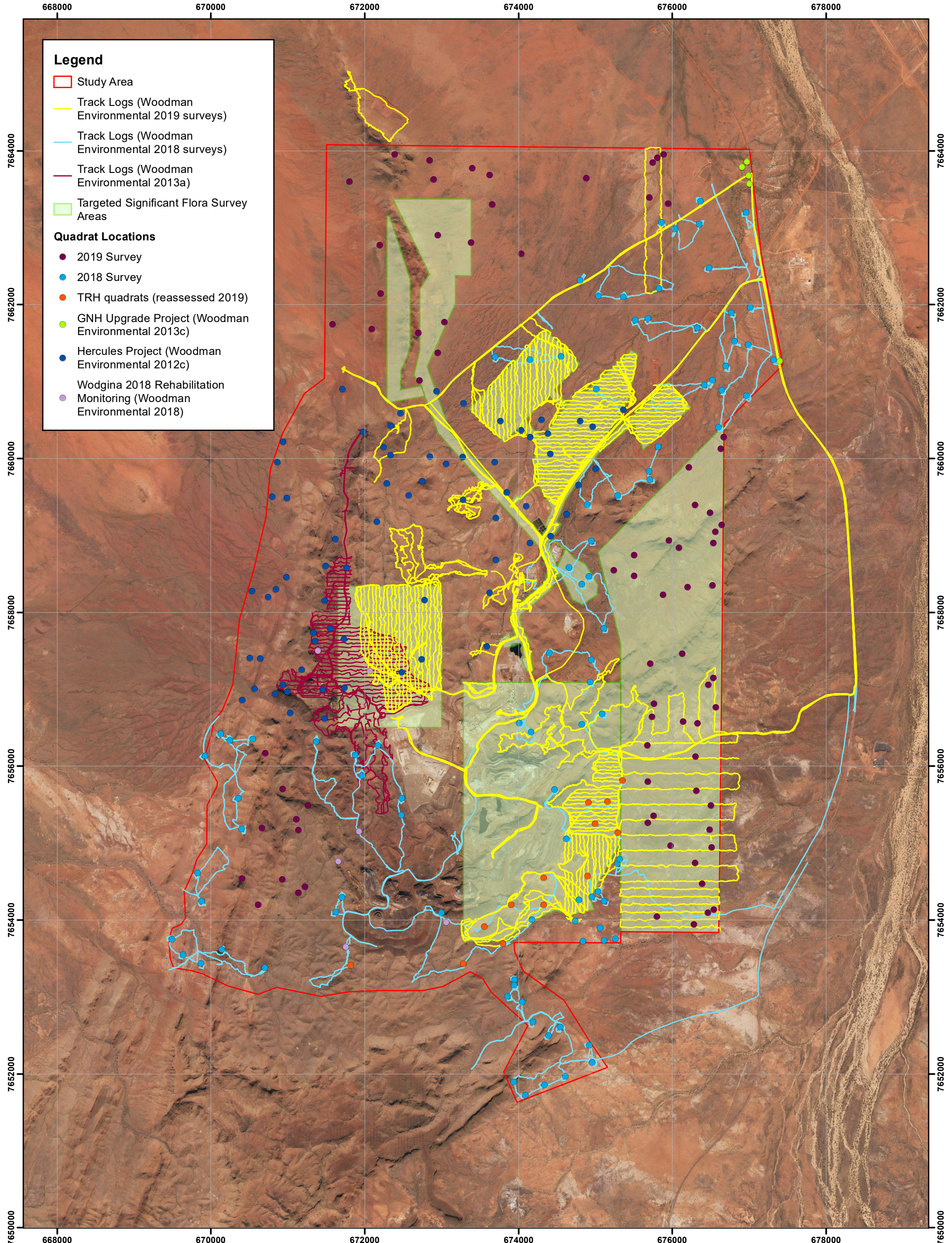


introduced flora taxa encountered opportunistically while traversing between quadrats were also recorded.

As noted above in Section 3.3, quadrats previously established by Woodman Environmental within the Study Area as part of the Turner River Hub survey (Woodman Environmental 2011a) were re-visited in 2018. A total of 13 quadrats were re-visited, but were not completely re-sampled; rather, they were traversed to locate specific taxa that were incompletely identified during the previous survey.

Traverses in the Study Area from the above surveys are mapped as track logs in Figure 4, along with quadrat locations. Please note that track logs from quadrat establishment for the Hercules survey (Woodman Environmental 2012c) and the Wodgina Iron Ore Project 2018 Rehabilitation Monitoring (Woodman Environmental 2018) are not available and therefore not presented.





**Legend**

Study Area

Track Logs (Woodman Environmental 2019 surveys)

Track Logs (Woodman Environmental 2018 surveys)

Track Logs (Woodman Environmental 2013a)

Targeted Significant Flora Survey Areas

**Quadrat Locations**

2019 Survey

2018 Survey

TRH quadrats (reassessed 2019)

GNH Upgrade Project (Woodman Environmental 2013c)

Hercules Project (Woodman Environmental 2012c)

Wodgina 2018 Rehabilitation Monitoring (Woodman Environmental 2018)



Track Logs and Quadrats

Author: David Coultas  
WEC Ref: MRL19-19-04  
Filename: MRL19-19-04-f04.mxd  
Projection: GDA 1994 MGA Zone 50

Figure  
4



### 3.4.3 Targeted Surveys for Significant Flora

Targeted survey for significant flora occurred over specific areas within the Study Area that may host future infrastructure (referred to as 'Targeted Significant Flora Survey Areas'). These areas were accessed by vehicle using existing access tracks, with survey undertaken via transects on foot. All suitable habitat for all significant taxa known to occur or potentially occurring within the Study Area (as per Section 5.1.4) within these areas (with the exception of *Terminalia supranitifolia* (P3) – see below) was surveyed using the method described below, regardless of previous searching efforts. These areas covered by the targeted surveys are shown on Figure 4.

Survey of suitable habitat for target significant flora within the Targeted Significant Flora Survey Areas was generally undertaken using a 50 m grid pattern (except in some instances for *Terminalia supranitifolia* (P3) – see below). However, transects deviated such that specific areas of habitat, such as the rock piles that *Vigna triodiophila* (P3) is known to inhabit, were also searched.

The following information was recorded at each location where significant flora taxa were found:

- Personnel and date;
- Taxon name;
- GPS location;
- Number of plants at location; and
- Condition of plants at location.

Due to the grid spacing used, numbers of plants recorded are not considered to be a full census of each taxon within the survey areas, but instead provide a conservative estimate of the numbers of individuals present.

*Terminalia supranitifolia* (P3) is a large, distinctive species that has been recorded by a number of previous surveys within the Study Area, and much survey time has been invested in recording individuals of this taxon across its rocky hill habitat (e.g. within the Hercules area (Woodman Environmental 2013a)). Therefore, suitable habitat for *Terminalia supranitifolia* (P3) in the Targeted Significant Flora Survey Areas that had been previously surveyed for it (primarily the Hercules area) was not re-surveyed. However, all remaining suitable habitat not previously surveyed was covered by the targeted surveys in 2019. Numerous historical locations of the significant taxon *Terminalia supranitifolia* (P3) were recorded by Woodman Environmental in the Hercules area, and by Outback Ecology (2009) in the Wodgina DSO Project area (located south-east of the Cassiterite Pit). A sub-sample of these locations was re-inspected in the field during the surveys in 2018 and 2019 to determine the current status of these locations; it was found that the numbers of individuals at all locations had not changed from those previously recorded. This taxon is a large, long-lived, slow-growing, re-sprouting species, which is generally very sparsely distributed (usually occurring as single individuals) (Woodman Environmental field observations). Recruitment of new individuals also appears to be very infrequent (only a handful of apparently young individuals have been observed).

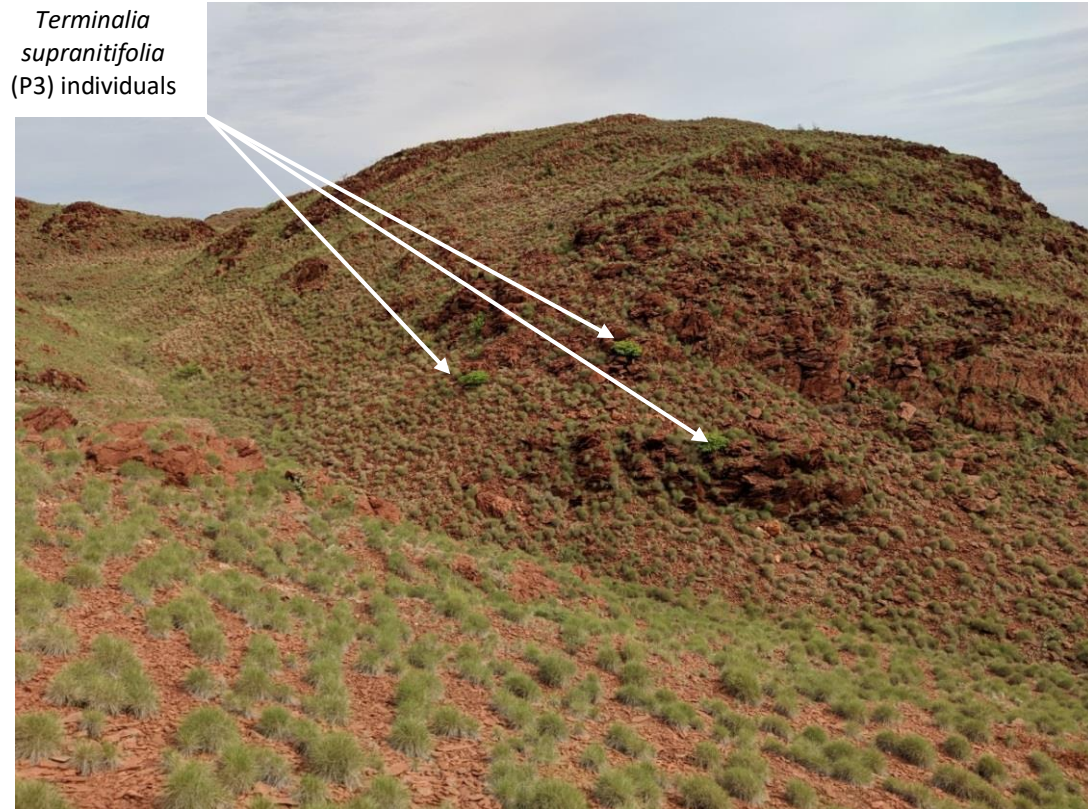


While survey for *Terminalia supranitifolia* was also undertaken on foot, the 50 m grid pattern of transects was often not used in areas where this taxon was the only significant flora taxon known to or likely to occur. This was primarily because such habitat (rocky cliffs) was too steep, unsafe and/or time-consuming for this method to be employed. However, grid searching is not considered necessary to detect individuals of this species. As mentioned above, this species is very large relative to the grasses and small shrubs that dominate its habitat and is exceptionally distinctive in the field, being very glossy green (see Plate 1). This allows individuals to be confidently identified on cliffs from several hundred metres away (see Plate 2). This taxon is often better observed from some distance rather than close-up, as individuals can be somewhat camouflaged or hidden by exposed rocks when standing directly below cliffs. While one other species, *Ficus brachypoda*, grows in similar habitats and has a similar growth form, it has dull dark-green foliage and can be confidently differentiated even from some distance away.



**Plate 1:** *Terminalia supranitifolia* (P3) showing distinctive, glossy green foliage (photo: Woodman Environmental)





**Plate 2: Distance view of *Terminalia supranitifolia* (P3) (photo: Woodman Environmental)**

Individuals of *Terminalia supranitifolia* (P3) were generally recorded using the method outlined above for other significant taxa. However, in a number of instances, plants could not be safely reached on foot such that a GPS location could be recorded. In these instances, locations of plants were plotted on high-resolution aerial photography during the survey. This photography was of such high quality that individuals themselves could often be identified on the imagery. In other cases, nearby landmarks (usually rocky outcrops) were easily identifiable, allowing for individuals to be plotted with a high degree of accuracy (within 10 m).

Because of the obvious nature of this taxon, the number of plants recorded by the targeted surveys are considered to represent a relatively accurate census of this taxon in the Targeted Significant Flora Survey Areas.

*Triodia chichesterensis* (P3) is known to occur as the dominant spinifex taxon in suitable habitat in the Study Area (Woodman Environmental 2012c). As such, accurate counts of individuals are generally not possible in a reasonable timeframe. To estimate numbers of individuals in a given patch of habitat, individuals were counted in an approximate 10 x 10 m area and multiplied by the approximate size of the patch. This was the most appropriate way to determine a relatively accurate estimation of the number of individuals of this taxon within populations.



Further targeted searching specifically for *Terminalia supranitifolia* (P3) and *Triodia chichesterensis* (P3) was also undertaken in other areas of suitable habitat within and immediately adjacent to the Study Area, to provide additional context for distribution and population size of these taxa. All such searching was either via wandering foot transects in the case of *Terminalia supranitifolia* (P3), or via 50 m grid-pattern transects in the case of *Triodia chichesterensis* (P3).

All foot transects are presented as track logs on Figure 4.

### 3.5 Plant Collection and Identification

Specimens of any unknown taxa that were collected were pressed for later identification at the WA Herbarium. External experts of particular families or genera were consulted for any specimens considered to be difficult to identify or of taxonomic interest.

Taxon nomenclature generally follows *FloraBase* (WA Herbarium 1998-) with all names checked against the current DBCA Max database to ensure their validity. However, nomenclature in the published literature is followed in cases where names of plant taxa have been published recently in scientific literature but have not yet been adopted on *FloraBase* due to time constraints (WA Herbarium 1998-). The conservation status of each taxon was checked against *FloraBase*, which provides the most up-to-date information regarding the conservation status of flora taxa in Western Australia.

Specimens of interest, including significant flora taxa, range extensions of taxa and potential new taxa, are sent to the WA Herbarium for consideration for voucherising as soon as practicable. However, this process is via donation, and the WA Herbarium may not voucher all specimens, in accordance with its own requirements. The specimen voucherising will be supported by completed Threatened and Priority Flora Report Forms submitted to DBCA (Species and Communities Branch) in the case of listed significant flora (e.g. Threatened and Priority flora taxa).

### 3.6 Floristic Analysis

Classification analysis of floristic data from the Study Area was conducted using 262 quadrats established in the Study Area by Woodman Environmental. This included:

- 170 quadrats established in the Study Area in 2018/2019 by this current survey (see Section 3.4.2);
- 13 quadrats established for the TRH project (Woodman Environmental 2011a) that were re-visited in 2018 by this current survey;
- 68 quadrats established in 2011 for the Hercules project (Woodman Environmental 2012c);
- Five existing quadrats established for the GNH Upgrade Project (Woodman Environmental 2013c); and
- Six quadrats established for the Wodgina Iron Ore Project 2018 Rehabilitation Monitoring (Woodman Environmental 2011a).



All historical quadrats were reviewed thoroughly for taxonomic currency (both in a nomenclature and concept context); with nomenclature updated where required.

The analysis used 157 perennial taxa, with taxa belonging to several categories removed prior to analysis, as listed below:

- Ephemeral or annual taxa – the presence of ephemeral or annual taxa is strongly influenced by seasonal conditions, with fewer taxa and individuals usually present following below-average rainfall;
- Introduced taxa – introduced taxa were removed as their distributions are generally defined by the presence of disturbance (e.g. clearing, animal movement) rather than particular natural habitat types;
- Hybrids – hybrids are usually the result of random reproductive events that produce small numbers (often only one) of sterile offspring, and are often not associated with particular habitat types;
- Taxa where identification was unclear – taxa were removed from the analysis where identification was unclear due to poor available material in the field. However, if such a taxon was known to be unique within the dataset, it was included in the analysis.
- Singletons – taxa that occur only once in the dataset were removed as published studies indicate that they provide little information in the dataset (e.g. Markey and Dillon 2008).

All taxa removed from the classification analysis (excluding ephemeral or annual taxa, introduced taxa and singletons) are presented in Appendix E.

A single-layer data matrix (i.e. presence/absence data only) was used in the classification analysis. PATN (V3.12) (Belbin and Collins 2009) was utilised to perform the classification and ordination analysis of the data matrix. The Bray-Curtis coefficient was used to generate an association matrix for the classification analysis. This association matrix consisted of pairwise coefficients of similarities between quadrats based on floristic data. Agglomerative hierarchical clustering, using flexible Unweighted Pair Group Method with Arithmetic Mean (UPGMA) ( $\beta = -0.1$ ), was used to generate a quadrat classification dendrogram (Sneath and Sokal 1973).

### 3.7 Vegetation Unit Definition, Mapping and Description

The classification analysis of Study Area floristic data aggregated quadrats into a group classification. The resulting dendrogram and taxon group matrix were initially examined at a group level determined by PATN as potentially appropriate for the dataset, to determine the plausibility of groups with regard to taxon groups, as well as field observations. This process determined a final number of clusters, which were considered to represent VUs.

VU descriptions have been adapted from the National Vegetation Information System (NVIS) Australian Vegetation Attribute Manual Version 6.0 (Executive Steering Committee for Australian Vegetation Information (ESCAVI) 2003), as stipulated by EPA (2016a). This model follows nationally-agreed guidelines to describe and represent VUs, so that comparable and



consistent data are produced nation-wide. It should be noted that the NVIS system utilises vegetation descriptions derived from structural characteristics of the individual community units, while the VUs presented in this report are defined based on the results of a floristic classification analysis, excluding any structural data. VUs therefore may include multiple structural types. Considering the effect of disturbance factors such as fire on vegetation structure, this approach is designed to provide a map of VUs that reflect taxon composition and the influences of the physical and chemical environment rather than disturbance history.

It should also be noted that this report describes VUs at the NVIS Sub-Association level, rather than the Association level as stipulated by EPA (2016a). This level is considered more appropriate for the vegetation of the Study Area, as often the vegetation possessed one or more additional strata to the traditional three-stratum classification system used at the Association level.

The locations of quadrats within each VU were used in conjunction with aerial photograph interpretation and mapping notes to develop VU mapping polygon boundaries. These VU mapping polygon boundaries were then digitised using Geographic Information System (GIS) software.

For each VU, indicator taxa were defined via Indicator Taxon Analysis (INDVAL). This was conducted using PC-Ord (V6.08) (McCune and Mefford 2011) via the method of Dufrene and Legendre (1997). This generates INDVAL values (a measure of taxon fidelity to a given VU), which range from 0 to 100; an INDVAL value of 100 indicates that a taxon is present in all quadrats within a particular VU, and absent from all other quadrats included in the analysis. The INDVAL values were then tested for significance of the indicator taxa using a Monte Carlo permutation test. Indicator taxa were defined as taxa with an INDVAL value > 14, and a significance p value of either <0.05, <0.01 or <0.001.

### **3.8 Vegetation Condition Mapping**

Vegetation condition was described using the vegetation condition scale presented in EPA (2016a) (see Appendix C). Notes on vegetation condition were taken during the field survey via vehicle traverses along access tracks and during foot traverses undertaken within the Study Area. Vegetation condition was also recorded at all quadrats. Vegetation condition category polygon boundaries were developed using this information and were digitised using GIS software as for VU polygon boundaries.

### **3.9 Significant Flora and Vegetation**

#### **3.9.1 Significant Flora**

As per EPA (2016b), flora taxa may be significant for a range of reasons, including, but not limited to the following:

- Being identified as a Threatened or Priority species (formally listed significant taxa – includes taxa listed under both State and Commonwealth legislation, and classified as Priority by DBCA);



- Locally endemic or associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems);
- New species or species with anomalous features that indicate a potential new species;
- Representative of the range of a species (particularly at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- Unusual species, including restricted subspecies, varieties or naturally occurring hybrids; and
- Relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

Significant taxa recorded within the Study Area are discussed in Section 5.2.1 with reference to the above categories. In this section, point locations, individuals and populations known from the Study Area are discussed. It is worthy of note that a population in the context of this survey is defined as a discrete group of individuals of a taxon separated by more than 500 m from the nearest discrete group of individuals (DBCA 2017). However, this definition can only be tentatively applied if the intervening 500 m has not been surveyed. This is discussed further in Section 5.2.1.

### 3.9.2 Significant Vegetation

As per EPA (2016b), vegetation may be significant for a range of reasons, including, but not limited to the following:

- Being identified as a TEC or PEC (formally listed significant vegetation – includes vegetation listed under Commonwealth legislation, endorsed as a TEC by the Western Australian Government, or classified as a PEC by DBCA);
- Having restricted distribution;
- Degree of historical impact from threatened processes;
- A role as a refuge; and
- Providing an important function required to maintain ecological integrity of a significant ecosystem.

With regard to TECs and PECs listed in Western Australia that occur in the Pilbara region, generally only broad descriptions are provided in the respective lists to allow for diagnosis. The vegetation of the Study Area was therefore manually compared to such descriptions to determine whether any vegetation may represent a TEC or PEC.

With regard to TECs listed under the EPBC Act, the vegetation of the Study Area was assessed against the appropriate listing and conservation advice for any TECs likely to occur in the Study Area.

The remaining significant vegetation criteria other than “being identified as a TEC and PEC” were applied to VUs mapped in the Study Area to determine whether a VU was significant in a local or regional context. In a regional context, limited information is available for comparison with VUs in the Study Area. This is discussed further in Section 5.2.2.



## 4. ADEQUACY AND LIMITATIONS OF SURVEY

### 4.1 Adequacy of Survey

The Study Area covers approximately 6,745 ha, with data from 262 quadrats used in the analysis. Quadrats were established in all preliminary vegetation patterns discernible by initial aerial photograph interpretation (Section 3.3), both to adequately sample variation in vegetation throughout the Study Area and to ensure adequacy of sampling for vascular plant taxa.

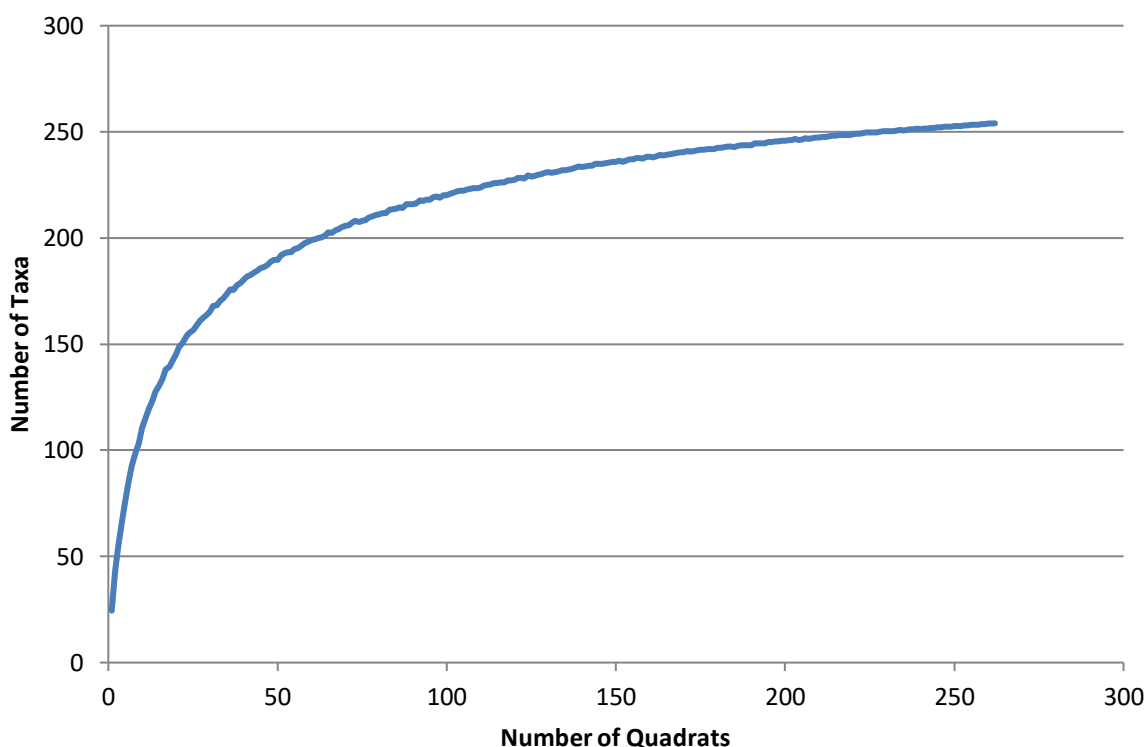
The number of quadrats established in the Study Area is considered to be an acceptable number given the low diversity of topography and soil types noted in the Study Area, as well as the size of the Study Area (approximately 1 quadrat established per 26 ha of Study Area; and approximately 1 quadrat per 23 ha of mapped native vegetation).

To provide an indication of the adequacy of this survey, a taxon accumulation curve was produced using PC-Ord (McCune and Mefford 2011). Taxon accumulation curves represent a theoretical model of the relationship between sampling intensity and taxon accumulation; when sampling intensity is increased, taxon accumulation is reduced, and a taxon accumulation curve becomes asymptotic.

The taxon accumulation curve for quadrat data from the Study Area was generated using all native taxa (both annual and perennial) recorded within each quadrat. Taxon accumulation calculations for the Study Area were then undertaken utilising the Chao-2 estimator for species richness (Chao 1987) and compared to the actual number of taxa recorded in the Study Area. This provides some indication as to whether sufficient quadrats were surveyed to adequately sample the species richness in the Study Area. As the generation of species accumulation curves includes quadrat data only, and not taxa recorded during targeted searching or otherwise opportunistically recorded, the indication of adequacy of survey provided is considered to be conservative.

Figure 5 presents the species accumulation curve generated from quadrat data from the Study Area. Using the Chao-2 estimator, the recorded number of taxa within quadrats is equivalent to 94.4 % of the estimated taxon richness in the Study Area; the estimated number of native taxa in the Study Area using Chao-2 was 269, with a total of 254 native taxa recorded in the 262 quadrats established within the Study Area by this current survey and previous surveys. It is of interest that when opportunistic records of taxa are included, 289 native taxa (see Section 5.2.1) were recorded in the Study Area, which is more than the Chao-2 estimate; this indicates that the Study Area was well-sampled.





**Figure 5: Study Area Quadrat Data Species Accumulation Curve**

Another adequacy of survey measure is that developed by Mueller-Dombois and Ellenberg (1974), who suggest that an adequacy cut-off point might be when a 10 % increase in quadrats surveyed results in a 5 % (or less) increase in taxa recorded. This measure was also calculated using all native taxa recorded within each quadrat. The number of quadrats established in the Study Area satisfies this adequacy measure suggested by Mueller-Dombois and Ellenberg (1974), with the final taxon increase value of 1.13 % recorded following the final 10 % increase in quadrats.

## 4.2 Limitations of Survey

Table 3 presents the limitations of the flora and vegetation survey of the Study Area in accordance with EPA (2016a). This table deals specifically with the surveys conducted in 2018 and 2019. For previous surveys where data has been used in this report, either for the purposes of taxon inventory, significant flora distribution and abundance, or floristic analysis, individual reports were reviewed to identify any specific limitations that may have significantly affected the results. No significant limitations were identified, except for the quadrats established for the TRH project; however, this was mitigated by re-visits to all quadrats in the Study Area.



**Table 3: Limitations of the Flora and Vegetation Survey of the Study Area**

Limitation	Limitation of Survey	Comment
Effort and Extent	No	<p>Detailed survey undertaken across entire Study Area. Multiple quadrats were established in each vegetation pattern identified in the Study Area. No constraints prevented appropriate sampling techniques (quadrat establishment, foot transects) being employed. Relative ease of access within the Study Area enabled detailed vegetation type and condition mapping to be undertaken throughout the Study Area via foot and vehicle transects. Mapping reliability is therefore considered to be relatively high.</p> <p>Targeted survey for significant taxa within the Targeted Significant Flora Survey Areas covered all areas of suitable habitat on foot, with transects generally undertaken at 50 m intervals (Section 3.4.3). A 50 m interval was considered to be adequate to provide appropriate data on the distribution of significant flora taxa within the. When searching for smaller, cryptic taxa such as <i>Vigna triodiophila</i> (P3), small deviations of transects were undertaken to ensure all suitable habitat of rocky dolerite outcrops were checked carefully. Areas previously surveyed for <i>Terminalia supranitifolia</i> (P3) were not re-surveyed for this taxon. This was due to the long-lived nature of this taxon and the extensive historical survey effort attributed to this taxon. Due to the intervals between transects, and large numbers of some taxa encountered (e.g. <i>Triodia chichesterensis</i> (P3)), numbers of individuals presented are not considered to be a full census of each taxon within the survey areas, with the exception of <i>Terminalia supranitifolia</i> (P3) (Section 3.4.3). The numbers of individuals presented are considered to be a conservative estimate of the numbers of individuals actually present.</p> <p>Targeted searching for significant flora across the entire Study Area has not been undertaken. Further survey for significant flora taxa may be required depending on the precise location of future impact areas.</p>
Competency / experience of the team carrying out the survey	No	<p>Project Managers have had extensive experience (&gt; 10 years) in conducting similar assessments in the Pilbara. Personnel conducting plant identifications have had &gt; 10 years' experience in plant identification in the Pilbara. Senior personnel provided guidance to less experienced botanists throughout the survey where necessary. Relevant experts at the WA Herbarium were consulted regarding taxonomic identifications where required.</p>
Proportion of flora identified, recorded and/or collected.	No	<p>All vascular groups that were present in the Study Area were sampled. A high proportion of perennial vascular taxa were recorded based on the intensity and method of survey, and almost all could be positively identified. A high proportion of ephemeral vascular taxa were recorded based on the intensity and method of survey, and adequate rainfall prior to survey (see timing/weather/season/cycle below). However, detection and identification of some ephemeral taxa was difficult due to timing of rainfall prior to the survey (see timing/weather/season/cycle below). It is possible that a small number of particularly fragile taxa (e.g. some grass species) may not have been detectable or identifiable during some surveys. Unknown vascular taxa were collected, with specimens identified at the WA Herbarium.</p>



Limitation	Limitation of Survey	Comment
Sources of information e.g. previously available information (whether historic or recent) as distinct from new data	No	Good contextual information for the Study Area was available prior to the surveys. Sources of information used included government databases (DBCA, DoEE), previous unpublished reports and data from the vicinity of the Study Area (e.g. Mattiske 2000; Outback Ecology 2008, 2009; Woodman Environmental 2011a, 2011b, 2012b, 2012c, 2013a, 2013b, 2013c) as well as numerous general sources pertaining to the climate, geomorphology, flora and vegetation of the Pilbara.
Timing/weather/season/cycle	No	All surveys were conducted within the appropriate season for survey in the Pilbara bioregion (6-8 weeks post wet season – generally March-June). However, the lower than average rainfall in February – May 2018, in combination with higher than average temperatures in February, March and May 2018, resulted in the majority of ephemeral species senescing prior to the 2018 survey, and most perennial taxa not being in flower. It is possible that a small number of particularly fragile taxa (e.g. some grass species) may not have been detectable or identifiable. The area received significant rainfall in March 2019 (immediately prior to targeted survey conducted in April) as a result of a cyclone (see section 2.1). Although the first targeted survey in 2019 was conducted only weeks after the cyclone, and many taxa had only just germinated, this is not considered to have affected the results of this particular survey. The second survey in 2019, which involved quadrats and targeted survey, was conducted approximately 8 weeks after the cyclone; ephemeral taxa were visible during this survey, and many perennial taxa were in flower.
Disturbances (e.g. fire, flood, accidental human intervention etc.), which affected results of survey	Possible	A portion of the Study Area in the north-west corner had been affected by a recent fire (less than 6 months ago), preventing the establishment of quadrats within the area due to the difficulty in identification of regrowth. This area was mapped using aerial photography captured before the fire. A proportion of the Study Area was relatively recently burnt (within the last one to two years). However, taxa were usually mature enough to be identified and therefore this did not affect the results of the survey significantly, with the vegetation able to be confidently assigned to a VU. The fire history of parts of the Targeted Significant Flora Survey Areas affected the targeted survey results to a minor extent. While many <i>Euphorbia clementii</i> (P3) were located in parts of the survey areas by previous surveys when surveys were conducted within 1 or a few years post-fire, few were visible during the 2019 survey in areas where individuals had previously been recorded, due to post-fire decline seen with this taxa.
Remoteness and/or access problems	No	Although some areas were difficult to reach because of distances from available access tracks, or steep, rocky or unsafe terrain, this is not considered to have affected the results of the surveys.



## 5. RESULTS

### 5.1 Desktop Study

#### 5.1.1 Regional Vegetation

As previously mentioned, the Study Area is located in the Pilbara IBRA region, specifically within the Abydos Plain (Beard 1975). Of the four main associations described on the Abydos Plain, shrub steppe is predominant in the Study Area (Beard 1975). This is the main community of the granite plain and is dominated by *Acacia pyrifolia*-*Triodia pungens* associations, with hummock grasses and widely-spaced shrubs.

The Study Area occurs within the Chichester Subregion of the Pilbara IBRA region (Commonwealth of Australia 2012). The Chichester Subregion is comprised of undulating Archaean granite and basalt plains with significant areas of basaltic ranges. Plains support a shrub steppe characterised by *Acacia inaequilatera* over *Triodia wiseana* hummock grasslands, while *Eucalyptus leucophloia* tree steppes occur on ranges. Grazing of native pastures by stock and mining activity are the main impacts on biodiversity within the region (Kendrick and McKenzie 2001).

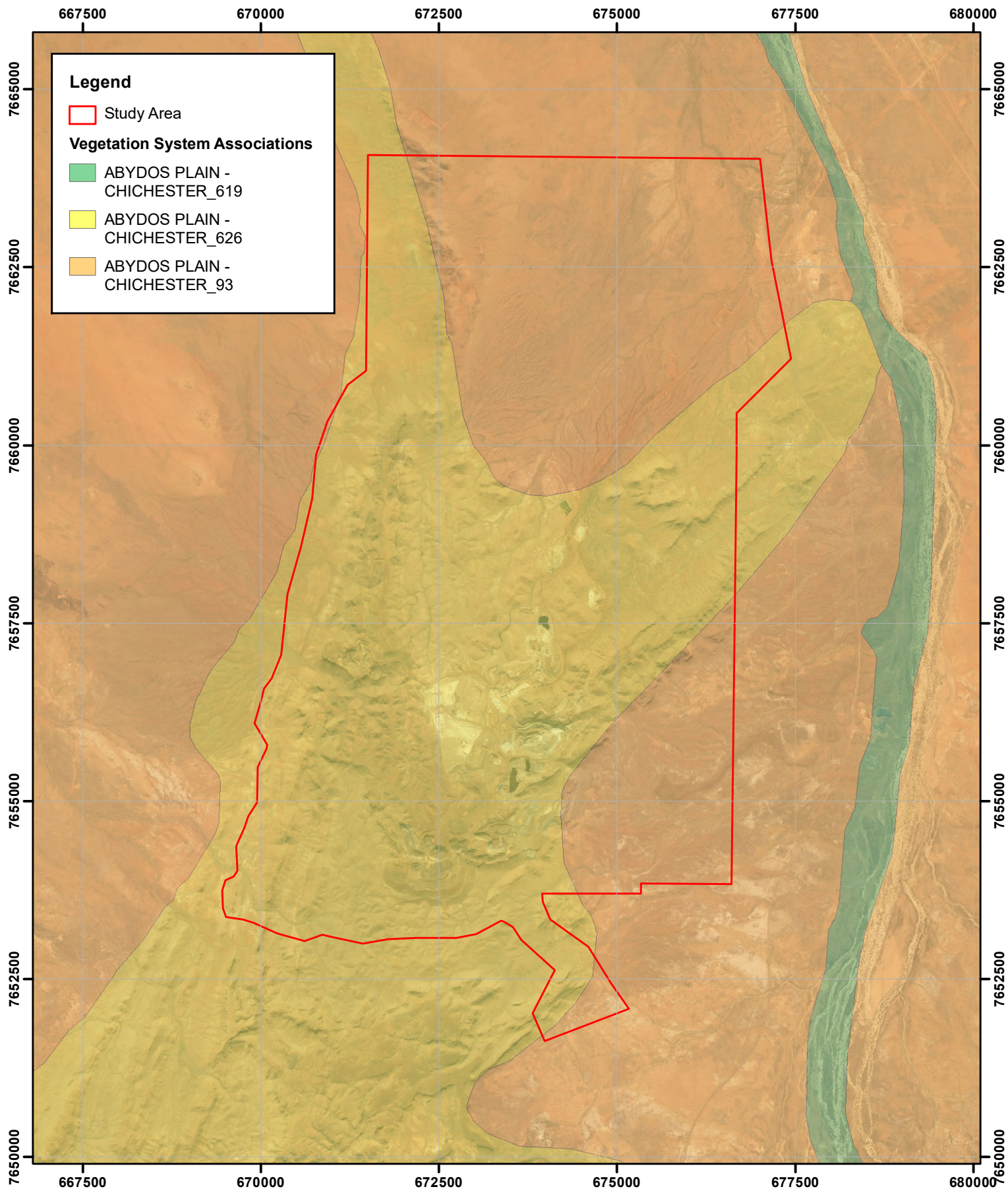
The vegetation mapping by Beard (1975) was used by Shepherd *et al.* (2002) to describe vegetation system associations (VSAs) throughout Western Australia at a scale of 1:250,000. Two VSAs occur in the Study Area as summarised in Table 4 and presented on Figure 6. Table 4 also presents the current extent of each VSA in relation to its pre-European extent (Government of Western Australia 2019) and the percentage of the current extent of each VSA currently reserved for conservation.

Two VSAs occur within the Study Area, both of which have over 99 % of their pre-European extent remaining. The Abydos Plain – Chichester\_93 VSA has very little (< 1 %) reserved for conservation, whereas the Abydos Plain – Chichester\_626 VSA has over 15 % reserved for conservation.

**Table 4: Vegetation System Associations within the Study Area**

Vegetation System Association	Description	Current Extent (ha)	Pre-European Extent Remaining (%)	Current Extent Protected for Conservation (%)
Abydos Plain – Chichester_93	Hummock grasslands, shrub steppe; kanji over soft spinifex	2,473,007	99.86	0.54
Abydos Plain – Chichester_626	Hummock grasslands, shrub-steppe; kanji over soft spinifex and <i>Triodia brizoides</i>	117,198	99.55	15.59





### Vegetation System Associations of the Study Area

Author: David Coultas

WEC Ref: MRL19-19-04



**WOODMAN**  
ENVIRONMENTAL

Filename: MRL19-19-04-f06.mxd

Scale: 1:70,000 (A4)

Projection: GDA 1994 MGA Zone 50

Revision: 0 - 4 April 2020

**Figure**

**6**

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In 2004, the Department of Agriculture described land systems within the Pilbara IBRA region, considering general ecological information, vegetation physiognomy and composition, patterns of variation, conservation status, gradational association and land system representation (Van Vreeswyk *et al.* 2004).

A total of seven land systems occur within the Study Area as summarised in Table 5 and presented on Figure 7. None of these land systems are listed as TECs or PECs (DBCA 2018; 2019a); the mapped extent of only one of these landforms (Platform) covered <1% of the Pilbara Study Area of Payne *et al.* (2004) (0.9%).

**Table 5: Land Systems within the Study Area**

Land System	Description of Land System	Mapped Extent (ha)
Boolgeeda	Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands and mulga shrublands	774,800
Capricorn	Hills and ridges of sandstone and dolomite supporting shrubby hard and soft spinifex grasslands	529,600
Macroy	Stony plains and occasional tor fields based on granite supporting hard and soft spinifex grasslands	1,309,500
Platform	Dissected slopes and raised plains supporting hard spinifex grasslands	1,570,00
Rocklea	Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands	22,993,00
Talga	Hills and ridges of greenstone and chert and stony plains supporting hard and soft spinifex grasslands	212,400
Uaroo	Broad sandy plains supporting shrubby hard and soft spinifex grasslands	768,100

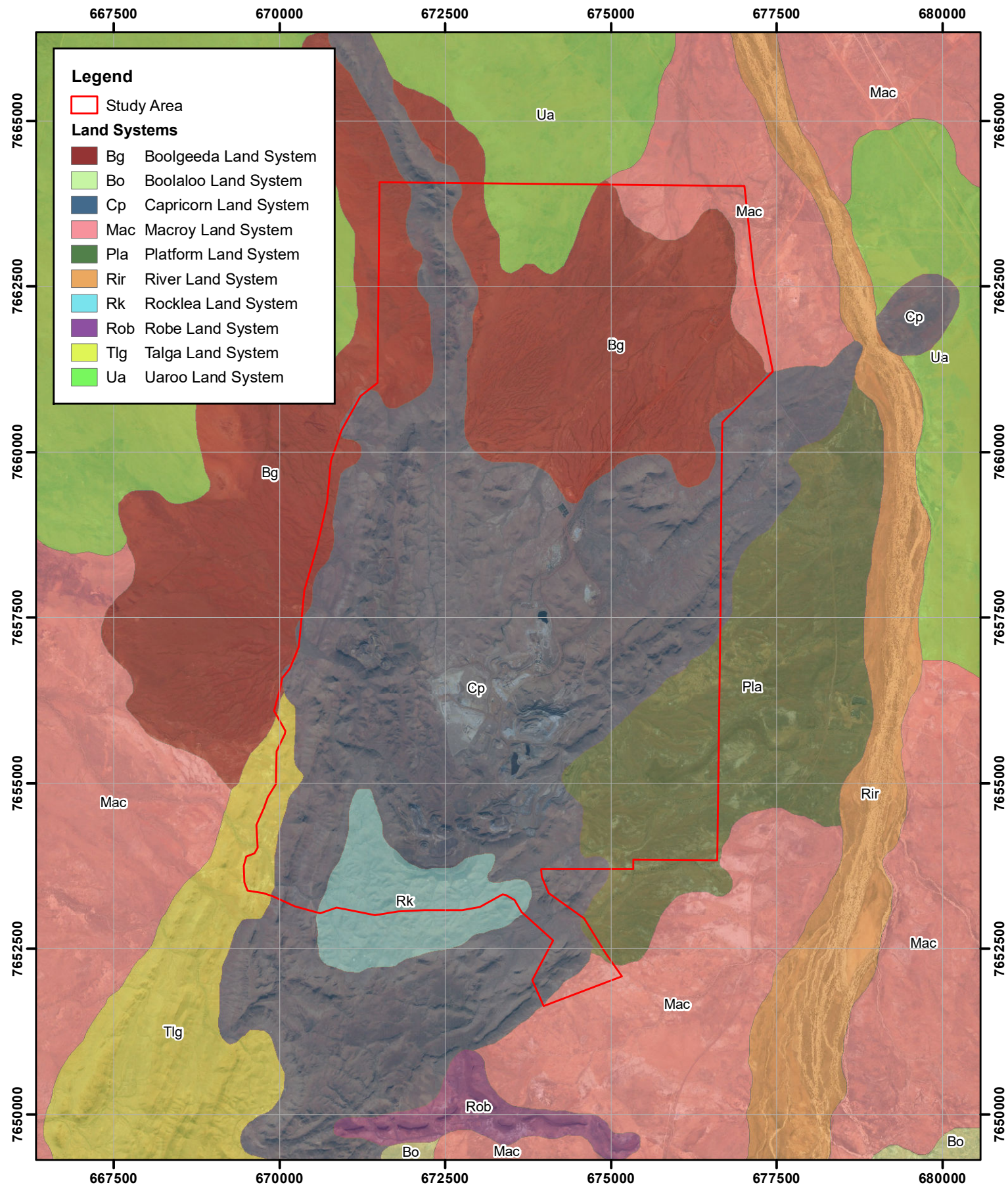
The Capricorn, Rocklea and Talga Land Systems are largely represented by VSA Abydos Plain-Chichester\_626, corresponding to areas of higher relief including hills and ridges. The Boolgeeda, Uaroo, Macroy and Platform Land Systems are represented by VSA Abydos Plain-Chichester\_93, corresponding to areas of lower relief including stoney plains, and dissected slopes to raised plains (Figure 6; Figure 7).

The interrogation of the DBCA TEC and PEC database (DBCA 2019c as per Section 3.1) did not identify any TECs or PECs within the Desktop Study Area.

The interrogation of the DBCA *NatureMap* database (DBCA 2007-) also did not identify any TECs or PECs known to occur within the Desktop Study Area.

The search of the DoEE SPRAT database with regard to MNES listed under the EPBC Act (DoEE 2019) did not identify any TECs as occurring or potentially occurring within the vicinity of the Study Area (Appendix D). Appendix B presents definitions, categories and criteria for TECs and PECs (DBCA 2013a).





## Land Systems of the Study Area

Author: David Coultas

WEC Ref: MRL19-19-04

Filename: MRL19-19-04-f07.mxd

Scale: 1:75,000 (A4)

Projection: GDA 1994 MGA Zone 50

Revision: 0 - 4 April 2020



**Figure**

**7**



**WOODMAN**  
ENVIRONMENTAL

This map should only be used in conjunction with WEC report MRL19-19-04.



### 5.1.2 Regional Flora

The interrogation of the DBCA WA Herbarium specimen database and TPFL database (DBCA 2019d) returned a total of 14 significant vascular flora taxa that have records within the Desktop Study Area. All are DBCA-classified Priority flora. These are presented in Table 6. Appendix A presents conservation codes for Western Australia flora (DBCA 2019b).

A search of these databases using *NatureMap* (DBCA 2007-) was also undertaken as part of the Desktop Study to check for any recently added records and to confirm the records returned from the DBCA WA Herbarium specimen database and TPFL database search. As per Table 1, the database was interrogated using a central point (21° 10' 32" S, 118° 39' 41" E) with a 20 km buffer. The *NatureMap* search did not return any additional significant flora taxa.

**Table 6: Significant Flora Returned from Regional Database Searches (DBCA 2019d; DBCA 2007-)**

Taxon	Status	Source
<i>Acacia leeuweniana</i>	P1	DBCA 2019d; <i>NatureMap</i>
<i>Acacia levata</i>	P3	DBCA 2019d
<i>Bulbostylis burbridgeae</i>	P4	DBCA 2019d; <i>NatureMap</i>
<i>Eragrostis crateriformis</i>	P3	DBCA 2019d
<i>Euphorbia clementii</i>	P3	DBCA 2019d; <i>NatureMap</i>
<i>Gomphrena leptophylla</i>	P3	DBCA 2019d; <i>NatureMap</i>
<i>Goodenia nuda</i>	P4	DBCA 2019d; <i>NatureMap</i>
<i>Gymnanthera cunninghamii</i>	P3	DBCA 2019d; <i>NatureMap</i>
<i>Heliotropium muticum</i>	P3	DBCA 2019d; <i>NatureMap</i>
<i>Nicotiana umbratica</i>	P3	DBCA 2019d; <i>NatureMap</i>
<i>Phyllanthus hebecarpus</i>	P3	DBCA 2019d; <i>NatureMap</i>
<i>Stylidium weeliwolli</i>	P3	DBCA 2019d; <i>NatureMap</i>
<i>Terminalia supranitfolia</i>	P3	DBCA 2019d; <i>NatureMap</i>
<i>Triodia chichesterensis</i>	P3	DBCA 2019d; <i>NatureMap</i>

A search of Department of the Environment and Energy (DoEE) Species Profile and Threats (SPRAT) Database was undertaken to identify Matters of National Environmental Significance (MNES), including Threatened flora and TECs listed under the EPBC Act, that occur or have the potential to occur within the vicinity of the Study Area. As per Table 1, the search was undertaken using a central point (21° 10' 32" S, 118° 39' 41" E) with a 20 km buffer (DoEE 2019). The search did not identify any flora taxa listed as Threatened Species, or habitat for Threatened Species, as listed under the EPBC Act, that are likely to occur within the search area.

The search of the DoEE SPRAT database with regard to MNES listed under the EPBC Act identified one significant invasive introduced flora taxon, or habitat for this taxon, as likely to occur within the Desktop Study Area; being *Cenchrus ciliaris* (Buffel Grass). *Cenchrus ciliaris* is known to be widespread and common in the Pilbara (WA Herbarium 1998-). This taxon is considered by the States and Territories to pose a particularly significant threat to biodiversity as it is known to be invasive under certain conditions (Hussey *et. al.* 2007; DoEE 2019). The full results of the DoEE database search are presented in Appendix D.



A search of the WA Herbarium specimen database for records of introduced taxa within the Desktop Study Area was performed using *NatureMap* using the same search parameters as the *NatureMap* significant flora search. A total of five introduced taxa that have records within the vicinity (20 km) of the Study Area were returned. These taxa are presented in Section 5.1.5. Of these, *Calotropis procera* is a Declared Pest listed under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) (DPIRD 2019), and *Opuntia stricta* is a Declared Pest and a listed Weed of National Significance (WoNS) (AWC 2019) (Section 5.1.5).

### 5.1.3 Local Flora and Vegetation Surveys

Flora and vegetation assessments have been undertaken at Wodgina since 1989 (Dames and Moore 1989). Flora and vegetation surveys undertaken within the vicinity of the Study Area that are relevant to the Project are summarised in Table 4. The locations of relevant surveys undertaken within the Study Area are shown on Figure 8 (subject to the availability of survey boundary files).



**Table 4: Summary of Flora and Vegetation Surveys Previously Conducted in the Vicinity of the Study Area**

Project	Location	Study	Parameters of Survey	Number of Taxa	Vegetation	Significant Flora Taxa^	Introduced Taxa^
Flora, Vegetation and Fauna of the Proposed Expansion at Wodgina	Overlaps northern/central section of the Study Area	Mattiske (2000)	Not specified	214 taxa; 112 genera; 46 families	18 vegetation units; no TECs or PECs identified	<i>Acacia aphanoclada</i> (P1) listed although identification appears to be incorrect based on <i>FloraBase</i> records (WA Herbarium 1998-) and therefore is not considered further	3 taxa: <i>Aerva javanica</i> ; <i>Cenchrus ciliaris</i> ; <i>Sagina apetala</i>
Talison Minerals Wodgina Operations and Mt Francisco: Vegetation and Flora Survey and DRF and Priority Targeted Search	Overlaps southern/central section of the Study Area	Outback Ecology (2008)	Survey area traversed on foot	111 taxa; 69 genera; 36 families	11 vegetation units; no TECs or PECs identified	-	3 taxa: <i>Aerva javanica</i> ; <i>Passiflora foetida</i> var. <i>hispida</i> ; <i>Cenchrus ciliaris</i>
Wodgina DSO Project Flora and Vegetation Assessment	Overlaps southern/central section of Study Area	Outback Ecology (2009)	41 quadrats; 66 relevès over 550 ha	122 taxa; 67 genera; 38 families	12 vegetation units; no TECs or PECs identified	1 taxon: <i>Terminalia supranitifolia</i> (P3)	1 taxon: <i>Aerva javanica</i>
Turner River Hub (TRH) Project Flora, Vegetation and Mangal Studies	Overlaps a small part of the eastern section of the Study Area	Woodman Environmental (2011a)	17 quadrats within the Study Area	Full number of taxa not relevant given survey area extends far beyond the Study Area	11 vegetation units within the Study Area	2 taxa within the Study Area: <i>Euphorbia clementii</i> (P3); <i>Terminalia supranitifolia</i> (P3); <i>Triodia chichesterensis</i> (P3)*	2 taxa within the Study Area <i>Aerva javanica</i> ; <i>Cenchrus ciliaris</i>
Wodgina Ore Stockpile Area Flora and Vegetation Assessment	Overlaps part of the northern section of the Study Area	Woodman Environmental (2011b)	3 relevès over 12 ha	19 dominant taxa	3 vegetation units; no TECs or PECs identified	1 taxon: <i>Euphorbia clementii</i> (P3)	1 taxon: <i>Cenchrus ciliaris</i>



Project	Location	Study	Parameters of Survey	Number of Taxa	Vegetation	Significant Flora Taxa^	Introduced Taxa^
Wodgina Proposed Tower Base and Access Road Flora and Vegetation Assessment	Overlaps the central/eastern section of the Study Area	Woodman Environmental (2012b)	8 relevés over 4.2 ha	33 dominant taxa	5 vegetation units; no TECs or PECs identified	1 taxon: <i>Terminalia supranitifolia</i> (P3)	2 taxa: <i>Aerva javanica</i> ; <i>Cenchrus ciliaris</i>
Flora and Vegetation Studies for the Hercules Project	Forms central western section of the Study Area	Woodman Environmental (2012c)	68 quadrats over 1583.9 ha	211 taxa; 105 genera; 43 families	6 vegetation units; no TECs or PECs identified	3 taxa: <i>Euphorbia clementii</i> (P3); <i>Terminalia supranitifolia</i> (P3); <i>Triodia chichesterensis</i> (P3)* <i>Vigna triodiophila</i> (P3)	6 taxa: <i>Aerva javanica</i> ; <i>Cenchrus ciliaris</i> ; <i>Cynodon dactylon</i> ; <i>Flaveria trinervia</i> ; <i>Passiflora foetida</i> var. <i>hispida</i> ; <i>Trianthema portulacastrum</i>
Hercules DSO Project Conservation Significant Flora Assessment	Forms central section of the Study Area	Woodman Environmental (2013a)	Survey area traversed	-	-	1 taxon: <i>Terminalia supranitifolia</i> (P3)	-
Wodgina Proposed Tower Base and Access Road Flora and Vegetation Assessment – Additional Assessment	Overlaps a small part of the central section of the Study Area	Woodman Environmental (2013b)	8 relevés over 2.74 ha	26 dominant taxa	5 vegetation units; no TECs or PECs identified	1 taxon: <i>Terminalia supranitifolia</i> (P3)	2 taxa: <i>Aerva javanica</i> ; <i>Cenchrus ciliaris</i>
Great Northern Highway (GNH) Upgrade Project Flora and Vegetation Assessment	Overlaps a small part of the north-eastern section of the Study Area	Woodman Environmental (2013c)	5 quadrats within the Study Area	Full number of taxa not relevant given survey area extends far beyond the Study Area	4 vegetation units within the Study Area	No taxa within the Study Area	2 taxa within the Study Area <i>Aerva javanica</i> ; <i>Cenchrus ciliaris</i>



Project	Location	Study	Parameters of Survey	Number of Taxa	Vegetation	Significant Flora Taxa^	Introduced Taxa^
Flora and Vegetation of the Cassiterite Pit Extension and EWL Extension	Overlaps part of the central section of the Study Area	Western Botanical (2017)	7 quadrats; 37 relevés over 110.12 ha	114 taxa; 65 genera; 31 families	5 vegetation units; no TECs or PECs identified	1 taxon: <i>Terminalia supranitifolia</i> (P3)	5 taxa: <i>Aerva javanica</i> ; <i>Cenchrus ciliaris</i> ; <i>Chloris barbata</i> ; <i>Passiflora foetida</i> ; <i>Physalis angulata</i>
Wodgina Mine Site and Proposed Airstrip Flora, Vegetation and Fauna Assessment	Overlaps the majority of the Study Area	360 Environmental Pty Ltd (360 Environmental) (2018a)	17 relevés over 988 ha	56 taxa; 34 genera; 18 families	8 vegetation units; no TECs or PECs identified	2 taxa: <i>Terminalia supranitifolia</i> (P3); <i>Heliotropium muticum</i> (P3)	4 taxa: <i>Aerva javanica</i> ; <i>Calotropis procera</i> ; <i>Cenchrus ciliaris</i> ; <i>Passiflora foetida</i> var. <i>hispida</i>
Wodgina Mine and Additional Gas Pipeline Flora, Vegetation, Fauna and Targeted Northern Quoll Assessment	Overlaps part of the central section of the Study Area	360 Environmental (2018b)	20 relevés over 1869 ha	79 taxa; 51 genera; 25 families	18 vegetation units; no TECs or PECs identified	-	2 taxa: <i>Aerva javanica</i> ; <i>Cenchrus ciliaris</i>
Wodgina Mine Flora, Vegetation and Fauna Assessment Addendum	Overlaps part of the central/northern section of the Study Area	360 Environmental (2018c)	5 relevés over 96 ha	43 taxa; 28 genera; 18 families	8 vegetation units; no TECs or PECs identified	1 taxon: <i>Terminalia supranitifolia</i> (P3)	5 taxa: <i>Aerva javanica</i> ; <i>Calotropis procera</i> ; <i>Cenchrus ciliaris</i> ; <i>Cyperus ?rotundus</i> ; <i>Passiflora foetida</i> var. <i>hispida</i>
Wodgina Aerodrome Detailed Flora and Vegetation Survey	8 km north of the Study Area	360 Environmental (2018d)	7 quadrats; 4 relevés over 469 ha	62 taxa; 36 genera; 20 families	2 vegetation units; no TECs or PECs identified	1 taxon: <i>Heliotropium muticum</i> (P3)	-

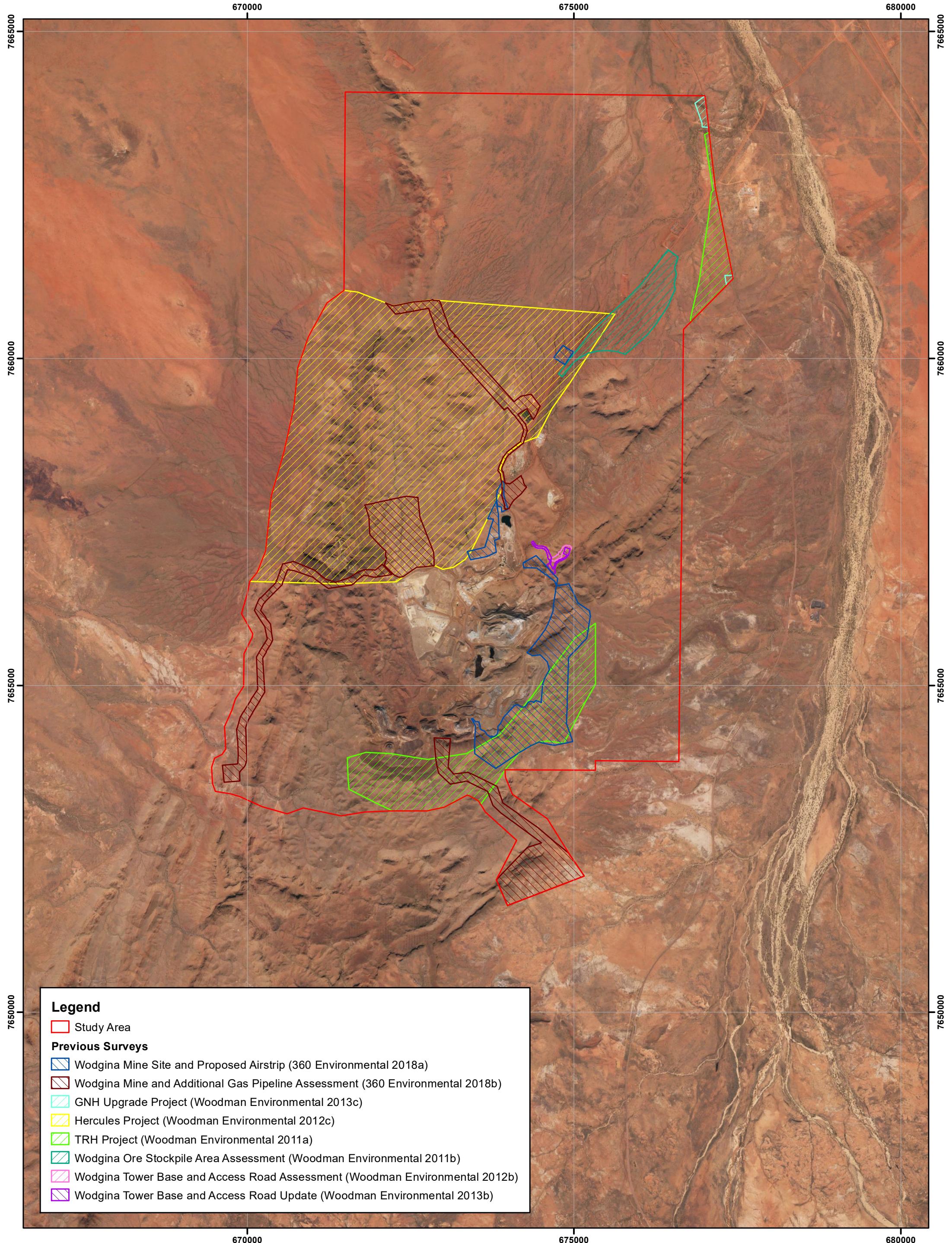


Project	Location	Study	Parameters of Survey	Number of Taxa	Vegetation	Significant Flora Taxa^	Introduced Taxa^
Wodgina Iron Ore Project 2018 Rehabilitation Monitoring	Within the Study Area	Woodman Environmental (2018)	6 baseline quadrats, rehabilitation transects established	NA	NA	NA	NA

^Significant flora and introduced flora as per current *FloraBase* listing (WA Herbarium 1998)

\*The *Triodia* aff. *basedowii* collections recorded by Woodman Environmental 2011a and 2012c are referable to *Triodia chichesterensis*, which was described as a new taxon following taxonomic studies undertaken after these reports were finalised.





This map should only be used in conjunction with WEC report MRL19-19-04.



### Flora and Vegetation Surveys Previously Conducted within the Study Area

Revision: 0 - 4 Apr 2020

Scale: 1:50,000 (A3)

Author: David Coultas

WEC Ref: MRL19-19-04

Filename: MRL19-19-04-f08.mxd

Projection: GDA 1994 MGA Zone 50

**Figure**

**8**



### 5.1.4 Summary of Significant Flora

A list of significant flora taxa known from within the Study Area and surrounds is presented in Table 5. This list has been compiled from the results of the desktop searches of the DBCA WA Herbarium and TPFL Databases (DBCA 2019d), DBCA *NatureMap* (DBCA 2007-), DoEE's SPRAT Database (DoEE 2019) and the results of local surveys as outlined in Section 5.1.3.

A total of 15 significant taxa are known from within the vicinity of the Study Area. These are all DBCA-classified Priority flora, with no Threatened flora returned. Of these, five taxa are known from within the Study Area itself (highlighted in yellow in Table 5). Figure 9 presents the known historical locations of significant flora taxa in the desktop study area.

**Table 5: Significant Flora Taxa Known from the Study Area and Surrounds**

Taxon	Status	Source*	Flowering Period (WA Herbarium 1998-)	Habitat (WA Herbarium 1998-)
<i>Acacia leeuweniana</i>	P1	DBCA 2019d; <i>NatureMap</i>	Not specified	Granite outcrops
<i>Acacia levata</i>	P3	DBCA 2019d	Not specified	Stony plains, granite hills and outcrops
<i>Bulbostylis burbridgeae</i>	P4	DBCA 2019d; <i>NatureMap</i>	March or June to August	Granite outcrops
<i>Eragrostis crateriformis</i>	P3	DBCA 2019d	February to August	Drainage lines and clay pans
<i>Euphorbia clementii</i>	P3	DBCA 2019d; <i>NatureMap</i> ; Woodman Environmental	May to June	Rocky slopes and plains
<i>Gomphrena leptophylla</i>	P3	DBCA 2019d; <i>NatureMap</i>	March to September	Plains, flats and drainage lines
<i>Goodenia nuda</i>	P4	DBCA 2019d; <i>NatureMap</i>	March to July	Plains, flats and drainage lines
<i>Gymnanthera cunninghamii</i>	P3	DBCA 2019d; <i>NatureMap</i>	January to December	Major drainage lines
<i>Heliotropium muticum</i>	P3	DBCA 2019d; <i>NatureMap</i> ; 360 Environmental	April to November	Plains and flats
<i>Nicotiana umbratica</i>	P3	DBCA 2019d; <i>NatureMap</i>	April to June	Rocky outcrops; usually granite
<i>Phyllanthus hebecarpus</i>	P3	DBCA 2019d; <i>NatureMap</i>	Not specified	Granite outcrops
<i>Stylidium weeliwolli</i>	P3	DBCA 2019d; <i>NatureMap</i>	March to October	Drainage lines, seepage areas on granite outcrops and edges of pools. Damp soil
<i>Terminalia supranitifolia</i>	P3	DBCA 2019d; <i>NatureMap</i> ; Outback Ecology; Western Botanical; Woodman Environmental; 360 Environmental	May, July or December	Rock outcrops, cliffs and breakaways



Taxon	Status	Source*	Flowering Period (WA Herbarium 1998-)	Habitat (WA Herbarium 1998-)
<i>Triodia chichesterensis</i>	P3	DBCA 2019d; <i>NatureMap</i> ; Woodman Environmental	Not applicable – after rainfall	Plains and low ridges
<i>Vigna triodiophila</i>	P3	Woodman Environmental	March to June	Rocky hills, slopes and outcrops among boulders

\*Sources are:

DBCA 2019d – DBCA WA Herbarium and TPFL Databases;

Mattiske – Mattiske (2000);

*NatureMap* – (DBCA 2007-);

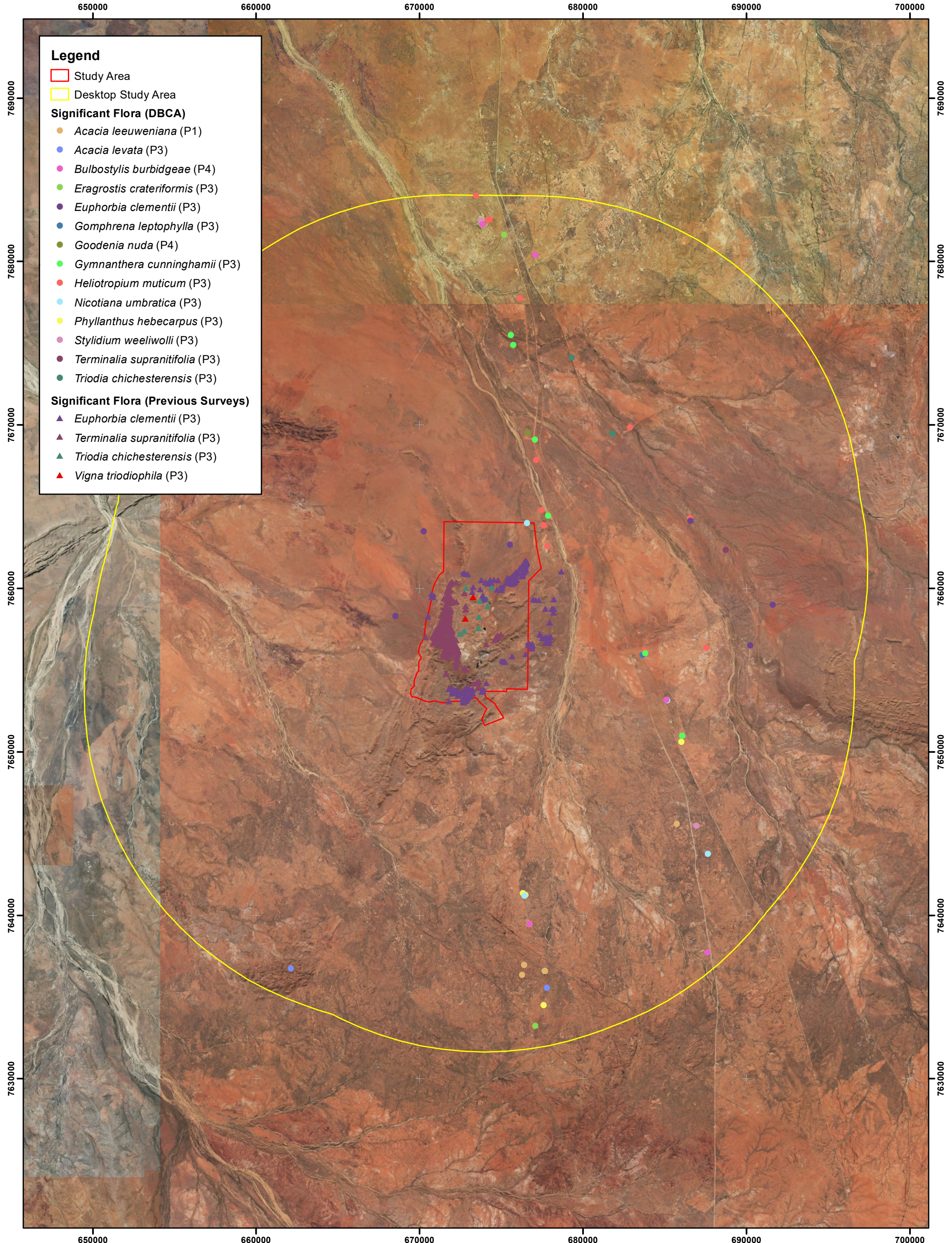
Outback Ecology – Outback Ecology (2008; 2009);

Western Botanical – Western Botanical (2017);

Woodman Environmental – Woodman Environmental (2011a; 2011b; 2012b; 2012c; 2013a; 2013b); and

360 Environmental – 360 Environmental (2018a; 2018b; 2018c; 2018d)







### 5.1.5 Summary of Introduced Flora

A list of introduced flora taxa known from within the Study Area and surrounds is presented in Table 6. The information presented has been compiled from the DBCA *NatureMap* search (DBCA 2007-), DoEE's SPRAT Database (DoEE 2019) and the results of local surveys as outlined in Section 5.1.3.

A total of 12 introduced taxa are known to occur in or within the vicinity of the Study Area. Of these, *Calotropis procera* is a Declared Pest listed (DPIRD 2019), and *Opuntia stricta* is a Declared Pest and a listed WoNS (AWC 2019; DPIRD 2019) (see Section 5.1.2).

**Table 6: Introduced Flora Taxa Known from the Study Area and Surrounds**

Taxon	Common Name	Source*
<i>Aerva javanica</i>	Kapok Bush	Mattiske; <i>NatureMap</i> ; Outback Ecology; Western Botanical; Woodman Environmental; 360 Environmental
<i>Calotropis procera</i>	Calotrope	<i>NatureMap</i> ; 360 Environmental
<i>Cenchrus ciliaris</i>	Buffel Grass	DoEE; Mattiske; <i>NatureMap</i> ; Outback Ecology; Western Botanical; Woodman Environmental; 360 Environmental
<i>Chloris barbata</i>	Purpletop Chloris	Western Botanical
<i>Cynodon dactylon</i>	Couch	Woodman Environmental
<i>Cyperus rotundus</i>	Nut Grass	360 Environmental (recorded <i>Cyperus? rotundus</i> )
<i>Flaveria trinervia</i>	Speedy Weed	Woodman Environmental
<i>Passiflora foetida</i> var. <i>hispida</i>	Stinking Passion Flower	Outback Ecology; Western Botanical; Woodman Environmental; 360 Environmental
<i>Physalis angulata</i>	Wild Gooseberry	Western Botanical
<i>Opuntia stricta</i>	Common Prickly Pear	<i>NatureMap</i>
<i>Sagina apetala</i>	Annual Pearlwort	Mattiske
<i>Trianthema portulacastrum</i>	Giant Pigweed	<i>NatureMap</i> ; Woodman Environmental

\*Sources are:

DoEE – DoEE (2019);

Mattiske – Mattiske (2000);

*NatureMap* – DBCA (2007-);

Outback Ecology – Outback Ecology (2008; 2009);

Western Botanical – Western Botanical (2017);

Woodman Environmental – Woodman Environmental (2011a; 2011b; 2012b; 2012c; 2013a; 2013b); and

360 Environmental – 360 Environmental (2018a; 2018b; 2018c; 2018d).

### 5.1.6 Summary of Significant Vegetation

No listed significant vegetation is known to occur in or within the vicinity of the Study Area based on searches of the DBCA TEC and PEC databases (DBCA 2019c), DBCA *NatureMap* (DBCA 2007-), DoEE's SPRAT Database (DoEE 2019) and the results of local surveys as outlined in Section 5.1.3.



## 5.2 Field Survey

### 5.2.1 Flora

#### 5.2.1.1 Vascular Flora Census

A total of 267 discrete vascular flora taxa (including eight introduced taxa), two known hybrids (as per WA Herbarium (1998-)) and five putative hybrids were recorded during the 2018/2019 surveys within the Study Area. The taxa and hybrids represent 51 families and 130 genera. The most well-represented families were Fabaceae (49 taxa, two known hybrids and five putative hybrids), Poaceae (46 taxa) and Malvaceae (23 taxa).

Within quadrats established in 2018/2019, the average taxon richness per quadrat was 22.58 ( $\pm$  11.97), with the greatest number of taxa recorded in a single quadrat being 68 (WDM25) and the lowest being seven (WD48, WDM21 and WDM11).

A total of 300 discrete vascular flora taxa (including 11 introduced taxa), three known hybrids (as per WA Herbarium (1998-)) and seven putative hybrids have been recorded in the Study Area during the 2018/2019 surveys and relevant previous surveys within the Study Area, including Western Botanical (2017) and Woodman Environmental (2011a; 2011b; 2013a; 2013b; 2013c). These taxa and hybrids represent 52 families and 138 genera. The most well-represented families were Fabaceae (55 taxa, three known hybrids and seven putative hybrids), Poaceae (51 taxa) and Malvaceae (26 taxa).

Average taxon richness per quadrat across all quadrats utilised in the analysis was 24.76 ( $\pm$  13.0), with the greatest number of taxa recorded in a single quadrat being 70, and the lowest number being seven.

A full list of taxa recorded within the Study Area is presented in Appendix F.

Several collections could not be identified to species level because of poor material. Some are known to be distinct taxa relative to other taxa recorded by the survey – these are included in the totals presented above, and in Appendix F (e.g. *Maireana* sp.). Other collections may represent distinct taxa relative to other taxa recorded by the survey; however it is more likely that they represent taxa already recorded elsewhere, with the quality of the material such that this distinction cannot be made (e.g. *Acacia* sp.). Such collections are not included in the totals above.

A total of two taxa (*Cajanus cinereus* and *Eriachne ciliata*) recorded during previous surveys of the Study Area (Woodman Environmental 2012c) were not included in the taxon counts above, or in Appendix F. *Cajanus cinereus* is apparently very similar to *Cajanus pubescens*, a taxon identified by this current survey, with available information indicating that these taxa differ only in quantitative flora attributes (WA Herbarium 1998-). Further study of these taxa may elucidate qualitative differences; however, in the meantime these taxa have been combined under the name *Cajanus pubescens*, as often plants are observed without flowering material and cannot be ascribed to either taxon. *Eriachne ciliata* is considered unlikely to occur in the Study Area, with records of this species likely referable to the recently established name *Eriachne* sp. Dugald River (B.K. Simon+ 3007), which was



recorded by this current survey. However, this cannot be verified for all records without collection of material at each record.

It should be noted that taxa from Western Botanical (2017) have not been verified by Woodman Environmental. Taxa from the 2018/2019 surveys with incomplete identifications were not included in the total taxa tally described above, and nor were an additional seven taxa listed by Western Botanical (2017) (*Acacia victoriae*, *Euphorbia coghlanii*, *Euphorbia drummondii*, *Heliotropium ovalifolium*, *Melaleuca lasiandra*, *Polymeria lanata* and *Swainsona pterostylis*) which are considered likely to be misidentifications based on knowledge of their distributions in the Pilbara (Woodman Environmental field observations) and their similarity to other taxa recorded by Woodman Environmental in the Study Area. As outlined above, *Cajanus cinereus* and *Eriachne ciliata* are likely to be synonymous with *Cajanus pubescens* and *Eriachne* sp. Dugald River (B.K. Simon+ 3007) respectively; they have therefore not been included as additional taxa or included in Appendix F. In addition, taxa were not included from the following surveys:

- Mattiske (2000); Outback Ecology (2008; 2009) – data unverifiable;
- 360 Environmental (2018a; 2018b) – surveys included areas (and taxa) outside Study Area; and
- 360 Environmental (2018c) – full list of taxa not presented in report or appendices.

#### 5.2.1.2 Significant Flora Taxa

Table 7 presents a summary of data relating to significant flora taxa recorded in the Study Area. A total of six significant flora taxa have been recorded from the Study Area by this current survey and previous surveys, including five Priority flora taxa (discussed in Section 5.2.1.3) and one taxon considered significant for other reasons as per EPA (2016a; 2016b) (discussed in Section 5.2.1.5). No Threatened flora taxa were recorded within the Study Area.

As noted in Section 5.1.4, *Nicotiana umbratica* (P3) is known to occur within the Study Area, with a single WA Herbarium record (DBCA 2019d) in the north-eastern corner of the Study Area (Figure 9). However, investigation of this record indicates that this record has erroneous coordinates. The locality description attached to the record notes that it is from the “Road to Nullagine, 2-5 km from junction with Great Northern Highway”. Although this description is fairly vague, it is certainly not within the Study Area. Notwithstanding this, in the general vicinity of the Study Area, *Nicotiana umbratica* is restricted to overhangs and cracks in granite boulders (Woodman Environmental field observations; WA Herbarium 1998-); this habitat does not occur at the coordinates of the record. This taxon is therefore not considered to occur within the Study Area.

Locations of significant flora taxa recorded in the Study Area are presented in Appendix G, Figure 10 and in Appendix H. Detailed descriptions of these taxa are provided below.



**Table 7: Summary of Significant Flora Taxa Recorded within the Study Area**

Taxon	Status	No. of Locations Recorded			No. of Individuals Recorded			Vegetation Units
		Study Area		Total	Study Area		Total	
		2018/2019*	Previous Surveys**		2018/2019*	Previous Surveys**		
<i>Abutilon</i> aff. <i>hannii</i>	Potentially undescribed	7	NR	7	51	NR	51	9, 14^
<i>Euphorbia clementii</i>	P3	181	171	352	60,044	1,739	61,783	1, 2^, 4, 5, 6, 7, 9^, 10^, 11^, 12, 13, 14
<i>Heliotropium muticum</i>	P3	1	NR	1	20	NR	20	1^
<i>Terminalia supranitifolia</i>	P3	339	750	1,089	1,241	1,062	2,303	2, 3, 4^, 5, 7, 8, 9^, 14
<i>Triodia chichesterensis</i>	P3	1,955	3	1,958	1,968,600	NR	1,968,600	1, 2, 4^, 5^, 6^, 7^, 8^, 9^, 10, 11, 12^, 13, 14
<i>Vigna triodiophila</i>	P3	167	2	169	2,482	NR	2,482	2, 7, 9^, 14

\*Includes significant flora data with some locations collected directly outside the Study Area as a result of surveys for the Project.

\*\*Includes significant flora data with locations in the Study Area from surveys: Woodman Environmental (2011a; 2011b; 2012b; 2013a; 2013b); Outback Ecology (2009).

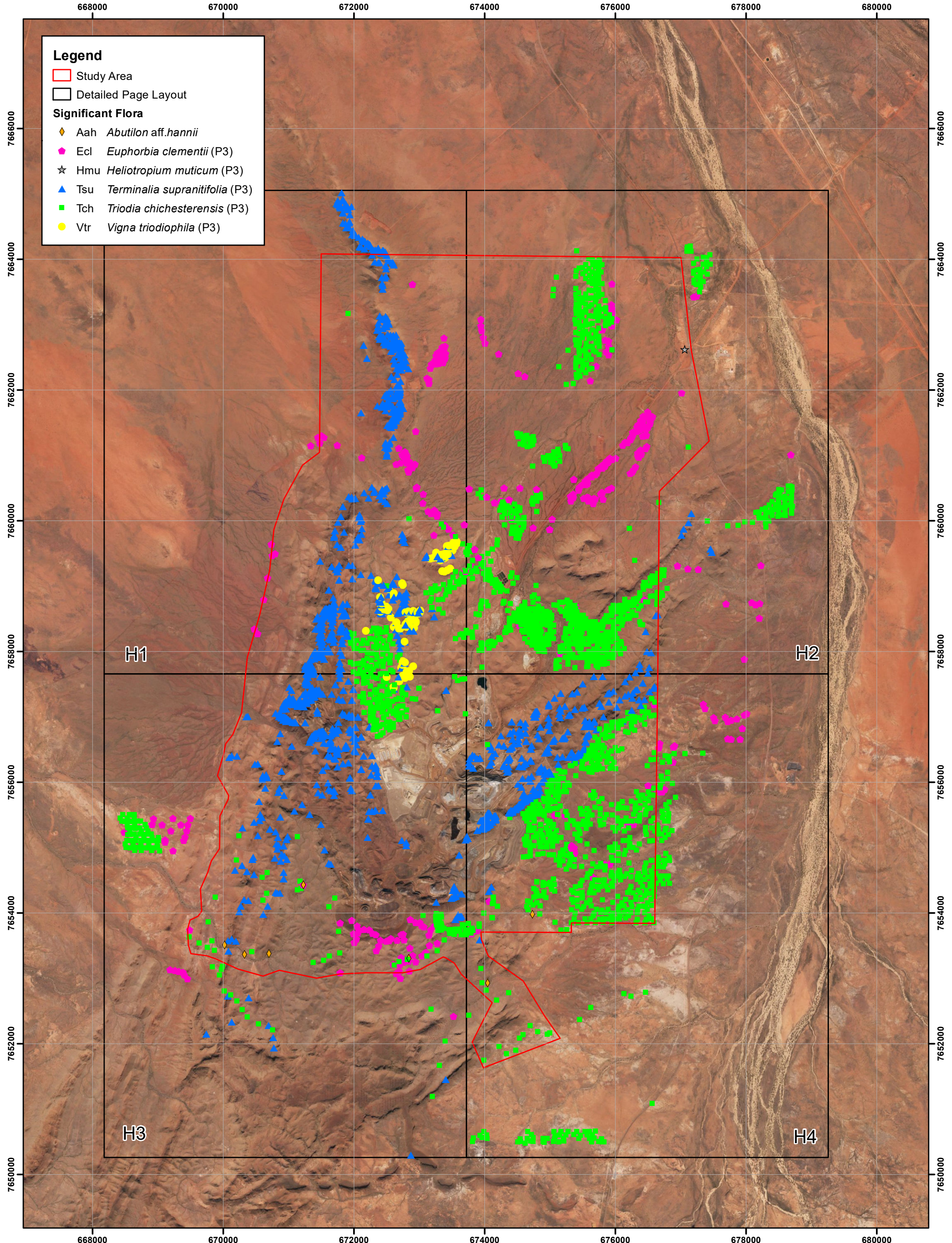
NR = Not recorded.

^Designates preferred habitat, based on proportional location representation and landforms/soils.

Significant flora data not included from the following surveys:

- Mattiske (2000) – data outdated;
- Western Botanical (2017) – no location data presented in report or appendices; and
- 360 Environmental (2018a; 2018b; 2018c) – no location data presented in report or appendices.





**Legend**

Study Area

Detailed Page Layout

**Significant Flora**

Aah*Abutilon* aff.*hannii*

Ecl*Euphorbia clementii* (P3)

Hmu*Heliotropium muticum* (P3)

Tsu*Terminalia supranitifolia* (P3)

Tch*Triodia chichesterensis* (P3)

Vtr*Vigna triodiophila* (P3)



### 5.2.1.3 Listed Significant Flora Taxa

#### *Euphorbia clementii* (P3)

*Euphorbia clementii* (P3) is an erect herb growing to 0.6 m high, that occurs on stony plains, and often within sandy flow lines that dissect such plains (Woodman Environmental field observations; WA Herbarium 1998-) (Plate 3). This taxon appears to be endemic to the Abydos Plain in northern part of the Pilbara region of Western Australia (ALA 2019), occurring over a range of 300 km from near Port Hedland in the west to Woodie Woodie in the east. There is a single disjunct record much further south near the southern corner of Karijini National Park (near West Angelas Iron Ore mine), however this is not represented by a WA Herbarium collection and therefore requires verification (DBCA 2007-).

There are 35 records of this taxon in DBCA's databases representing approximately 25 populations (including the population in the Study Area, none of which occur in DBCA-managed tenure (DBCA 2007-). The population of this taxon in the Study Area is located on the western edge of the known range of this taxon.

This taxon is known to occur widely across the Study Area (Figure 10). A total of 60,044 individuals of *Euphorbia clementii* were recorded at 181 point locations in the Study Area during surveys in 2018/2019 (Table 7; Appendix G). In total, 352 point locations consisting of 61,783 individuals have been recorded within the Study Area (including some locations just outside the Study Area boundary). However, there are no extant plants at many locations because of time since fire – this is discussed further below. These are considered to represent a single population. These locations occur within VUs 1, 2, 4, 5, 6, 7, 9, 10, 11, 12, 13 and 14, with VUs 2, 9, 10 and 11 considered to represent the preferred habitat for this taxon (Appendix H).

*Euphorbia clementii* had previously been recorded at numerous locations within the Study Area (Woodman Environmental 2012c; 2013a). This taxon is well known to occur almost exclusively in areas that have been recently burnt (Woodman Environmental field observations). Almost all individuals previously recorded in the Study Area were recorded in areas known to have been burnt within the previous 12 months (Woodman Environmental field observations). Indeed, the majority of individuals of *Euphorbia clementii* recorded by the 2018/2019 survey occurred in a single small sandy flat area in the northern part of the Study Area that had been burnt within a few months of the survey being conducted, while only widely scattered individuals were recorded in unburnt areas. Similarly, outside the Study Area, almost all *Euphorbia clementii* plants recorded in 2018/2019 were located in recently burnt areas. Although a significant number of individuals were recorded in these recently burnt areas, very few individuals were recorded elsewhere within unburnt areas that were the subject of targeted survey, despite almost identical habitat to the aforementioned burnt area being present elsewhere.

The relative absence of individuals in areas that were the subject of targeted survey is therefore considered to be the result of such areas not being recently burnt, rather than individuals either not occurring or being overlooked by the targeted surveys. This was reinforced following a visit in 2019 to several locations where this taxon had been recorded in 2018 in recently burnt areas, where hundreds of plants had been observed. At two



locations, no plants could be located in 2019, while at the third only a few unhealthy individuals were found. It is probable that most individuals of this species do not live beyond 12 months post-fire.



**Plate 3: *Euphorbia clementii* (P3) (Woodman Environmental 2018)**

### ***Heliotropium muticum* (P3)**

*Heliotropium muticum* (P3) is an ascending to spreading perennial herb growing to 0.3 m high, and generally occurs on coarse sandy plains and flats (WA Herbarium 1998-) (Plate 4). This taxon appears to be endemic to the Abydos Plain in northern part of the Pilbara region of Western Australia (ALA 2019), occurring over a range of approximately 240 km from near Marble Bar in the east to Whim Creek (west of Port Hedland) in the west (DBCA 2007-).

There are 73 records of this taxon in DBCA's databases representing approximately 32 populations (not including the population in the Study Area), none of which occur in DBCA-managed tenure (DBCA 2007-). The Study Area is located within the known range of this taxon.

This taxon is restricted in distribution in the Study Area (Figure 10), with a total of 20 individuals recorded at one point location in the Study Area during surveys in 2018/2019. This location occurs in VU 1 (Table 7; Appendix H). Extensive survey for this taxon has not located it elsewhere in the Study Area; this was expected, as this species is known to be far more common on the granite-derived coarse sandy plains to the east of the Study Area (Woodman Environmental field observations). *Heliotropium muticum* is typically recorded following recent fire and, like *Euphorbia clementii*, is short-lived. It is possible that further potential habitat is present within the Study Area where plants would reappear following fire or disturbance, however, this is not considered likely.





**Plate 4: *Heliotropium muticum* (P3) (Photos: Woodman Environmental 2018)**

### ***Terminalia supranitifolia* (P3)**

*Terminalia supranitifolia* (P3) is a spreading, tangled shrub or tree growing to 3 m high, and generally occurs on rock outcrops, cliffs and breakways (WA Herbarium 1998-) (Plate 5). This taxon is endemic to the northern part of the Pilbara region of Western Australia (ALA 2019), occurring over a range of approximately 275 km from Kangan Station in the east to near Pannawonica in the west (DBCA 2007-).

There are 56 records of this taxon in DBCA's databases, representing approximately 10 populations (including the population in the Study Area), two of which occur in DBCA tenure including Murujunga National Park (on Burrup Peninsula) and Dolphin Island Nature Reserve (DBCA 2007-). The majority of records of this taxon (including nine of the 10 populations) occur over 190 km west of the Study Area. The other locality (consisting of four records) is within the Study Area itself (one locality has erroneous coordinates and plots outside the Study Area but is known to have been collected within the Study Area by Woodman Environmental). The Study Area population is therefore the eastern-most known occurrence of this taxon.

This taxon occurs widely across the Study Area (Figure 10), with a total of 1,241 individuals recorded at 339 point locations in the Study Area (including a number just outside the Study Area) during surveys in 2018/2019 (Table 7; Appendix G). In total, 1,089 point locations consisting of 2,303 individuals have been recorded within the Study Area (including some locations just outside the Study Area boundary). These are considered to represent a single population. The locations occur within VUs 2, 3, 4, 5, 7, 8, 9 and 14, of which VUs 4 and 9 are considered to represent preferred habitat for this taxon (Appendix H).





**Plate 5: *Terminalia supranitifolia* (P3) (Photos: Woodman Environmental 2012)**

### ***Triodia chichesterensis* (P3)**

*Triodia chichesterensis* (P3) is a hummock grass growing to 0.4 m high, that generally occurs on stony plains and low stony ridges (usually calcrete or quartz-derived) (WA Herbarium 1998-) (Plate 6). This taxon appears to be endemic to the Abydos Plain in northern part of the Pilbara region of Western Australia (ALA 2019), occurring over a range of approximately 91 km from north of Indee Station (south of Port Hedland) in the north to east of Mungaroona Nature Reserve in the south (DBCA 2007-).

There are 13 location records of this taxon in DBCA's databases, representing approximately nine populations (not including the Study Area), none of which occur in DBCA tenure (DBCA 2007-). Although the Study Area is located on the edge of the known range of this taxon (as provided on *NatureMap*; DBCA 2007-), this taxon was previously collected from Wodgina as *Triodia* aff. *basedowii* prior to the formal description of this taxon (Table 4).

This taxon occurs widely across the Study Area (Figure 10). A total of 1,968,600 individuals of *Triodia chichesterensis* were recorded at 1,955 point locations in the Study Area during surveys in 2018/2019 (Table 7; Appendix G). A further three locations of this taxon were recorded by previous surveys, with counts of individuals not made. These are considered to represent a single population. These locations occur within VUs 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, of which 4, 5, 6, 7, 8, 9, and 12 are considered to be preferred habitat for this taxon (Appendix H).

Both *Triodia chichesterensis* and *Triodia scintillans*, a very superficially similar and closely related taxon (Anderson *et al.* 2017), were recorded during surveys in 2018. However, it was noted that additional material was required to conclusively determine whether one or both



were present in the Study Area (Woodman Environmental 2019). A number of collections of what were considered to be these taxa were made during 2019, with representative specimens sent to the WA Herbarium for identification. The WA Herbarium advised that all collections represent *Triodia chichesterensis* on account of lemma morphology, as well as the locality of the collections (M. Hislop *pers. comm.* 2019). The presence of 'sparkling droplets' on all specimens is somewhat at variance for this taxon, as it is not mentioned in its taxonomic description ; this was the primary reason that material collected in 2018 was identified as *Triodia scintillans*, which characteristically has 'sparkling droplets' (Anderson *et al.* 2017). However, there is a paucity of collections of *Triodia chichesterensis* at the WA Herbarium, and some do possess some sparkling droplets (M. Hislop *pers. comm.* 2019), indicating that this character may be somewhat variable, possibly depending on the level of drought stress.

*Triodia chichesterensis* primarily occurs on low dolerite hills and outwashes where calcrete has developed that surround the main range at Wodgina, and was recorded as dominating the ground stratum in most locations where it was present (Plate 6). The count of individuals recorded during the 2018/2019 survey can only be considered an indication of the abundance of the taxon in this area, with the recorded locations providing an overview of the distribution of this taxon throughout the Study Area.



**Plate 6: *Triodia chichesterensis* (P3) (Photos: Woodman Environmental 2018)**

### ***Vigna triodiophila* (P3)**

*Vigna triodiophila* (P3) is a perennial (ephemeral stems arising from a persistent woody rootstock) climber that occurs on rocky hills, slopes and outcrops among boulders (WA Herbarium 1998-) (Plate 7). This taxon appears to be endemic to the northern Pilbara in Western Australia (ALA 2019), with current DBCA records indicating it has a range of approximately 60 km from Burrup Peninsula (north of Karratha) in the north to near Lake Poongkaliyarra (south of Roebourne) in the south (DBCA 2007-). However, this taxon has



previously been recorded in the Study Area (Woodman Environmental 2012c), which extends its distribution to 205 km. The collection of this taxon was forwarded to the WA Herbarium for lodgement but was rejected because it was sterile.

There are 12 location records of this taxon in DBCA's databases, representing approximately six populations, with the Study Area representing an additional population. One population occurs in Murujunga National Park (on Burrup Peninsula) (DBCA 2007-). The Study Area population is therefore the eastern-most known occurrence of this taxon.

This taxon is relatively restricted in distribution in the Study Area (Figure 10). A total of 2,482 individuals of *Vigna triodiophila* were recorded at 167 point locations during surveys in 2018/2019 (Table 7; Appendix G; Appendix H). As noted above, it was recorded in the Study Area previously (two point locations), however, individuals were not counted. These locations occur within VUs 2, 7, 9 and 14, of which VU 9 is considered to be preferred habitat for this taxon (Appendix H).



**Plate 7:** *Vigna triodiophila* (P3) habit and typical position in landscape (Photos: Woodman Environmental 2019)

#### 5.2.1.4 Unlisted Significant Flora Taxa

##### *Abutilon* aff. *hannii*

A collection was made within the Study Area of an entity that has previously been identified by a specialist taxonomist at the WA Herbarium as *Abutilon* aff. *hannii*.

This entity matches a small number of collections from the Pilbara Bioregion, one of which is currently lodged as *Abutilon hannii*. However, these collections differ significantly in indumentum characters from all other *A. hannii* collections in the WA Herbarium (all of which are from the Kimberley Bioregion). Although there has been speculation as to



whether these collections may represent introgression between *A. macrum* and *A. hannii*, this was considered to be very unlikely given that typical *A. hannii* does not occur near the Pilbara. Therefore, this entity potentially represents an undescribed taxon. The genus *Abutilon* is currently under active revision and this taxon may fall within the concept of a described taxon upon publication of this revision (M. Hislop *pers. comm.* 2014, 2016). However, as a precaution, and given that it appears to occur in relatively specific habitat (rocky drainage lines) and is apparently not common, this entity is considered to be a significant taxon as per EPA (2016a).

This entity is relatively restricted in the Study Area (Figure 10), with a total of 51 individuals recorded at seven point locations in the Study Area during surveys in 2018/2019 (Table 7; Appendix G). These locations are all located within rocky drainage lines mapped as VU 14, with one location in a smaller drainage line mapped as VU 9; VU 14 is considered to represent the preferred habitat for this taxon (Appendix H). This entity has also been recorded nearby during surveys for the Corunna Project (Woodman Environmental 2016), McPhee Creek Rail Project (Woodman Environmental 2014a), Abydos DSO Project (Woodman Environmental 2012a) and Mt Webber DSO Project (Woodman Environmental 2012d), with few locations and low plant numbers recorded.



**Plate 8:** *Abutilon* aff. *hannii* (Woodman Environmental)

#### 5.2.1.5 Other Flora Taxa of Interest

##### *Polygala* aff. *saccopetala*

A collection identified as *Polygala* aff. *saccopetala* was made in the Study Area as part of the GNH Upgrade Project (Woodman Environmental 2013c). This entity has historically been identified as *Polygala longifolia*, however a revision of *Polygala* indicates that *Polygala longifolia* does not occur in the Pilbara. The same entity has been collected at two other nearby locations in the vicinity of Port Hedland (WA Herbarium 1998-), in the same sandy, granite-derived plain habitat that the collection in the Study Area was made from. It was also recorded at a further six locations in the GNH Upgrade Project survey area (Woodman Environmental 2013c).



Although this entity is of taxonomic interest, and may represent an undescribed species, its recording at a number of locations in a widespread habitat, albeit over a relatively restricted range, and past confusion with *Polygala longifolia*, indicates that it is unlikely to be of significance as per EPA (2016a). In any case, it appears to be restricted to the very eastern margin of the Study Area where some coarse granite-derived sandy plain habitat occurs, as no collections of this taxon were made in 2018 or 2019.

#### 5.2.1.6 Distribution Extensions and Distribution Gaps

Table 8 presents taxa where the collections of flora taxa from the Study Area represent extensions to the known distribution of such taxa or otherwise fill gaps within the known distribution of such taxa according to *NatureMap* (DBCA 2007-). With respect to significant flora taxa, populations in the Study Area occur within the known range of the taxa, however several form the edge of the known range of the taxon (e.g. *Terminalia supranitifolia* (P3), *Vigna triodiophila* (P3).

**Table 8: Taxa Where Collections Represent Range Extensions to the Known Ranges of these Taxa or Fill Distribution Gaps (DBCA 2007-)**

Taxon	Description
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	Fills gap in known distribution
<i>Cheilanthes contigua</i>	Fills gap in known distribution
<i>Goodenia cusackiana</i>	Fills gap in known distribution
<i>Triumfetta clementii</i>	Fills gap in known distribution
<i>Velleia connata</i>	Fills gap in known distribution

#### 5.2.1.7 Likelihood of Occurrence of Further Significant Flora Taxa

As detailed in Section 5.1.4, a total of 15 listed significant flora taxa were identified prior to the 2018/2019 survey as occurring within or in the vicinity of the Study Area. Of these, four taxa were already known to occur within the Study Area (Table 5) and one was recorded in the Study Area for the first time during the 2018/2019 surveys (*Heliotropium muticum* (P3)). It is considered that the remaining 10 taxa were identifiable during the survey period, either because the survey period coincided with the taxon's flowering period or the taxon can be identified reliably when in fruit or sterile. As such, the likelihood of these taxa occurring in the Study Area is considered to be relatively low.

It is considered that three Priority flora taxa could potentially occur in the Study Area as suitable habitat may be present in the Study Area. These are indicated in Table 9. The remaining 7 taxa are considered unlikely to occur in the Study Area, primarily because suitable habitat is not considered to be present in the Study Area (Table 9). In terms of taxa with habitats of granite outcrops, there are small areas of granite outcrops present in the Study Area but these areas are not sufficiently large enough to support these taxa, a number of which occur in cracks and under overhangs of large granite outcrops. Likewise, there are minor drainage areas within the Study Area but none of these are substantial enough to support *Gymnanthera cunninghamii* (P3).



**Table 9: Likelihood of Occurrence of Significant Flora Taxa in the Study Area**

Taxon	Status	Flowering Period (WA Herbarium 1998-)	Habitat (WA Herbarium 1998-)	Nearest Known Location to Study Area (DBCA 2007-)	Identifiable During Survey?	Likelihood of Occurrence in Study Area
<i>Acacia leeuweniana</i>	P1	Not specified	Large granite outcrops	12 km south-east	Yes	Unlikely – habitat not known to be present
<i>Acacia levata</i>	P3	Not specified	Granite plains, granite hills and outcrops	15 km south	Yes	Unlikely – habitat not known to be present
<i>Bulbostylis burbidgeae</i>	P4	March or June to August	Large granite outcrops	9 km east	Yes	Unlikely – habitat not known to be present
<i>Eragrostis crateriformis</i>	P3	February to August	Drainage lines and clay pans	17 km north	Yes	<b>Possible</b> – not recorded by this survey or previous surveys. Potential habitat present
<i>Gomphrena leptophylla</i>	P3	March to September	Floodplains, drainage lines and flats	8 km east	Yes	<b>Possible</b> – not recorded by this survey or previous surveys. Potential habitat present
<i>Goodenia nuda</i>	P4	March to July	Plains, flats and drainage lines	6 km north	Yes	<b>Possible</b> – not recorded by this survey or previous surveys. Potential habitat present
<i>Gymnanthera cunninghamii</i>	P3	January to December	Major drainage lines	< 1 km north	Yes	Unlikely – habitat not known to be present
<i>Nicotiana umbratica</i>	P3	April to June	Large granite outcrops	< 1 km north	Yes	Unlikely – habitat not known to be present
<i>Phyllanthus hebecarpus</i>	P3	Not specified	Large granite outcrops	10 km south south-east	Yes	Unlikely – habitat not known to be present
<i>Stylidium weeliwolli</i>	P3	March to October	Drainage lines, seepage areas on granite outcrops and edges of pools. Damp soil.	13 km south-east	Yes	Unlikely – habitat not known to be present



### 5.2.1.8 Introduced Taxa

A total of 11 introduced flora taxa are known from the Study Area, eight of which were recorded within the Study Area during the 2018/2019 surveys. Table 10 lists location information and comments regarding the significance of these taxa, including ecological impact and invasiveness ratings for each introduced taxon under the *Invasive Plant Prioritization Process for the DBCA* for the Pilbara Region (DBCA 2014). Note that *Calotropis procera* is a Declared Pest under the BAM Act (DPIRD 2019). No WoNS were recorded in the Study Area. An overview of locations of introduced flora taxa are presented on Figure 11, with detailed locations presented on Appendix G.

**Table 10: Summary of Introduced Taxa Recorded within the Study Area**

Taxon	Common Name	No. of Locations within the Study Area			Comments
		2018/2019	Previous Surveys*	Total	
<i>Aerva javanica</i>	Kapok	56	32	88	Ecological impact rated High, invasiveness rated Rapid (DBCA 2014)
<i>Calotropis procera</i>	Calotrope	3	1	4	Declared Pest (DPIRD 2019); Priority alert weed (DBCA 2014)
<i>Cenchrus ciliaris</i>	Buffel Grass	94	22	116	Considered by the States and Territories of Australia to pose a particularly significant threat to biodiversity (DoEE 2018a); Ecological impact rated High, invasiveness rated Rapid (DBCA 2014)
<i>Cenchrus setiger</i>	Birdwood Grass	28	0	28	Ecological impact rated High, invasiveness rated Rapid (DBCA 2014)
<i>Chloris barbata</i>	Purpletop Chloris	1	0	1	Ecological impact rated High, invasiveness rated Rapid (DBCA 2014)
<i>Cynodon dactylon</i>	Couch	1	1	2	Ecological impact rated High, invasiveness rated Rapid (DBCA 2014)
<i>Eragrostis minor</i>	Smaller Stinkgrass	0	1	1	Not rated by DBCA (2014)
<i>Flaveria trinervia</i>	Speedy Weed	3	9	12	Not rated by DBCA (2014)
<i>Passiflora foetida</i> var. <i>hispida</i>	Stinking Passionflower	3	16	19	Ecological impact rated High, invasiveness rated Rapid (DBCA 2014)
<i>Physalis angulata</i>	Wild Gooseberry	0	Recorded but number not specified^	-	Ecological impact and invasiveness Unknown (DBCA 2014)
<i>Trianthema portulacastrum</i>	Giant Pigweed	0	4	4	Not rated by DBCA (2014)

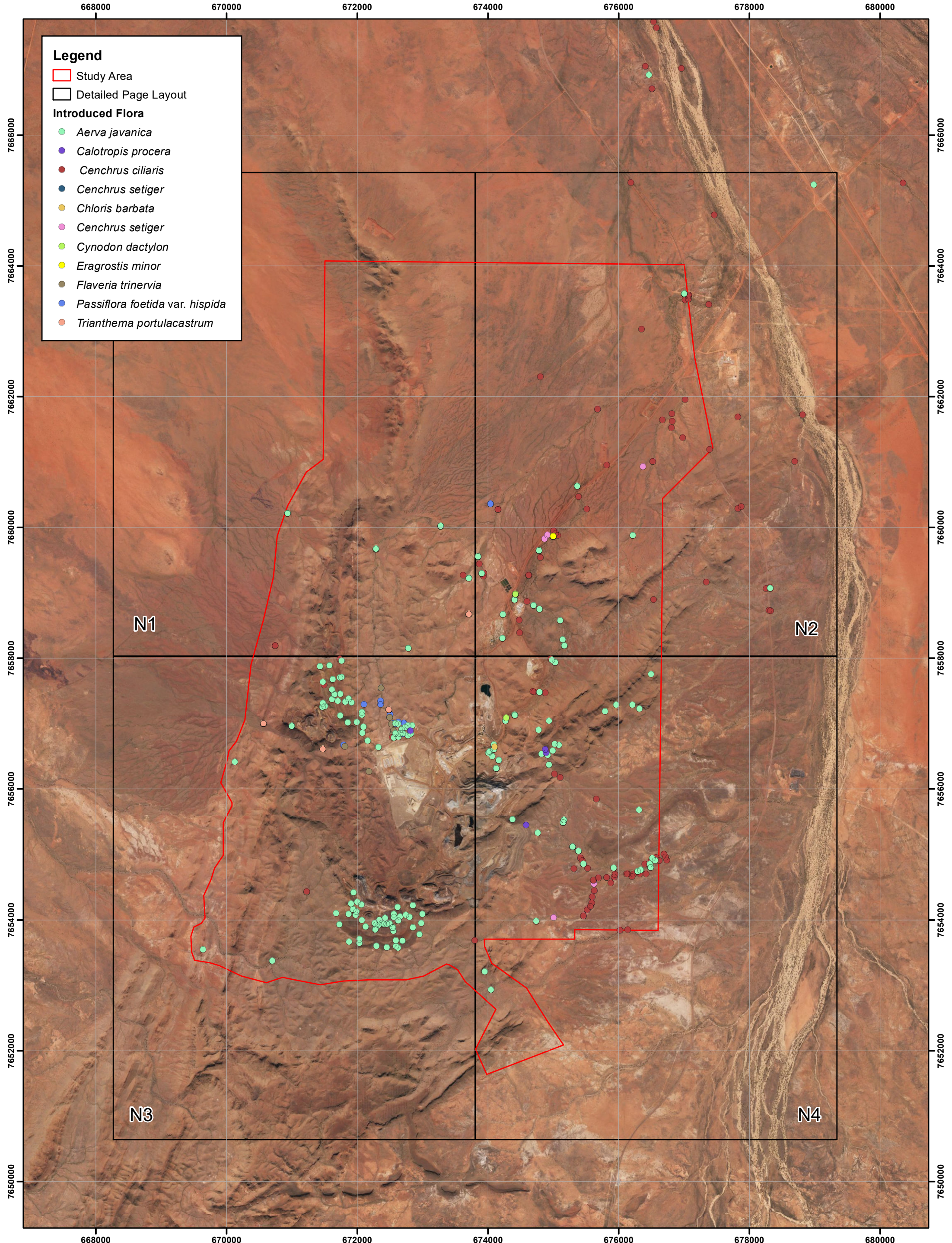
^Recorded by Western Botanical (2017); however, number of locations not specified.

\*Includes introduced flora data with locations in the Study Area from Woodman Environmental (2011a; 2012c; 2013a; 2013b; 2013c).

Introduced flora data not included from the following surveys:

- Mattiske (2000), Outback Ecology (2008; 2009) – data outdated;
- 360 Environmental (2018a; 2018b; 2018 c) – no location data presented in report or appendices.







## 5.2.2 Vegetation

### 5.2.2.1 Floristic Classification Results

The PATN software package (Belbin and Collins 2009) initially suggested that a 17-cluster classification of quadrats may be appropriate for the Study Area quadrat data. The resulting dendrogram (Appendix I) and taxon group matrix were therefore initially examined at this level, to determine the plausibility of clusters with regard to taxon groups and also field observations.

This examination found that four clusters (three containing one quadrat in each; one containing two quadrats) were misclassified and did not represent distinct clusters; these quadrats were manually reassigned following detailed investigation of individual quadrat datasets (including soil, topography and taxon composition/dominant taxa), and examination of field notes and the taxon group matrix. Conversely, 2 clusters contained two obvious sub-grouping of quadrats; examination of these quadrats found that these subgroups were worthy of distinction as individual clusters. This resulted in 15 plausible clusters being identified, which are considered to represent VUs in the Study Area. These clusters are ordered from one to fifteen from top to bottom in the dendrogram (Appendix I).

It should be noted that the above investigations of quadrat clusters also identified 18 other quadrats that were considered to have been misclassified; often this appeared to be because the quadrats were established in vegetation that was transitional, was particularly species-poor, or had been recently burnt. These quadrats were also manually reassigned into more appropriate clusters based on taxon composition. These quadrats are detailed in Appendix I.

### 5.2.2.2 Vegetation Units

A total of 15 vegetation units (VUs) were defined and mapped based on the results of the floristic classification analysis and subsequent examination of quadrat data. The 15 VUs defined represent four broad groups of vegetation, based on soils and topography:

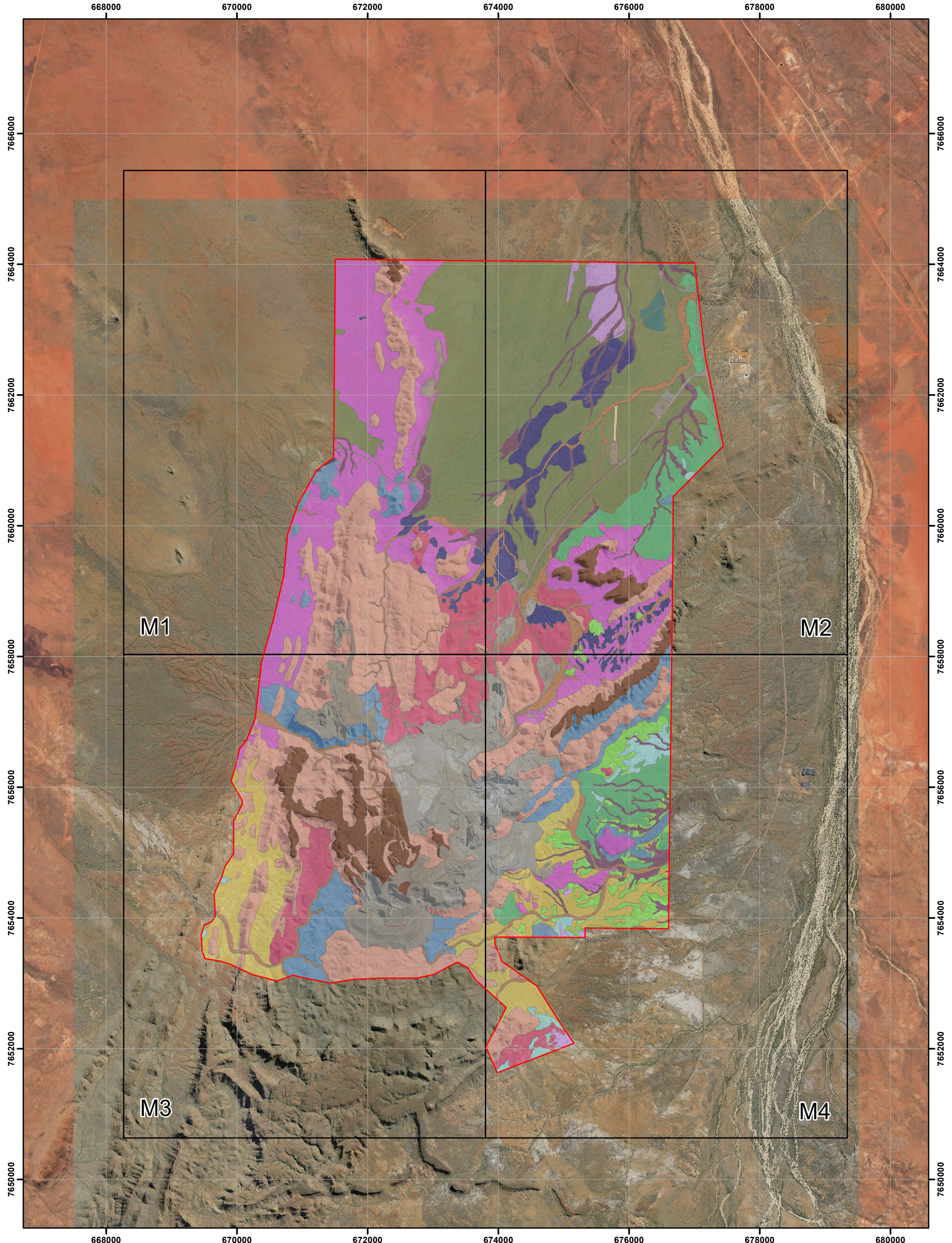
- Group 1: Shrublands over hummock grasslands on steep to moderate crests and slopes to stony outwash plains influenced by granite, ironstone and/or dolerite (VU 1, 2, 3, 4, 5, 6, 7, 8, 9).
- Group 2: Low woodlands and shrublands over hummock and occasionally tussock grasslands on low, undulating to flat plains and minor drainage lines with sandy to clay loams with granite or quartz stones (VU 10, 11, 12, 13).
- Group 3: Low woodlands and shrublands over hummock and tussock grassland on clay to sandy loams on major drainage lines (VU 14).
- Group 4: Shrublands over hummock grasslands on stony plains with saline influence (VU 15).

Figure 12 presents an overview of the distribution of these VUs throughout the Study Area. Table 11 presents a description of each of the VUs mapped in the Study Area, including location, area mapped, sampling regime, significant flora recorded, average taxon richness and a description of variation found within the VU. Indicator taxon analysis is presented in Appendix J. The raw quadrat data is presented in Appendix K.



Appendix L presents the resulting taxon-VU matrix. Appendix M presents the detailed vegetation unit mapping, with locations of quadrats.





**Overview of Vegetation Units  
of the Study Area**

Author: David Coultas  
WEC Ref: MRL19-19-04  
Filename: MRL19-19-04-f12-0.mxd  
Projection: GDA 1994 MGA Zone 50

**Figure  
12.0**

This map should only be used in conjunction with WEC report MRL19-19-04.

Revision: 0 - 4 Apr 2020

Scale: 1:50,000 (A3)



Legend

Study Area

Vegetation Units

- 1

Tall open to sparse shrubland dominated by *Acacia orthocarpa*, *A. ancistrocarpa* and occasionally *A. acradenia* over low sparse shrubland of mixed species dominated by *A. stellaticeps* over low hummock grassland dominated by *Triodia lanigera* and occasionally *T. epactia* on red-brown clay loam with granite, quartz or ironstone stones on colluvial stone plains and low flat-topped rises.
- 2

Tall to mid sparse shrubland of mixed species dominated by *Acacia acradenia*, *A. inaequilatera*, *Grevillea wickhamii* subsp. *hispidula* and occasionally *A. tumida* var. *pilbarensis* and *A. ancistrocarpa* over low sparse shrubland of mixed species including *Indigofera monophylla* and *Goodenia stobbsiana* over low hummock grassland dominated by *Triodia epactia* and/or *T. brizoides* on red, brown or red-brown clay loam with metamorphic, ironstone, quartz and occasionally granite stones, occasionally with metamorphosed granite or granite outcropping, on lower slopes and colluvial outwashes of ranges and occasionally on low flat-topped rises.
- 3

Low open woodland to isolated trees of *Eucalyptus leucophloia* subsp. *leucophloia* and/or *Corymbia hamersleyana* over tall to mid sparse to open shrubland dominated by *Acacia acradenia*, *Grevillea wickhamii* subsp. *hispidula* and *A. tumida* var. *pilbarensis* over low sparse shrubland of mixed species including *Dampiera candidans*, *Indigofera monophylla*, *Goodenia stobbsiana* and *Triumfetta maconochieana* over low hummock grassland dominated by *Triodia epactia* and often *T. brizoides* or *T. wiseana* over low sparse tussock grassland dominated by *Eriachne mucronata* on red, brown or red brown clay loam with ironstone or metamorphosed granite stones over ironstone or metamorphosed granite outcropping on plateaus, crests and upper slopes of
- 4

Tall to mid sparse shrubland dominated by *Acacia inaequilatera*, *A. acradenia* and *Grevillea wickhamii* subsp. *hispidula* over low sparse shrubland of mixed species including *Corchorus parviflorus* and *Indigofera monophylla* over low hummock grassland dominated by *Triodia epactia* and/or *T. wiseana*, or occasionally *T. brizoides* and *T. chichesterensis*, on red, brown or red-brown clay loam with metamorphosed granite, dolerite and occasionally ironstone stones over metamorphosed granite or dolerite outcropping on mid and upper slopes of ranges, and low ridges and hills.
- 5

Tall to mid sparse shrubland of mixed species dominated by *Acacia acradenia*, *A. inaequilatera* and *A. orthocarpa* over low sparse shrubland of mixed species dominated by *Acacia spondylophylla* over low hummock grassland dominated by a combination of *Triodia chichesterensis*, *T. wiseana*, *T. epactia*, *T. brizoides* and *T. lanigera* on red-brown clay loam with metamorphosed granite, ironstone, dolerite, quartz and calcrete stones, occasionally over metamorphosed granite and dolerite outcropping, on lower slopes and colluvial outwashes of ranges and low flat-topped rises.
- 6

Low open woodland to isolated trees of *Corymbia hamersleyana* over tall to mid sparse shrubland dominated by *Acacia inaequilatera*, *A. acradenia* and *Grevillea wickhamii* subsp. *hispidula* over low hummock grassland dominated by *Triodia chichesterensis* and/or *T. wiseana* on brown or occasionally red clay loam with calcrete, quartz and metamorphosed granite stones, occasionally over calcrete outcropping, on colluvial outwashes of ranges and colluvial stony plains.
- 7

Tall to mid sparse shrubland of mixed species including *Acacia inaequilatera*, *Grevillea pyramidalis* subsp. *leucadendron* and *A. orthocarpa* over low hummock grassland dominated by *Triodia chichesterensis* and/or *T. wiseana* on brown, red or red-brown clay loam with dolerite, calcrete and quartz stones, often with dolerite outcropping, on low hills.
- 8

Low isolated trees of *Corymbia hamersleyana* over tall to mid sparse shrubland dominated by *Acacia bivenosa* and *A. inaequilatera* over low hummock grassland dominated by *Triodia chichesterensis* and/or *T. wiseana* and *T. angusta* on brown, red-brown or grey-brown clay loam with dolerite, calcrete, ironstone and quartz stones on colluvial stony plains.
- 9

Low isolated trees of *Corymbia hamersleyana* over mid sparse shrubland to isolated shrubs dominated by *Acacia acradenia*, *A. inaequilatera* and *Grevillea wickhamii* subsp. *hispidula* over low hummock grassland dominated by *T. wiseana*, *T. epactia* and occasionally *T. brizoides* on red, brown or red-brown clay loam with ironstone, metamorphosed granite or occasionally dolerite or quartz stones over ironstone or metamorphosed granite outcropping on cliffs, ridges and crests and upper to mid slopes of ranges.
- 10

Low isolated trees of *Corymbia hamersleyana* and/or *Corymbia zygophylla* over tall to mid open to sparse shrubland dominated by *Acacia ancistrocarpa* and occasionally *A. tumida* var. *pilbarensis*, *A. inaequilatera* and *Grevillea wickhamii* subsp. *hispidula* over low sparse shrubland of mixed species dominated by *Bonamia erecta*, *Indigofera monophylla* and *Ptilotus astrolasius* over low hummock grassland dominated by *Triodia lanigera* and occasionally *T. schinzii* and/or *T. epactia* on red, brown or red-brown sandy or clay loam, often with quartz or ironstone stones, on plains.
- 11

Low isolated trees of *Corymbia hamersleyana* over tall open to sparse shrubland dominated by *A. tumida* var. *pilbarensis*, *A. ancistrocarpa* and *A. acradenia* over low open to sparse shrubland of mixed species including *Bonamia erecta*, *Isotropis atropurpurea* and *Corchorus parviflorus* over low hummock and tussock grassland dominated by *Chrysopogon fallax*, *Triodia epactia* and occasionally *T. lanigera* on red, brown or red-brown sandy or clay loam with colluvial stones in minor drainage features including flats and small creeks.
- 12

Low open woodland of *Corymbia hamersleyana* over tall sparse shrubland dominated by *Acacia inaequilatera* over mid sparse shrubland dominated by *Acacia bivenosa* and *Codonocarpus cotinifolius* over low sparse shrubland of mixed species dominated by *Corchorus parviflorus*, *Indigofera monophylla*, *Heliotropium chrysocarpum* and *Heliotropium pachyphyllum* over low hummock grassland dominated by *Triodia chichesterensis* and occasionally *T. epactia* or *T. angusta* on red, brown or grey-brown clay loam with calcrete or quartz stones on undulating plains.
- 13

Isolated low trees dominated by *Corymbia hamersleyana* over tall to mid sparse shrubland dominated by *Acacia orthocarpa*, *Grevillea wickhamii* subsp. *hispidula* and often *A. maitlandii* and *A. tumida* var. *pilbarensis* over low sparse shrubland of mixed species including *Corchorus parviflorus*, *Dampiera candidans*, *Goodenia stobbsiana*, *Indigofera monophylla* and *Scaevola browniana* subsp. *browniana* over low hummock grassland dominated by *Triodia epactia* and occasionally *T. brizoides* or *T. lanigera* on orange, brown or red-brown sandy or clay loam with granite and quartz stones over granite outcropping on undulating plains or low rises.
- 14

Low open woodland to isolated trees dominated by *Eucalyptus victrix* and/or *Corymbia hamersleyana* over tall open to sparse shrubland of mixed species dominated by *Acacia pyrifolia* var. *pyrifolia*, *A. tumida* var. *pilbarensis* and *Melaleuca linophylla* over mid to low open to sparse shrubland of mixed species including *Cajanus pubescens*, *Indigofera monophylla*, *Tephrosia rosea* var. *clementii*, *Corchorus parviflorus* and *Jasminum didymum* subsp. *lineare* over low tussock and hummock grassland to open tussock and hummock grassland of mixed species dominated by *Triodia epactia*, *Cenchrus ciliaris*, *Chrysopogon fallax*, *Cymbopogon ambiguus* and *Eriachne tenuiculis* on red or brown clay or sandy loam, usually with colluvial stones, in major creeks.
- 15

Mid isolated shrubs of *Acacia synchronicia* over low isolated chenopod shrubs of *Maireana* sp. over low sparse forbland, tussock grassland and sedgeland of mixed species including *Portulaca oleracea*, *Ptilotus exaltatus*, *Cynodon prostratus*, *Sporobolus australasicus* and *Fimbristylis dichotoma* on red clay loam with colluvial stones on plains.
- C

Approved Clearing
- D

Degraded Land



This map should only be used in conjunction with WEC report MRL19-19-04.

Overview of Vegetation Units  
of the Study Area

Revision: 0 - 4 April 2020

Author: David Coultas

WEC Ref: MRL19-19-04

Filename: MRL19-19-04-f012-1.mxd



Projection: GDA 1994 MGA Zone 50

Figure



12.1




**Table 11: Summary of Vegetation Units Described in the Study Area**

VU	Summary	Photograph
1	<p><b>Description:</b> Tall open to sparse shrubland dominated by <i>Acacia orthocarpa</i>, <i>A. ancistrocarpa</i> and occasionally <i>A. acradenia</i> over low sparse shrubland of mixed species dominated by <i>A. stellaticeps</i> over low hummock grassland dominated by <i>Triodia lanigera</i> and occasionally <i>T. epactia</i> on red-brown clay loam with granite, quartz or ironstone stones on colluvial stone plains and low flat-topped rises.</p> <p><b>Location:</b> Mapped on stony plains and low rises in the north-eastern and south-eastern extent of the Study Area (Appendix M: Figures M2 and M4)</p> <p><b>Area mapped (Proportion of Study Area):</b> 300.4 ha (4.5 %)</p> <p><b>Sampling:</b> 16 quadrats (GNH16; GNH40; GNH41; TRH067; WD02; WD08; WD18; WD21; WD26; WD30; WD69; WDK07; WDK12; WDK14; WDK17; WDK18)</p> <p><b>Average Taxon Richness per Quadrat:</b> 14.4 ± 3.5</p> <p><b>Indicator Taxa:</b> <i>Triodia lanigera</i>.</p> <p><b>Significant Taxa:</b> <i>Euphorbia clementii</i> (P3), <i>Heliotropium muticum</i> (P3) (preferred habitat), <i>Triodia chichesterensis</i> (P3)</p> <p><b>Variation and Similar VUs:</b> The <i>Acacia</i>-dominated overstorey component was variable, ranging from comprising a relatively minor component (see Plate 9), to being more dominant (see Plate 10). <i>Acacia orthocarpa</i> and <i>A. ancistrocarpa</i> rarely co-dominated in any quadrat. <i>Triodia lanigera</i> was almost always dominant in the hummock grassland stratum, however occasionally <i>Triodia epactia</i>, and rarely <i>Triodia chichesterensis</i>, dominated or co-dominated.</p> <p>Floristically, VU 1 was most similar to the VU 2 – VU 6 group within Group 1 (Appendix I). Species such as <i>Triodia lanigera</i> were more common to VU 1 than to VU 2 – VU 6, with other species such as <i>Acacia acradenia</i> and <i>Triodia brizoides</i> either less common or not recorded in VU 1.</p>	 <p>Plate 9: VU 1 (Quadrat TRH067)</p>  <p>Plate 10: VU 1 (Quadrat WD69)</p>




VU	Summary	Photograph
2	<p><b>Description:</b> Tall to mid sparse shrubland of mixed species dominated by <i>Acacia acradenia</i>, <i>A. inaequilatera</i>, <i>Grevillea wickhamii</i> subsp. <i>hispidula</i> and occasionally <i>A. tumida</i> var. <i>pilbarensis</i> and <i>A. ancistrocarpa</i> over low sparse shrubland of mixed species including <i>Indigofera monophylla</i> and <i>Goodenia stobbsiana</i> over low hummock grassland dominated by <i>Triodia epactia</i> and/or <i>T. brizoides</i> on red, brown or red-brown clay loam with metamorphic, ironstone, quartz and occasionally granite stones, occasionally with metamorphosed granite or granite outcropping, on lower slopes and colluvial outwashes of ranges and occasionally on low flat-topped rises.</p> <p><b>Location:</b> Mapped on lower slopes and outwashes predominantly in the north-western and central extent of the Study Area, as well as some smaller areas in the south-east (Appendix M; Figures M1, M2, M3 and M4)</p> <p><b>Area mapped (Proportion of Study Area):</b> 834.5 ha (12.4 %);</p> <p><b>Sampling:</b> 27 quadrats (HER001; HER003; HER007; HER014; HER017; HER022; HER050; HER051; HER057; HER061; HER062; HER066; TRH060; TRH062; WD24; WD32; WD40; WDD01; WDD04; WDD06; WDD09; WDD21; WDK04; WDM13; WDM16; WDM17; WDM19)</p> <p><b>Average Taxon Richness per Quadrat:</b> 14.9 ± 3.9</p> <p><b>Indicator Taxa:</b> No indicator taxa.</p> <p><b>Significant Taxa:</b> <i>Euphorbia clementii</i> (P3) (preferred habitat), <i>Terminalia supranitifolia</i> (P3), <i>Triodia chichesterensis</i> (P3), <i>Vigna triodiophila</i> (P3)</p> <p><b>Variation and Similar VUs:</b> The <i>Acacia</i>-dominated overstorey component was variable, ranging from comprising a relatively minor component (see Plate 9), to being more dominant. <i>Acacia acradenia</i> was almost always present and almost always dominant or co-dominant, however <i>Acacia tumida</i> var. <i>pilbarensis</i> was dominant at some locations. <i>Triodia epactia</i> was almost always dominant or co-dominant in the hummock grassland stratum, with <i>Triodia brizoides</i> often co-dominant or dominant; rarely, <i>Triodia lanigera</i> or <i>Triodia wiseana</i> dominated or co-dominated.</p> <p>VU 2 was floristically most similar to VU 3, however was generally more species poor, and was mapped on lower slopes and outwashes as opposed to crests and upper slopes.</p>	 <p>Plate 11: VU 2 (Quadrat HER001)</p>  <p>Plate 12: VU 2 (Quadrat WD32)</p>





VU	Summary	Photograph
3	<p><b>Description:</b> Low open woodland to isolated trees of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> and/or <i>Corymbia hamersleyana</i> over tall to mid sparse to open shrubland dominated by <i>Acacia acradenia</i>, <i>Grevillea wickhamii</i> subsp. <i>hispidula</i> and <i>A. tumida</i> var. <i>pilbarensis</i> over low sparse shrubland of mixed species including <i>Dampiera candidans</i>, <i>Indigofera monophylla</i>, <i>Goodenia stobbsiana</i> and <i>Triumfetta maconochieana</i> over low hummock grassland dominated by <i>Triodia epactia</i> and often <i>T. brizoides</i> or <i>T. wiseana</i> over low sparse tussock grassland dominated by <i>Eriachne mucronata</i> on red, brown or red brown clay loam with ironstone or metamorphosed granite stones over ironstone or metamorphosed granite outcropping on plateaus, crests and upper slopes of ranges.</p> <p><b>Location:</b> Mapped on ranges with ironstone or granite in the far north-western, central eastern and south-western extent of the Study Area (Appendix M; Figures M1, M2, M3 and M4)</p> <p><b>Area mapped (Proportion of Study Area):</b> 250.8 ha (3.7 %)</p> <p><b>Sampling:</b> 15 quadrats (HER044; HER046; HER049; HER053; W01A; W03A; WD09; WD13; WD20; WDD07; WDK11; WDK20; WDK21; WDM11; WDM18)</p> <p><b>Average Taxon Richness per Quadrat:</b> 20.3 ± 7.0</p> <p><b>Indicator Taxa:</b> <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>, <i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543) and <i>Triumfetta maconochieana</i>.</p> <p><b>Significant Taxa:</b> <i>Terminalia supranitifolia</i> (P3)</p> <p><b>Variation and Similar VUs:</b> VU 3 was relatively homogenous, except for the tree stratum and low shrub stratum, which were not present consistently throughout the VU, and varied in species composition between locations. The upper shrub stratum was generally present and consistent in composition. <i>Triodia epactia</i> was almost always dominant or co-dominant in the hummock grassland stratum, with <i>Triodia brizoides</i> or <i>Triodia wiseana</i> occasionally co-dominating. For similar VUs, see under VU 2.</p>	 <p>Plate 13: VU 3 (Quadrat WDD07)</p>




VU	Summary	Photograph
4	<p><b>Description:</b> Tall to mid sparse shrubland dominated by <i>Acacia inaequilatera</i>, <i>A. acradenia</i> and <i>Grevillea wickhamii</i> subsp. <i>hispidula</i> over low sparse shrubland of mixed species including <i>Corchorus parviflorus</i> and <i>Indigofera monophylla</i> over low hummock grassland dominated by <i>Triodia epactia</i> and/or <i>T. wiseana</i>, or occasionally <i>T. brizoides</i> and <i>T. chichesterensis</i>, on red, brown or red-brown clay loam with metamorphosed granite, dolerite and occasionally ironstone stones over metamorphosed granite or dolerite outcropping on mid and upper slopes of ranges, and low ridges and hills.</p> <p><b>Location:</b> Mapped on range slopes and ridges and rocky hills throughout central to southern extent of the Study Area (Appendix M: Figures M1, M2, M3 and M4)</p> <p><b>Area mapped (Proportion of Study Area):</b> 324.3 ha (4.8%)</p> <p><b>Sampling:</b> 18 quadrats (HER009; HER010; HER055; HER058; HER064; W04A; W05A; W06A; WD06; WD17; WD19; WD58; WD66; WDK01; WDK05; WDK10; WDK13; WDK15)</p> <p><b>Average Taxon Richness per Quadrat:</b> 22.2 ± 5.1</p> <p><b>Indicator Taxa:</b> <i>Senna glutinosa</i> subsp. <i>glutinosa</i>.</p> <p><b>Significant Taxa:</b> <i>Euphorbia clementii</i> (P3), <i>Terminalia supranitifolia</i> (P3) (preferred habitat), <i>Triodia chichesterensis</i> (P3) (preferred habitat).</p> <p><b>Variation and Similar VUs:</b> This VU was relatively consistent, with sparse, species poor shrub strata almost always present, with low trees very occasionally also present. The most prominent variation was in the hummock grassland stratum; <i>Triodia epactia</i> and <i>Triodia wiseana</i> usually dominated or co-dominated, however other <i>Triodia</i> species including <i>Triodia brizoides</i> or <i>Triodia chichesterensis</i> occasionally dominated or co-dominated. VU 4 was most floristically similar to VU 5 of Group 1. However, VU 4 had higher species richness, and generally occurred in higher, rockier terrain, which was reflected in its species composition, particularly in the consistent presence of <i>Triodia wiseana</i> and <i>Triodia epactia</i>.</p>	 <p>Plate 14: VU 4 (Quadrat WD17)</p>




VU	Summary	Photograph
5	<p><b>Description:</b> Tall to mid sparse shrubland of mixed species dominated by <i>Acacia acradenia</i>, <i>A. inaequilatera</i> and <i>A. orthocarpa</i> over low sparse shrubland of mixed species dominated by <i>Acacia spondylophylla</i> over low hummock grassland dominated by a combination of <i>Triodia chichesterensis</i>, <i>T. wiseana</i>, <i>T. epactia</i>, <i>T. brizoides</i> and <i>T. lanigera</i> on red-brown clay loam with metamorphosed granite, ironstone, dolerite, quartz and calcrete stones, occasionally over metamorphosed granite and dolerite outcropping, on lower slopes and colluvial outwashes of ranges and low flat-topped rises.</p> <p><b>Location:</b> Mapped on slopes and outwashes in the south-eastern and south-western extent of the Study Area (Appendix M; Figures M3 and M4)</p> <p><b>Area mapped (Proportion of Study Area):</b> 375.0 ha (5.6 %)</p> <p><b>Sampling:</b> 16 quadrats (TRH061; TRH066; WD29; WD35; WD39; WD45; WD49; WD60; WD62; WD76; WD86; WD92; WDM01; WDM02; WDM07; WDM27)</p> <p><b>Average Taxon Richness per Quadrat:</b> 20.9 ± 6.1</p> <p><b>Indicator Taxa:</b> <i>Acacia spondylophylla</i>.</p> <p><b>Significant Taxa:</b> <i>Euphorbia clementii</i> (P3), <i>Terminalia supranitifolia</i> (P3), <i>Triodia chichesterensis</i> (P3) (preferred habitat).</p> <p><b>Variation and Similar VUs:</b> The upper stratum was uniformly sparse throughout; the taxa present varied between locations to some extent, although <i>Acacia inaequilatera</i> and <i>Acacia acradenia</i> were generally present, with <i>Acacia tumida</i> var. <i>pilbarensis</i> dominating occasionally. The composition of the hummock grassland was the most variable of all VUs, as noted in the description above.</p> <p>VU 5 was most floristically similar to VUs 4 and 6; see under these VUs.</p>	 <p>Plate 15: VU 5 (Quadrat WD86)</p>  <p>Plate 16: VU 5 Quadrat (WD35)</p>




VU	Summary	Photograph
6	<p><b>Description</b> Low open woodland to isolated trees of <i>Corymbia hamersleyana</i> over tall to mid sparse shrubland dominated by <i>Acacia inaequilatera</i>, <i>A. acradenia</i> and <i>Grevillea wickhamii</i> subsp. <i>hispidula</i> over low hummock grassland dominated by <i>Triodia chichesterensis</i> and/or <i>T. wiseana</i> on brown or occasionally red clay loam with calcrete, quartz and metamorphosed granite stones, occasionally over calcrete outcropping, on colluvial outwashes of ranges and colluvial stony plains.</p> <p><b>Location:</b> Mapped on outwashes and plains in the north-eastern to central-eastern extent of the Study Area as well as small areas in the north-western part of the Study Area (Appendix M: Figures M1, M2 and M4)</p> <p><b>Area mapped (Proportion of Study Area):</b> 215.4 ha (3.2 %)</p> <p><b>Sampling:</b> 10 quadrats (HER015; HER029; HER031; HER033; WD44; WD55; WD59; WD89; WDM14; WDM20)</p> <p><b>Average Taxon Richness per Quadrat:</b> 17.4 ± 9.0</p> <p><b>Indicator Taxa:</b> <i>Cassytha capillaris</i>.</p> <p><b>Significant Taxa:</b> <i>Euphorbia clementii</i> (P3), <i>Triodia chichesterensis</i> (P3) (preferred habitat.)</p> <p><b>Variation and Similar VUs:</b> The tree and tall shrub strata were generally very sparse and consistent in composition, however on some occasions they were absent altogether. <i>Triodia chichesterensis</i> was always present and almost always dominated the hummock grassland stratum or co-dominated with <i>Triodia wiseana</i>, although occasionally other <i>Triodia</i> species such as <i>Triodia epactia</i> or <i>Triodia lanigera</i> co-dominated. VU 6 was most floristically similar to VU 5, however was more species-poor, and was characterised by the presence of <i>Triodia chichesterensis</i> at all locations.</p>	 <p>Plate 17: VU 6 (Quadrat HER015)</p>





VU	Summary	Photograph
7	<p><b>Description:</b> Tall to mid sparse shrubland of mixed species including <i>Acacia inaequilatera</i>, <i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i> and <i>A. orthocarpa</i> over low hummock grassland dominated by <i>Triodia chichesterensis</i> and/or <i>T. wiseana</i> on brown, red or red-brown clay loam with dolerite, calcrete and quartz stones, often with dolerite outcropping, on low hills.</p> <p><b>Location:</b> Mapped on low hills in the central, south-western and far southern extent of the Study Area (Appendix M: Figures M1, M2, M3 and M4)</p> <p><b>Area mapped (Proportion of Study Area):</b> 369.9 ha (5.5 %)</p> <p><b>Sampling:</b> 11 quadrats (HER028; HER035; HER036; HER067; WD46; WD50; WD52; WD83; WDK03; WDK23; WDM26)</p> <p><b>Average Taxon Richness per Quadrat:</b> 16.4 ± 6.2</p> <p><b>Indicator Taxa:</b> <i>Boerhavia gardneri</i>, <i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i> and <i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen <i>et al.</i> PBS 0356).</p> <p><b>Significant Taxa:</b> <i>Euphorbia clementii</i> (P3), <i>Terminalia supranitifolia</i> (P3), <i>Triodia chichesterensis</i> (P3) (preferred habitat), <i>Vigna triodiophila</i> (P3).</p> <p><b>Variation and Similar VUs:</b> The tall shrub stratum was generally very sparse, however on some occasions was absent altogether. <i>Acacia inaequilatera</i> and <i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i> usually dominated this stratum, although occasionally <i>Acacia orthocarpa</i> replaced them. <i>Triodia chichesterensis</i> was almost always present and usually dominated the hummock grassland stratum or co-dominated with <i>Triodia wiseana</i>, although occasionally <i>Triodia epactia</i> dominated. VU 7 was most floristically similar to VU 8, however was much more species-rich, and <i>Acacia bivenosa</i> was not present.</p>	 <p>Plate 18: VU 7 (Quadrat WD52)</p>





VU	Summary	Photograph
8	<p><b>Description:</b> Low isolated trees of <i>Corymbia hamersleyana</i> over tall to mid sparse shrubland dominated by <i>Acacia bivenosa</i> and <i>A. inaequilatera</i> over low hummock grassland dominated by <i>Triodia chichesterensis</i> and/or <i>T. wiseana</i> and <i>T. angusta</i> on brown, red-brown or grey-brown clay loam with dolerite, calcrete, ironstone and quartz stones on colluvial stony plains.</p> <p><b>Location:</b> Mapped on stony plains in the central-eastern to south-eastern extent of the Study Area (Appendix M: Figure M2 and M4)</p> <p><b>Area mapped (Proportion of Study Area):</b> 134.1 ha (2.0 %)</p> <p><b>Sampling:</b> 8 quadrats (TRH063; WD48; WD80; WDK02; WDK06; WDM03; WDM04; WDM21)</p> <p><b>Average Taxon Richness per Quadrat:</b> 11.0 ± 3.2</p> <p><b>Indicator Taxa:</b> No indicator taxa.</p> <p><b>Significant Taxa:</b> <i>Terminalia supranitifolia</i> (P3), <i>Triodia chichesterensis</i> (P3) (preferred habitat).</p> <p><b>Variation and Similar VUs:</b> The tree stratum was often absent in this VU. The tall shrub stratum was relatively variable in composition; although <i>Acacia bivenosa</i> and <i>A. inaequilatera</i> were usually present, occasionally <i>Acacia acradenia</i> or <i>Acacia orthocarpa</i> replaced them. <i>Triodia chichesterensis</i> was always present and usually dominant, with <i>Triodia wiseana</i> and <i>Triodia angusta</i> often co-dominant; rarely the latter species dominated.</p> <p>VU 8 was most floristically similar to VU 7, see under this VU.</p>	 <p>Plate 19: VU 8 (Quadrat WD48)</p>





VU	Summary	Photograph
9	<p><b>Description:</b> Low isolated trees of <i>Corymbia hamersleyana</i> over mid sparse shrubland to isolated shrubs dominated by <i>Acacia acradenia</i>, <i>A. inaequilatera</i> and <i>Grevillea wickhamii</i> subsp. <i>hispidula</i> over low hummock grassland dominated by <i>T. wiseana</i>, <i>T. epactia</i> and occasionally <i>T. brizoides</i> on red, brown or red-brown clay loam with ironstone, metamorphosed granite or occasionally dolerite or quartz stones over ironstone or metamorphosed granite outcropping on cliffs, ridges and crests and upper to mid slopes of ranges.</p> <p><b>Location:</b> Mapped on ranges throughout the north-western, central and southern extent of the Study Area (Appendix M; Figures M1, M2, M3 and M4)</p> <p><b>Area mapped (Proportion of Study Area):</b> 1388.8 ha (20.6 %)</p> <p><b>Sampling:</b> 53 quadrats (HER004; HER005; HER008; HER016; HER018; HER039; HER040; HER041; HER042; HER043; HER047; HER052; HER054; HER059; HER060; HER063; HER068; TRH052 ;TRH056; TRH057; TRH059; W02A; WD05; WD07; WD11; WD22; WD23; WD27; WD31; WD34; WD36; WD38; WD41; WD42; WD43; WD47; WD54; WD56; WD84; WD87; WD88; WD96; WDD05; WDD20; WDD23; WDK22; WDK24; WDK25; WDM10; WDM15; WDM22; WDM23; WDM24)</p> <p><b>Average Taxon Richness per Quadrat:</b> 27.7 ± 9.0</p> <p><b>Indicator Taxa:</b> <i>Cymbopogon ambiguus</i>, <i>Cyperus hesperius</i>, <i>Euphorbia careyi</i>, <i>Solanum horridum</i>, <i>Triumfetta propinqua</i> and <i>Tribulus suberosus</i></p> <p><b>Significant Taxa:</b> <i>Abutilon</i> aff. <i>hannii</i> (potentially undescribed), <i>Euphorbia clementii</i> (P3) (preferred habitat), <i>Terminalia supranitifolia</i> (P3) (preferred habitat), <i>Triodia chichesterensis</i> (P3) (preferred habitat).</p> <p><b>Variation and Similar VUs:</b> The upper tree stratum was often absent in this VU. The tall shrubland stratum was usually present, however often only isolated shrub were present, and occasionally these were also absent. <i>Acacia acradenia</i> was almost always present when this stratum was present. The hummock grassland was fairly consistently dominated or co-dominated by <i>Triodia wiseana</i> and <i>Triodia epactia</i>, although <i>Triodia brizoides</i> occasionally co-dominated, and rarely dominated.</p> <p>VU 9 is most similar to VUs 3 and 4, however is more species-rich, and contains a number of taxa that prefer rocky outcrop habitats that are either absent or rare in these VTs.</p>	 <p>Plate 20: VU 9 (Quadrat WDM10)</p>  <p>Plate 21: VU 9 (Quadrat HER016)</p>




VU	Summary	Photograph
10	<p><b>Description:</b> Low isolated trees of <i>Corymbia hamersleyana</i> and/or <i>Corymbia zygophylla</i> over tall to mid open to sparse shrubland dominated by <i>Acacia ancistrocarpa</i> and occasionally <i>A. tumida</i> var. <i>pilbarensis</i>, <i>A. inaequilatera</i> and <i>Grevillea wickhamii</i> subsp. <i>hispidula</i> over low sparse shrubland of mixed species dominated by <i>Bonamia erecta</i>, <i>Indigofera monophylla</i> and <i>Ptilotus astrolasius</i> over low hummock grassland dominated by <i>Triodia lanigera</i> and occasionally <i>T. schinzii</i> and/or <i>T. epactia</i> on red, brown or red-brown sandy or clay loam, often with quartz or ironstone stones, on plains.</p> <p><b>Location:</b> Mapped on plains in the northern extent of the Study Area (Appendix M: Figures M1 and M2)</p> <p><b>Area mapped (Proportion of Study Area):</b> 1240.4 ha (18.4 %)</p> <p><b>Sampling:</b> 22 quadrats (HER012; HER070; WD10; WD14; WD51; WD57; WD61; WD67; WD71; WD75; WDD02; WDD03; WDD08; WDD10; WDD11; WDD12; WDD13; WDD14; WDD17; WDD18; WDD19; WDD24)</p> <p><b>Average Taxon Richness per Quadrat:</b> 16.4 ± 6.7</p> <p><b>Indicator Taxa:</b> <i>Acacia ancistrocarpa</i>, <i>Bonamia erecta</i>, <i>Corymbia zygophylla</i> and <i>Triodia schinzii</i></p> <p><b>Significant Taxa:</b> <i>Euphorbia clementii</i> (P3) (preferred habitat), <i>Triodia chichesterensis</i> (P3).</p> <p><b>Variation and Similar VUs:</b> Much of the variation was related to the relative stoniness of the occurrence, with some areas completely stony, and others completely sandy. The tree stratum was very sparse and absent in some areas; generally, <i>Corymbia zygophylla</i> dominated sandier sites, while <i>Corymbia hamersleyana</i> dominated stony sites. The tall shrub stratum was generally sparse on sandy sites and open on stony sites, however the composition was quite uniform across most sites. <i>Triodia lanigera</i> dominated or co-dominated almost all occurrences, especially occurrences that were stony; occasionally <i>Triodia epactia</i> and/or <i>Triodia schinzii</i> dominated, but this was almost always at sandy sites. VU 10 is most similar to VU 11, however that VT occurs in water-gaining sites such as flow lines or flats, and consequently has much higher species richness.</p>	 <p>Plate 22: VU 10 (Quadrat WDD14)</p>  <p>Plate 23: VU 10 (Quadrat WDD13)</p>




VU	Summary	Photograph
11	<p><b>Description:</b> Low isolated trees of <i>Corymbia hamersleyana</i> over tall open to sparse shrubland dominated by <i>A. tumida</i> var. <i>pilbarensis</i>, <i>A. ancistrocarpa</i> and <i>A. acradenia</i> over low open to sparse shrubland of mixed species including <i>Bonamia erecta</i>, <i>Isotropis atropurpurea</i> and <i>Corchorus parviflorus</i> over low hummock and tussock grassland dominated by <i>Chrysopogon fallax</i>, <i>Triodia epactia</i> and occasionally <i>T. lanigera</i> on red, brown or red-brown sandy or clay loam with colluvial stones in minor drainage features including flats and small creeks.</p> <p><b>Location:</b> Mapped on minor drainage areas in the northern and south-eastern extent of the Study Area (Appendix M; Figures M1, M2 and M4).</p> <p><b>Area mapped (Proportion of Study Area):</b> 185.5 ha (2.8 %)</p> <p><b>Sampling:</b> 19 quadrats (GNH17; HER011; HER019; HER021; HER024; HER032; HER069; WD16; WD28; WD53; WD63; WD74; WD82; WD91; WDD16; WDK16; WDK19; WDM05; WDM08)</p> <p><b>Average Taxon Richness per Quadrat:</b> 40.9 ± 14.4</p> <p><b>Indicator Taxa:</b> <i>Acacia tumida</i> var. <i>pilbarensis</i>, <i>Aristida holathera</i> var. <i>holathera</i>, <i>Chrysopogon fallax</i>, <i>Eragrostis eriopoda</i>, <i>Isotropis atropurpurea</i>, <i>Paraneurachne muelleri</i> and <i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601).</p> <p><b>Significant Taxa:</b> <i>Euphorbia clementii</i> (P3) (preferred habitat), <i>Triodia chichesterensis</i> (P3).</p> <p><b>Variation and Similar VUs:</b> The tree and tall shrub strata were relatively consistent compositionally, however structurally the tall shrub stratum was quite variable; this appears to be related to the amount of drainage water the areas receive, with the shrubland generally densest at the wettest sites. This was also the case for the low shrub stratum; however, this stratum varied greatly in composition, and was generally not dominated by any one taxon. The lower stratum was also relatively variable; often it was dominated by <i>Triodia epactia</i>, or more rarely <i>Triodia lanigera</i>; however, tussock grasses such as <i>Chrysopogon fallax</i> were also occasionally co-dominant and rarely dominant. VU 11 is most similar to VU 12; however, this primarily appears to be because the rocky calcrete sites that VU 12 occurs on are interspersed with sandy flow lines that contain species frequently recorded in VU 11. It is also similar to VU 10 – see under that VU for discussion.</p>	 <p>Plate 24: VU 11 (Quadrat WDK16)</p>  <p>Plate 25: VU 11 (Quadrat WD74)</p>





VU	Summary	Photograph
12	<p><b>Description:</b> Low open woodland of <i>Corymbia hamersleyana</i> over tall sparse shrubland dominated by <i>Acacia inaequilatera</i> over mid sparse shrubland dominated by <i>Acacia bivenosa</i> and <i>Codonocarpus cotinifolius</i> over low sparse shrubland of mixed species dominated by <i>Corchorus parviflorus</i>, <i>Indigofera monophylla</i>, <i>Heliotropium chrysocarpum</i> and <i>Heliotropium pachyphyllum</i> over low hummock grassland dominated by <i>Triodia chichesterensis</i> and occasionally <i>T. epactia</i> or <i>T. angusta</i> on red, brown or grey-brown clay loam with calcrete or quartz stones on undulating plains.</p> <p><b>Location:</b> Mapped on undulating plains in the north-eastern and south-eastern extent of the Study Area (Appendix M: Figure M2 and M4).</p> <p><b>Area mapped (Proportion of Study Area):</b> 59.7 ha (0.9 %)</p> <p><b>Sampling:</b> 7 quadrats (WD03; WD12; WD70; WD77; WD78; WDD15; WDD22)</p> <p><b>Average Taxon Richness per Quadrat:</b> 23.7 ± 4.1</p> <p><b>Indicator Taxa:</b> <i>Acacia bivenosa</i>, <i>Codonocarpus cotinifolius</i> and <i>Heliotropium chrysocarpum</i>.</p> <p><b>Significant Taxa:</b> <i>Euphorbia clementii</i> (P3), <i>Triodia chichesterensis</i> (P3) (preferred habitat).</p> <p><b>Variation and Similar VUs:</b> This VU was relatively consistent structurally and compositionally. <i>Triodia chichesterensis</i> usually dominated the hummock grassland stratum, although occasionally <i>Triodia angusta</i> replaced it. <i>Triodia epactia</i> was also often present, with its abundance related to the number of sandy flowlines that usually dissected the otherwise calcrete-stony plains where this VU occurred.</p> <p>This VU is not particularly similar to any other VUs, although it is related to VU 11 to an extent; see under that VU for discussion.</p>	 <p>Plate 26: VU 12 (Quadrat WD78)</p>



VU	Summary	Photograph
13	<p><b>Description:</b> Isolated low trees dominated by <i>Corymbia hamersleyana</i> over tall to mid sparse shrubland dominated by <i>Acacia orthocarpa</i>, <i>Grevillea wickhamii</i> subsp. <i>hispidula</i> and often <i>A. maitlandii</i> and <i>A. tumida</i> var. <i>pilbarensis</i> over low sparse shrubland of mixed species including <i>Corchorus parviflorus</i>, <i>Dampiera candicans</i>, <i>Goodenia stobbsiana</i>, <i>Indigofera monophylla</i> and <i>Scaevola browniana</i> subsp. <i>browniana</i> over low hummock grassland dominated by <i>Triodia epactia</i> and occasionally <i>T. brizoides</i> or <i>T. lanigera</i> on orange, brown or red-brown sandy or clay loam with granite and quartz stones over granite outcropping on undulating plains or low rises.</p> <p><b>Location:</b> Mapped on undulating plains and low rises influenced by granite predominantly in south-eastern extent of the Study Area as well as some smaller areas in the north-eastern and south-western parts of the Study Area (Appendix M: Figure M2, M3 and M4).</p> <p><b>Area mapped (Proportion of Study Area):</b> 57.2 ha (0.9 %)</p> <p><b>Sampling:</b> 12 quadrats (WD04; WD33; WD37; WD68; WD72; WD79; WD81; WD85; WD94; WDK08; WDK09; WDM09)</p> <p><b>Average Taxon Richness per Quadrat:</b> 35.8 ± 10.4</p> <p><b>Indicator Taxa:</b> <i>Acacia maitlandii</i>, <i>Acacia orthocarpa</i>, <i>Bonamia alatisemina</i>, <i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>, <i>Fimbristylis dichotoma</i>, <i>Hibiscus sturtii</i> var. <i>campylochlamys</i>, <i>Scaevola browniana</i> subsp. <i>browniana</i> and <i>Tripogonella loliiformis</i>.</p> <p><b>Significant Taxa:</b> <i>Euphorbia clementii</i> (P3), <i>Triodia chichesterensis</i> (P3).</p> <p><b>Variation and Similar VUs:</b></p> <p>Although the tree stratum of <i>Corymbia hamersleyana</i> was not consistently present, a consistent tall shrubland stratum was present. <i>Acacia orthocarpa</i> and <i>Grevillea wickhamii</i> subsp. <i>hispidula</i> were almost always present and co-dominant, with <i>Acacia maitlandii</i> and <i>Acacia tumida</i> var. <i>pilbarensis</i> also regularly dominating. The low shrub stratum was consistently present, but was compositionally variable. Generally <i>Triodia epactia</i> dominated, although other <i>Triodia</i> species occasionally co-dominated. This VU also sometimes had a defined forb stratum that was relatively species-rich, however this was usually only at locations where there was a relatively large amount of granite outcropping. This VU is not especially similar to any other VUs.</p>	 <p>Plate 27: VU 13 (Quadrat WD85)</p>




VU	Summary	Photograph
14	<p><b>Description:</b> Low open woodland to isolated trees dominated by <i>Eucalyptus victrix</i> and/or <i>Corymbia hamersleyana</i> over tall open to sparse shrubland of mixed species dominated by <i>Acacia pyrifolia</i> var. <i>pyrifolia</i>, <i>A. tumida</i> var. <i>pilbarensis</i> and <i>Melaleuca linophylla</i> over mid to low open to sparse shrubland of mixed species including <i>Cajanus pubescens</i>, <i>Indigofera monophylla</i>, <i>Tephrosia rosea</i> var. <i>clementii</i>, <i>Corchorus parviflorus</i> and <i>Jasminum didymum</i> subsp. <i>lineare</i> over low tussock and hummock grassland to open tussock and hummock grassland of mixed species dominated by <i>Triodia epactia</i>, <i>Cenchrus ciliaris</i>, <i>Chrysopogon fallax</i>, <i>Cymbopogon ambiguus</i> and <i>Eriachne tenuiculmis</i> on red or brown clay or sandy loam, usually with colluvial stones, in major creeks.</p> <p><b>Location:</b> Mapped on major drainage lines throughout the Study Area (Appendix M; Figures M1, M2, M3 and M4).</p> <p><b>Area mapped (Proportion of Study Area):</b> 209.3 ha (3.1 %)</p> <p><b>Sampling:</b> 26 quadrats (GNH18; HER002; HER006; HER013; HER020; HER023; HER025; HER026; HER027; HER030; HER034; HER037; HER038; HER045; HER056; TRH058; TRH064; TRH065; WD15; WD25; WD64; WD73; WD90; WDM06; WDM12; WDM25)</p> <p><b>Average Taxon Richness per Quadrat:</b> 44.3 ± 12.1</p> <p><b>Indicator Taxa:</b> <i>Abutilon</i> aff. <i>hannii</i>, <i>Acacia coriacea</i> subsp. <i>pendens</i>, <i>Acacia pyrifolia</i> var. <i>pyrifolia</i>, <i>Acacia trachycarpa</i>, <i>Boerhavia schomburgkiana</i>, <i>Cajanus pubescens</i>, <i>Eucalyptus victrix</i>, <i>Jasminum didymum</i> subsp. <i>lineare</i>, <i>Melaleuca linophylla</i>, <i>Phyllanthus maderaspatensis</i>, <i>Polymeria ambigua</i>, <i>Pterocaulon sphacelatum</i>, <i>Rhynchosia minima</i>, <i>Stemodia grossa</i>, <i>Tephrosia rosea</i> var. <i>clementii</i> and <i>Themeda triandra</i></p> <p><b>Significant Taxa:</b> <i>Abutilon</i> aff. <i>hannii</i> (potentially undescribed) (preferred habitat), <i>Euphorbia clementii</i> (P3), <i>Terminalia supranitifolia</i> (P3), <i>Triodia chichesterensis</i> (P3), <i>Vigna triodiophila</i> (P3).</p> <p><b>Variation and Similar VUs:</b> A tree stratum was almost always present, with <i>Eucalyptus victrix</i> in particular dominating the larger drainage lines, often with <i>Corymbia hamersleyana</i>; in smaller drainage lines the latter tended to dominate. In rare cases <i>Melaleuca argentea</i> was prevalent, but only where there appeared to be relatively consistent seepage water. Rarely, no trees were present – in particular, drainage lines higher in the ranges had no trees. The tall shrub strata varied in density, however was compositionally quite consistent, although <i>Melaleuca linophylla</i> was often very sparse or absent, and in sandier drainage lines, occasionally <i>Acacia trachycarpa</i> co-dominated. The lower shrub strata was always present but variable in both structure and composition, with</p>	 <p>Plate 28: VU 14 (Quadrat WDM25)</p>  <p>Plate 29: VU 14 (Quadrat HER037)</p>



VU	Summary	Photograph
	<p>no one taxon generally dominating. The grassland stratum was similar, with tussock grasses such as <i>Chrysopogon fallax</i>, <i>Cymbopogon ambiguus</i> and <i>Eriachne tenuiculmis</i> often dominating, sometimes with <i>Triodia epactia</i>, although in some cases the latter was very sparse. This VU also occasionally had a diverse forb stratum, generally in larger drainage lines where more water collects. This VU is not especially similar to any other VUs.</p>	



VU	Summary	Photograph
15	<p><b>Description:</b> Mid isolated shrubs of <i>Acacia synchronicia</i> over low isolated chenopod shrubs of <i>Maireana</i> sp. over low sparse forbland, tussock grassland and sedgeland of mixed species including <i>Portulaca oleracea</i>, <i>Ptilotus exaltatus</i>, <i>Cynodon prostratus</i>, <i>Sporobolus australasicus</i> and <i>Fimbristylis dichotoma</i> on red clay loam with colluvial stones on plains.</p> <p><b>Location:</b> Mapped in one low-lying area in the north-eastern extent of the Study Area (Appendix M: Figure M2).</p> <p><b>Area mapped (Proportion of Study Area):</b> 15.6 ha (0.2 %)</p> <p><b>Sampling:</b> 2 quadrats (WD01; WD65)</p> <p><b>Average Taxon Richness per Quadrat:</b> <math>9.5 \pm 2.1</math></p> <p><b>Indicator Taxa:</b> <i>Acacia synchronicia</i>, <i>Maireana</i> sp., <i>Sida fibulifera</i> and <i>Triodia longiceps</i>.</p> <p><b>Significant Taxa:</b> None recorded.</p> <p><b>Variation and Similar VUs:</b> There was no variation observed across the very small area of this VU mapped. This VU is not similar to any other VUs.</p>	 <p>Plate 30: VU 15 (Quadrat WD01)</p>



### 5.2.2.3 Other Areas Described

Areas where there is either approved disturbance (as provided by MARBL JV) or where natural vegetation has been completely and apparently permanently removed, with no native taxa remaining, have been mapped as 'Approved Clearing' (C). This includes roads (and associated infrastructure including culverts), tracks and areas cleared for mining activities. A total of 781.7 ha of 'Approved Clearing' has been mapped, representing 11.6 % of the Study Area (Figure 12; Appendix M).

In addition, one area where vegetation has been historically cleared and left to regrow was mapped as Degraded Land (D). A total of 2.4 ha of Degraded Land were mapped, representing 0.04% of the Study Area (Figure 12; Appendix M).

### 5.2.2.4 Significant Vegetation

No listed significant vegetation is known to occur in or within the vicinity of the Study Area (Section 5.1.6). None of the VUs mapped within the Study Area are considered to represent any formally listed TECs (DBCA 2018; DoEE 2019) or PECs (DBCA 2019a).

None of the VUs mapped in the Study Area are considered to be significant for reasons other than formal listing (see Section 3.9.2). Based on field observations and aerial photograph interpretation, all VUs mapped in the Study Area are either known to, or considered likely to, extend outside the Study Area to some extent. VUs 12, 13 and 15 are locally restricted, comprising less than 1% of the Study Area each. However, it is considered that this is because only very small amounts of the landforms that these VUs occur on are intersected by the Study Area. Investigation of aerial photography indicates that the low calcrete rises and stony plains where VUs 12 and 15 are much more prevalent to the east of the Study Area, while there are significant areas of the granite outcrops that VU 13 occurs on to the south of the Study Area.

As no Pilbara-wide vegetation dataset defined at the same scale that the VUs were defined at is available, it is not possible to conclusively assess the significance of VUs in a regional context. However, based on the overall taxon composition of the VUs mapped, it is likely that these would be relatively widespread in the general region surrounding the Study Area; additionally, the landforms and geology that the VUs are associated with are known to occur widely in the region (see Sections 2.2 and 5.1.1). Although several VUs are characterised by the presence of the somewhat restricted *Triodia chichesterensis* (P3), this species is known to occur relatively widely to the east of the Study Area, and it is considered probable that such VUs would also occur to the east of the Study Area based on the landforms that they occur on.

### 5.2.2.5 Wetlands, Groundwater and Surface Water Dependent Vegetation

Riparian vegetation is defined as plant habitats and communities occurring in association with watercourses, both ephemeral and permanent. Two VUs mapped in the Study Area contain riparian vegetation:

- VU 11: mapped in minor drainage features including flats and small ephemeral creeklines. This VU was mainly located on small drainage lines; however, it was also



mapped on associated flats in the north-east of the Study Area. A total of 185.5 ha of VU 11 were mapped in the Study Area (Appendix M).

- VU 14: mapped in major ephemeral creeklines. A total of 209.31 ha of VU 14 were mapped in the Study Area (Appendix M).

No other VUs mapped within the Study Area are considered to be wetlands.

As such, only VUs 11 and 14 are considered to be totally dependent on surface water flows for survival.

Groundwater dependent vegetation is known to occur in the Pilbara, and is generally indicated by the presence of one or several phreatophytic species. These are:

- *Melaleuca argentea* (obligate phreatophyte) (Graham 2001; cited in Department of Water 2010). Studies by Graham (2001) indicate that this species has a shallow planiform root system adapted to areas of very shallow groundwater (2-3 m below ground level) and has difficulties adjusting to short periods of dry conditions (Department of Water 2010). Studies undertaken by BHP (1997) indicate that a decline in groundwater level of 0.5 m may result in decreased vigour of plants and that a decline of 1 m or more may result in death.
- *Eucalyptus camaldulensis* (obligate or facultative phreatophyte, depending on the specific hydrological characteristics of a site (Department of Water 2010)). It is likely that this taxon is phreatophytic when groundwater is present only within 10m of the surface, and may be sensitive when groundwater drawdown occurs at a rapid rate in these areas.
- *Sesbania formosa* (likely to be an obligate phreatophyte (Department of Water 2010)).
- *Melaleuca glomerata*, *Atalaya hemiglauca*, *Acacia ampliceps* and *Melaleuca linophylla* - partially facultative phreatophytes, primarily based on their presence in major river channels where groundwater is known to be close to the surface (Loomes 2010a, 2010b; Loomes and Braimbridge 2010). No impacts through groundwater drawdown have been noted regarding *Atalaya hemiglauca*, *Acacia ampliceps* and *Melaleuca linophylla* based on observations by Woodman Environmental (2019c) indicating that these taxa have a low likelihood of phreatophytic nature. Therefore these species will not be considered further. Some impacts to *Melaleuca glomerata* were observed with regard to individuals located on a shallow sandbar that had been supported by a shallow groundwater table, and therefore this taxon is potentially phreatophytic depending upon the situations in which it grows.
- *Eucalyptus victrix* – suggested to be facultative phreatophyte in some situations (AQ2 2015; Eastham, 2015; Loomes and Braimbridge 2010; Loomes 2010a), however it is generally considered to be a vadophyte (AQ2 2015). Monitoring at the Ridley River (Pardoo) observed no impacts to *E. victrix* surrounding a bore over three years of extraction (Woodman Environmental 2014b); therefore, this taxon is not considered further.



Based on the presence of several of the above-noted taxa, it is possible that some occurrences of VU 14 are dependent on groundwater, if the local water table is within reach of the root systems of these taxa (generally within 10 m of the ground surface). The obligate phreatophyte *Melaleuca argentea* is known from the Study Area, however only from three locations. It is not common or widespread at any of these locations. In one, there appears to be an extended period of seepage after significant rainfall events; this therefore may be from surface water infiltration rather than groundwater. Another location is within an artificial drain area in proximity to the Wodgina camp that is being influenced by anthropogenic factors, and therefore this location also may not be associated with shallow groundwater. *Melaleuca glomerata* is also known to occur at three locations in VU 14, while *Eucalyptus victrix* and *Melaleuca linophylla* are common in this VU. However, available evidence indicates that vegetation that is groundwater dependent is not extensive in the Study Area. It should be noted that depth to groundwater within elevated parts of Wodgina (main range) is generally at least 20 m from the surface (Golder 2018), and therefore would not be accessible to any occurrences of VU 14 in these areas.

#### 5.2.2.6 Vegetation Condition

The majority (96.8 %) of the mapped vegetation in the Study Area (which comprises equivalent to 85.6 % of the entire Study Area) was rated as 'Excellent' (EPA 2016a; Appendix C) as there was no or little evidence of impact to vegetation composition as a result of human activities, or there were only low levels of introduced (weed) taxa. Table 12 presents the area (ha) of each VU and corresponding condition rating mapped in the Study Area.

The vegetation within VU 14 recorded substantial areas (56.0 % of total extent mapped) of vegetation rated as 'Good' or 'Poor'. These areas generally displayed obvious signs of impacts to structure and species composition, primarily as a result of cattle trampling and grazing, and the presence of moderate to large infestations of invasive weeds, particularly *Aerva javanica* and *Cenchrus ciliaris*. There were also some other small areas of other VUs mapped as 'Very Good' and 'Good' due to the presence of weed infestations (particularly *Aerva javanica*) and the presence mechanical disturbance associated with historical mining activities.

Some areas required mapping as mosaics of vegetation condition ratings, including areas mapped as 'Excellent/Very Good', and 'Good/Poor'. Such areas were primarily in drainage lines, and were variable in condition depending on usage by cattle, and consequential weed infestations. Time constraints prevented field investigation to determine accurate condition boundaries in these areas, and therefore mapping as a mosaic was considered the most pragmatic approach in these situations.

Areas rated as 'Degraded' and 'Completely Degraded' comprise 11.6 % of the entire Study Area; however, these ratings were only assigned to areas mapped as Degraded Land or Cleared (as per Section 5.2.2.3); no intact vegetation received these rating.

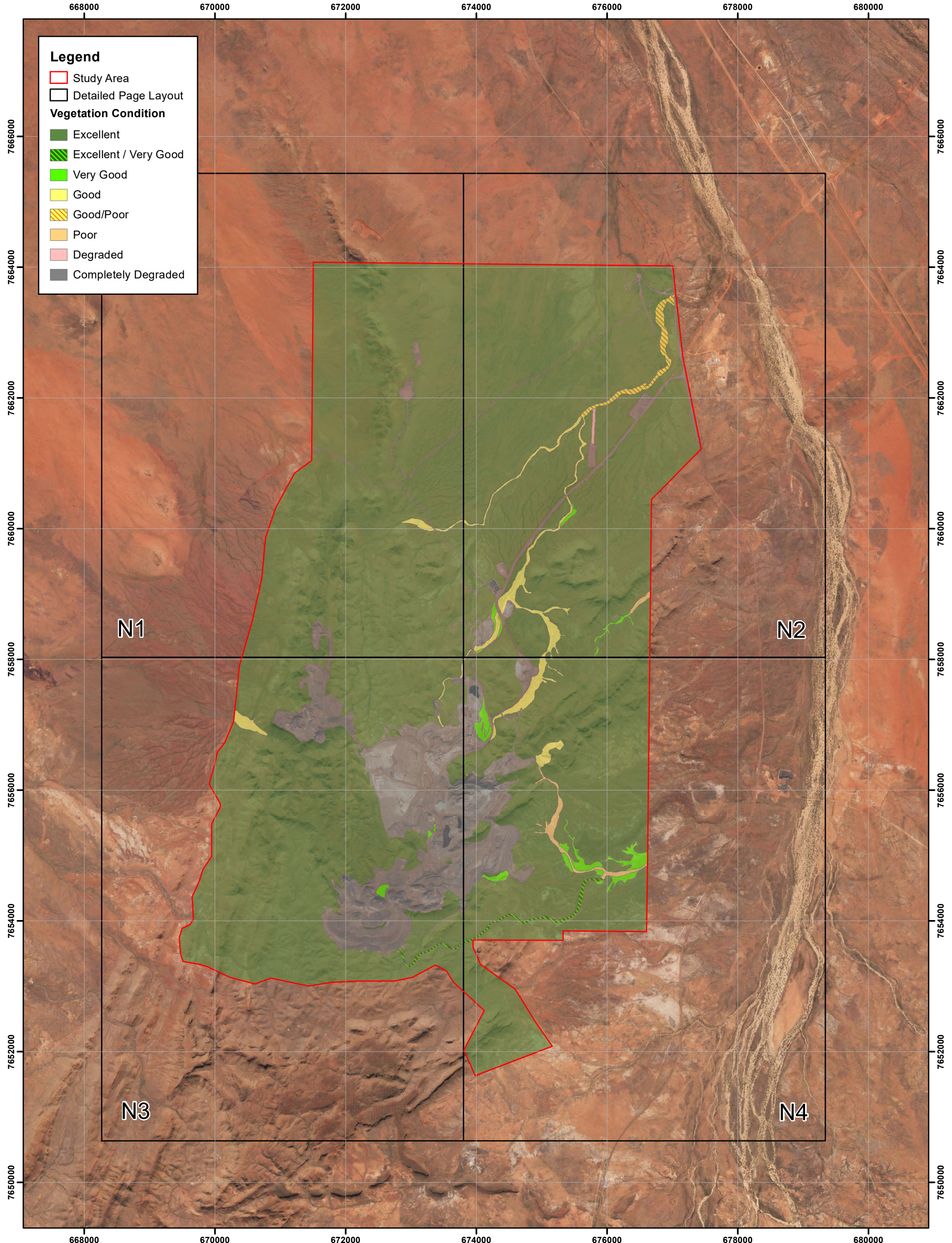
An overview of vegetation condition mapping polygons is presented in Figure 13, with detailed vegetation condition mapping presented in Appendix N.



**Table 12: Vegetation Condition Types Mapped in the Study Area**

VU	Area (ha)	Vegetation Condition Rating							
		Excellent (E)	Excellent/Very Good (E/VG)	Very Good (VG)	Good (G)	Good/Poor (G/P)	Poor (P)	Degraded (D)	Completely Degraded (CD)
1	300.41	300.41	-	-	-	-	-	-	-
2	834.55	834.55	-	-	-	-	-	-	-
3	250.78	248.32	-	2.47	-	-	-	-	-
4	324.34	324.34	-	-	-	-	-	-	-
5	374.99	371.64	-	3.36	-	-	-	-	-
6	215.41	215.41	-	-	-	-	-	-	-
7	369.86	366.37	-	3.49	-	-	-	-	-
8	134.15	134.15	-	-	-	-	-	-	-
9	1388.78	1371.85	-	9.59	7.34	-	-	-	-
10	1240.41	1240.41	-	-	-	-	-	-	-
11	185.53	158.16	-	27.38	-	-	-	-	-
12	59.67	59.67	-	-	-	-	-	-	-
13	57.21	57.21	-	-	-	-	-	-	-
14	209.31	72.57	15.88	3.55	75.87	21.84	19.60	-	-
15	15.61	15.61	-	-	-	-	-	-	-
D	2.40	0.00	-	-	-	-	-	2.40	-
C	781.69	0.00	-	-	-	-	-	-	781.69
<b>Total</b>	<b>6745.11</b>	<b>5770.67</b>	<b>15.88</b>	<b>49.83</b>	<b>83.20</b>	<b>21.84</b>	<b>19.60</b>	<b>2.40</b>	<b>781.69</b>







## 6. DISCUSSION

The Study Area is considered to have moderate diversity in terms of taxon richness, with 300 discrete taxa recorded; this was generally expected given its location in the north of the Pilbara region, and the results of other surveys, including by Woodman Environmental, in the surrounding region. However, the presence of a relatively wide variety of habitat types resulted in somewhat higher diversity than what would be expected in nearby local areas; this is considered to be a function of the Wodgina area being a relatively small but steep, isolated range surrounded by plains and large drainage features. Similar to the flora of the Study Area, the diversity of VUs within the Study Area is considered to be moderate, but likely slightly higher than surrounding areas for the same reasons outlined above.

Six significant flora taxa are known from the Study Area including five DBCA-classified Priority flora taxa and one taxon considered significant for other reasons as per EPA (2016a, b) (discussed in Section 5.2.1.5). *Euphorbia clementii* (P3) and *Heliotropium muticum* (P3) are both known from a relatively large number of records and considerable ranges and both have a number of records within 10 km of the Study Area. *Triodia chichesterensis* (P3) is known from a fairly low number of records over a somewhat limited range (13 records over 91 km); however, this is considered to be because of a lack of survey, and also a complex taxonomic history, with this species only being described in 2017. Although the number of individuals estimated to occur in the Study Area is considerable, there are almost certainly similarly large populations in areas to the east of the Study Area. The discovery of *Abutilon* aff. *hannii* in the Study Area increases the number of known populations for this entity; however, without publication of a revision of the genus, the true significance of this taxon cannot be determined with certainty.

The presence of *Terminalia supranitifolia* (P3) and *Vigna triodiophila* (P3) in the Study Area is of particular interest. Both have distributions concentrated in the western Pilbara, particularly around Karratha, with the populations in the Study Area being significantly disjunct from the main area of distribution. It is unclear as to whether there are populations in intervening areas, or whether their presence in the Study Area is a true disjunction driven by a contraction of range due to changing climate, or by random dispersal to a similar habitat and climatic niche. In any event, the Study Area populations appear to represent the eastern range end for both taxa. It should be noted that the areas to the west and south of Wodgina in particular appear to be very poorly botanically-explored (WA Herbarium 1998-), although it is unknown if appropriate habitat exists in these areas.

It is also of interest that the recording of a number of species in sandy areas at Wodgina represents somewhat disjunct records for such species. This includes *Heliotropium vestitum*, *Heliotropium diversifolium* and *Halgania solanacea* var. *solanacea*, all of which have been recorded in the general area previously. These species are generally found in areas east of Wodgina that have more extensive sandplains (WA Herbarium 1998-). As discussed above, these may not be true disjunctions, as the surrounding areas are very poorly botanically-explored.



Extensive searching for all significant flora taxa previously recorded in the Study Area, or considered to potentially occur within the Study Area, was undertaken. It is therefore considered unlikely that populations of significant flora taxa other than those recorded in 2018 and 2019 occur in the Study Area. It is considered likely that further locations of those significant taxa recorded in 2018 and 2019 do occur in the Study Area, however, as not all suitable habitat for all taxa has been searched.

As noted in Section 5.2, fire has likely had a significant effect on the results of the surveys in the Study Area. Fire is a strong driver of species composition in the Pilbara; this effect is especially prominent in the presence of several significant flora taxa, particularly *Euphorbia clementii* (P3), which is almost absent from areas in which it has been recorded in only a few years post-fire. This has potential flow-on effects in terms of the floristic analysis (through the misclassification of quadrats), and the ability to confidently map vegetation across the Study Area. This is compounded by issues such as low taxon diversity of the northern Pilbara, as well as the absence of geological preference in the majority of taxa (e.g. *Triodia epactia*, which occurs on almost all geological features in the Study Area) resulting in less than optimal classification results and manual re-assignment of quadrats within analyses. Despite these issues, the sampling strategy and field verification work undertaken provides confidence that the VUs and VU mapping polygons presented in this report adequately characterise the vegetation of the Study Area based on available data and are suitable for use in future impact assessments related to the Study Area.

None of the VUs mapped in the Study Area are considered to represent any formally listed TECs or PECs. It is also considered likely that none of the VUs are significant for any other reasons. All VUs are likely to be present outside the Study Area based on taxonomic composition and interpretation of vegetation and topographical patterns on aerial photography. The absence of a regional dataset also makes assessment of the significance of the vegetation of the Pilbara particularly problematic.

The majority of the vegetation in the Study Area was rated and mapped as being in Excellent condition, with little to no historical mechanical disturbance and an absence or low levels of introduced flora taxa. However, the majority of larger drainage features, including creeks and flow lines, had lower condition ratings as a result of the presence of high densities of aggressive introduced taxa and high grazing and trampling impacts from cattle.



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**Appendix A: Conservation Codes for Western Australian Flora and Fauna (DBCA 2019b)**





Department of Biodiversity,  
Conservation and Attractions

## CONSERVATION CODES

### For Western Australian Flora and Fauna

Threatened, Extinct and Specially Protected fauna or flora<sup>1</sup> are species<sup>2</sup> which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

**The Wildlife Conservation (Specially Protected Fauna) Notice 2018 and the Wildlife Conservation (Rare Flora) Notice 2018 have been transitioned under regulations 170, 171 and 172 of the Biodiversity Conservation Regulations 2018 to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the Biodiversity Conservation Act 2016.**

Categories of Threatened, Extinct and Specially Protected fauna and flora are:

#### **T Threatened species**

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

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

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

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

#### **CR Critically endangered species**

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

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

#### **EN Endangered species**

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

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

#### **VU Vulnerable species**

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

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



## Conservation codes for Western Australian flora and fauna

**Extinct species**

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

**EX Extinct species**

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

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

**EW Extinct in the wild species**

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

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

**Specially protected species**

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

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

**MI Migratory species**

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

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

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

**CD Species of special conservation interest (conservation dependent fauna)**

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

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

**OS Other specially protected species**

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

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



## Conservation codes for Western Australian flora and fauna

**P Priority species**

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

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

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

**1 Priority 1: Poorly-known species**

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

**2 Priority 2: Poorly-known species**

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

**3 Priority 3: Poorly-known species**

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

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

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

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

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

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

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

Last updated 3 January 2019



## **Appendix B: Definitions, Categories and Criteria for Threatened and Priority Ecological Communities (DBCA 2013a)**



## 1. GENERAL DEFINITIONS

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

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

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

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

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

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

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

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

**Adequately Surveyed** is defined as follows:

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

**Community structure** is defined as follows:

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

**Definitions of Modification and Destruction** of an ecological community:

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



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

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

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

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

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

**Threatening processes** are defined as follows:

“Any process or activity that threatens to destroy or significantly modify the ecological community and/or affect the continuing evolutionary processes within any ecological community.”

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

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

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



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

### Presumed Totally Destroyed (PD)

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

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

- A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats **or**
- B) All occurrences recorded within the last 50 years have since been destroyed

### Critically Endangered (CR)

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

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

- A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% **and either or both** of the following apply (i or ii):
  - i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years);
  - ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated.
- B) Current distribution is limited, **and one or more** of the following apply (i, ii or iii):
  - i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years);
  - ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes;



iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes.

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

### Endangered (EN)

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

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

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

- i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years);
- ii) modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated.

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

- i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years);
- ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes;
- iii) there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes.

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

### Vulnerable (VU)

An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet



been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

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

- A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated.
- B) The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations.
- C) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long term future because of existing or impending threatening processes.

### 3. DEFINITIONS AND CRITERIA FOR PRIORITY ECOLOGICAL COMMUNITIES PRIORITY ECOLOGICAL COMMUNITY LIST

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

#### **Priority One:** Poorly-known ecological communities:

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

#### **Priority Two:** Poorly-known ecological communities:

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



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

**Priority Three:** Poorly known ecological communities:

- (i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or;
- (ii) Communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or;
- (iii) Communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.

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

**Priority Four:** Ecological communities:

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

- (i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.
- (ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for a higher threat category.
- (iii) Ecological communities that have been removed from the list of threatened communities during the past five years.

**Priority Five:** Conservation Dependent ecological communities:

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

*Current as of January 2013*



## **Appendix C:      Vegetation Condition Scale for the Eremaean and Northern Botanical Provinces**



Condition Ranking	Description
E (Excellent)	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
VG (Very Good)	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
G (Good)	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
P (Poor)	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
VP (Very Poor)	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species
D (Completely Degraded)	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.



**Appendix D: Results of Search of the Department of the Environment and Energy Species Profile and Threats (SPRAT) Database (DoEE 2019)**





# EPBC Act Protected Matters Report

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

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

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

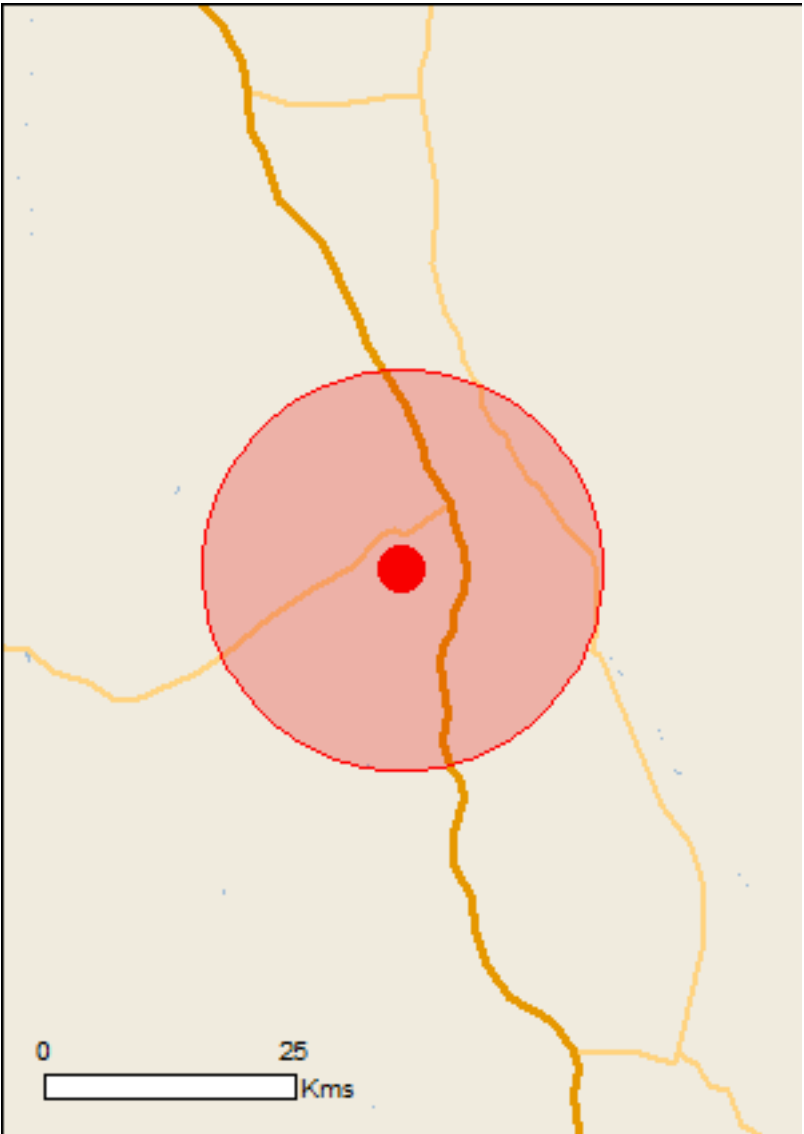
Report created: 15/08/19 12:57:25

- [Summary](#)
- [Details](#)

[Matters of NES](#)

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

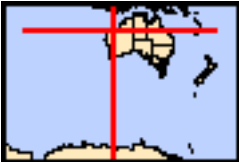
[Extra Information](#)
- [Caveat](#)
- [Acknowledgements](#)



This map may contain data which are  
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[Coordinates](#)

Buffer: 20.0Km





# Summary

## Matters of National Environmental Significance

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

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance:</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	None
<a href="#">Listed Threatened Species:</a>	9
<a href="#">Listed Migratory Species:</a>	12

## Other Matters Protected by the EPBC Act

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

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

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

<a href="#">Commonwealth Land:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	18
<a href="#">Whales and Other Cetaceans:</a>	None
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None

## Extra Information

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

<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	11
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">Key Ecological Features (Marine)</a>	None



# Details

## Matters of National Environmental Significance

Listed Threatened Species		[ Resource Information ]
Name	Status	Type of Presence
Birds		
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Pezoporus occidentalis</a> Night Parrot [59350]	Endangered	Species or species habitat may occur within area
<a href="#">Rostratula australis</a> Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
<a href="#">Dasyurus hallucatus</a> Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
<a href="#">Macroderma gigas</a> Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Macrotis lagotis</a> Greater Bilby [282]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Rhinonictoris aurantia (Pilbara form)</a> Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
<a href="#">Liasis olivaceus barroni</a> Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat likely to occur within area
Listed Migratory Species		[ Resource Information ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		



Name	Threatened	Type of Presence
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat may occur within area
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat may occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
<a href="#">Glareola maldivarum</a> Oriental Pratincole [840]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[ <u>Resource Information</u> ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat known to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may occur within area



Name	Threatened	Type of Presence
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
<a href="#">Chrysococcyx osculans</a> Black-eared Cuckoo [705]		Species or species habitat may occur within area
<a href="#">Glareola maldivarum</a> Oriental Pratincole [840]		Species or species habitat may occur within area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat may occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat may occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat may occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

## Extra Information

Invasive Species

[ Resource Information ]

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

Name	Status	Type of Presence
Birds		



Name	Status	Type of Presence
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Mammals		
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area



# Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

# Coordinates

-21.17544 118.6615



# Acknowledgements

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

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

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

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



## **Appendix E: Vascular Plant Taxa Amalgamated in or Omitted from the Floristic Analysis**



Description	Taxon	Reasoning
<b>Amalgamated Taxa</b>	<i>Cajanus cinereus</i> , <i>Cajanus pubescens</i>	Unclear taxonomy
	<i>Clerodendrum tomentosum</i> , <i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	Variants could not be consistently positively identified because of inadequate material
	<i>Haloragis gossei</i> , <i>Haloragis gossei</i> var. <i>gossei</i>	Variants could not be consistently positively identified because of inadequate material
	<i>Trichodesma zeylanicum</i> , <i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	Variants could not be consistently positively identified because of inadequate material
<b>Omitted taxa</b>	<i>Abutilon</i> sp.	Could not be positively identified because of inadequate material
	<i>Acacia</i> sp.	Could not be positively identified because of inadequate material
	? <i>Corymbia hamersleyana</i>	Could not be positively identified because of inadequate material
	? <i>Dysphania</i> sp.	Could not be positively identified because of inadequate material
	<i>Euphorbia</i> ? <i>trigonosperma</i>	Could not be positively identified because of inadequate material
	? <i>Goodenia stobbsiana</i>	Could not be positively identified because of inadequate material
	<i>Hibiscus</i> ? <i>leptocladus</i>	Could not be positively identified because of inadequate material
	? <i>Polymeria ambigua</i>	Could not be positively identified because of inadequate material
	<i>Ptilotus</i> ? <i>auriculifolius</i>	Could not be positively identified because of inadequate material
	<i>Ptilotus</i> ? <i>exaltatus</i>	Could not be positively identified because of inadequate material
	? <i>Ptilotus helipteroides</i>	Could not be positively identified because of inadequate material
	? <i>Schenkia australis</i>	Could not be positively identified because of inadequate material
	<i>Senna</i> ? <i>glaucifolia</i>	Could not be positively identified because of inadequate material



## **Appendix F: Vascular Plant Taxa Recorded in the Study Area**



Family	Taxon	2018/2019 Survey	Study Area*
<b>Aizoaceae</b>	<i>Trianthema pilosum</i>	x	
	* <i>Trianthema portulacastrum</i>		x
	<i>Trianthema triquetrum</i>	x	
<b>Amaranthaceae</b>	* <i>Aerva javanica</i>	x	
	<i>Amaranthus interruptus</i>		x
	<i>Amaranthus undulatus</i>	x	
	<i>Gomphrena cunninghamii</i>	x	
	<i>Ptilotus aervoides</i>		x
	<i>Ptilotus arthrolasius</i>	x	
	<i>Ptilotus astrolasius</i>	x	
	<i>Ptilotus auriculifolius</i>	x	
	<i>Ptilotus axillaris</i>	x	
	<i>Ptilotus calostachyus</i>	x	
	<i>Ptilotus clementii</i>	x	
	<i>Ptilotus exaltatus</i>	x	
	<i>Ptilotus fusiformis</i>	x	
	<i>Ptilotus incanus</i>	x	
	<i>Ptilotus obovatus</i>		x
	<i>Ptilotus polystachyus</i>	x	
<b>Apocynaceae</b>	* <i>Calotropis procera</i>	x	
<b>Araliaceae</b>	<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	x	
<b>Asteraceae</b>	* <i>Flaveria trinervia</i>	x	
	<i>Peripleura virgata</i>	x	
	<i>Pluchea dentex</i>	x	
	<i>Pluchea ferdinandi-muelleri</i>	x	
	<i>Pluchea rubelliflora</i>	x	
	<i>Pluchea tetranthera</i>	x	
	<i>Pterocaulon sphacelatum</i>	x	
	<i>Pterocaulon sphaeranthoides</i>	x	
	<i>Rhodanthe margarethae</i>	x	
	<i>Streptoglossa decurrens</i>	x	
	<i>Streptoglossa odora</i>		x
<b>Boraginaceae</b>	<i>Halgania solanacea</i> var. <i>solanacea</i> ms	x	
	<i>Heliotropium chrysocarpum</i>	x	
	<i>Heliotropium crispatum</i>	x	
	<i>Heliotropium cunninghamii</i>	x	
	<i>Heliotropium diversifolium</i>	x	
	<i>Heliotropium muticum</i> (P3)	x	
	<i>Heliotropium pachyphyllum</i>	x	
	<i>Heliotropium skeleton</i>	x	
	<i>Heliotropium tenuifolium</i>	x	
	<i>Heliotropium vestitum</i>	x	
	<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	x	
<b>Brassicaceae</b>	<i>Lepidium ?pholidogynum</i>	x	
<b>Byblidaceae</b>	<i>Byblis pilbarana</i>	x	



Family	Taxon	2018/2019 Survey	Study Area*
<b>Campanulaceae</b>	<i>Wahlenbergia tumidifructa</i>	x	
<b>Caryophyllaceae</b>	<i>Polycarpaea corymbosa</i>	x	
	<i>Polycarpaea holtzei</i>	x	
	<i>Polycarpaea longiflora</i>	x	
<b>Celastraceae</b>	<i>Stackhousia muricata</i>	x	
<b>Chenopodiaceae</b>	<i>Dysphania kalpari</i>	x	
	<i>Dysphania plantaginella</i>		x
	<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	x	
	<i>Dysphania sphaerosperma</i>	x	
	<i>Maireana</i> sp.	x	
	<i>Salsola australis</i>	x	
	<i>Sclerolaena densiflora</i>	x	
<b>Cleomaceae</b>	<i>Cleome uncifera</i> subsp. <i>uncifera</i>	x	
	<i>Cleome viscosa</i>	x	
<b>Combretaceae</b>	<i>Terminalia circumalata</i>	x	
	<i>Terminalia supranitifolia</i> (P3)	x	
<b>Convolvulaceae</b>	<i>Bonamia alatisemina</i>	x	
	<i>Bonamia erecta</i>	x	
	<i>Bonamia media</i>	x	
	<i>Bonamia pannosa</i>	x	
	<i>Bonamia pilbarensis</i>	x	
	<i>Evolvulus alsinoides</i> var. <i>decumbens</i>		x
	<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	x	
	<i>Ipomoea muelleri</i>	x	
	<i>Operculina aequisejala</i>	x	
	<i>Polymeria ambigua</i>	x	
<b>Cucurbitaceae</b>	<i>Cucumis variabilis</i>	x	
	<i>Trichosanthes cucumerina</i> var. <i>cucumerina</i>	x	
<b>Cyperaceae</b>	<i>Bulbostylis barbata</i>	x	
	<i>Cyperus hesperius</i>	x	
	<i>Cyperus pulchellus</i>	x	
	<i>Cyperus squarrosus</i>	x	
	<i>Cyperus vaginatus</i>	x	
	<i>Fimbristylis dichotoma</i>	x	
	<i>Fimbristylis elegans</i>		x
	<i>Fimbristylis rara</i>	x	
	<i>Fimbristylis simulans</i>	x	
<b>Elatinaceae</b>	<i>Bergia pedicellaris</i>	x	
<b>Euphorbiaceae</b>	<i>Adriana tomentosa</i> var. <i>tomentosa</i>	x	
	<i>Euphorbia australis</i> var. <i>subtomentosa</i>	x	
	<i>Euphorbia biconvexa</i>	x	
	<i>Euphorbia careyi</i>	x	
	<i>Euphorbia clementii</i> (P3)	x	
	<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	x	
	<i>Euphorbia trigonosperma</i>	x	



Family	Taxon	2018/2019 Survey	Study Area*
<b>Euphorbiaceae cont.</b>	<i>Euphorbia vaccaria</i> var. <i>vaccaria</i>	x	
	<i>Mallotus nesophilus</i>		x
<b>Fabaceae</b>	<i>Acacia acradenia</i>	x	
	<i>Acacia ancistrocarpa</i>	x	
	<i>Acacia ancistrocarpa</i> x <i>arida</i>		x
	<i>Acacia ancistrocarpa</i> x <i>orthocarpa</i>	x	
	<i>Acacia ancistrocarpa</i> x <i>tumida</i> var. <i>pilbarensis</i>	x	
	<i>Acacia arida</i>		x
	<i>Acacia bivenosa</i>	x	
	<i>Acacia colei</i> var. <i>colei</i>		x
	<i>Acacia coriacea</i> subsp. <i>pendens</i>	x	
	<i>Acacia inaequilatera</i>	x	
	<i>Acacia maitlandii</i>	x	
	<i>Acacia orthocarpa</i>	x	
	<i>Acacia orthocarpa</i> x <i>ancistrocarpa</i>	x	
	<i>Acacia orthocarpa</i> x	x	
	<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	x	
	<i>Acacia sphaerostachya</i>	x	
	<i>Acacia spondylophylla</i>	x	
	<i>Acacia stellaticeps</i>	x	
	<i>Acacia synchronicia</i>	x	
	<i>Acacia trachycarpa</i>	x	
	<i>Acacia trachycarpa</i> x <i>tumida</i> var. <i>pilbarensis</i>		x
	<i>Acacia tumida</i> var. <i>pilbarensis</i>	x	
	<i>Alysicarpus muelleri</i>	x	
	<i>Cajanus pubescens</i>	x	
	<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	x	
	<i>Crotalaria novae-hollandiae</i> subsp. <i>novae-hollandiae</i>	x	
	<i>Cullen cinereum</i>		x
	<i>Cullen leucanthum</i>	x	
	<i>Cullen leucochaetes</i>	x	
	<i>Cullen martinii</i>		x
	<i>Cullen stipulaceum</i>	x	
	<i>Desmodium filiforme</i>	x	
	<i>Glycine canescens</i>		x
	<i>Indigofera colutea</i>	x	
	<i>Indigofera linifolia</i>		x
	<i>Indigofera linnaei</i>	x	
	<i>Indigofera monophylla</i>	x	
	<i>Indigofera rugosa</i>	x	
	<i>Indigofera trita</i>	x	
	<i>Isotropis atropurpurea</i>	x	
	<i>Leptosema anomalum</i>	x	
	<i>Petalostylis labicheoides</i>	x	
	<i>Rhynchosia minima</i>	x	



Family	Taxon	2018/2019 Survey	Study Area*
<b>Fabaceae cont.</b>	<i>Senna artemisioides</i> subsp. <i>hemslsii</i> x <i>oligophylla</i>		x
	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	x	
	<i>Senna curvistyla</i>	x	
	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	x	
	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	x	
	<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	x	
	<i>Senna glutinosa</i> x	x	
	<i>Senna notabilis</i>	x	
	<i>Senna symonii</i>	x	
	<i>Senna venusta</i>	x	
	<i>Sesbania cannabina</i>	x	
	<i>Swainsona formosa</i>	x	
	<i>Swainsona stenodonta</i>	x	
	<i>Tephrosia clementii</i>	x	
	<i>Tephrosia densa</i>	x	
	<i>Tephrosia rosea</i> var. <i>clementii</i>	x	
	<i>Tephrosia supina</i>	x	
	<i>Tephrosia virens</i>	x	
	<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	x	
	<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	x	
	<i>Vigna triodiophila</i> (P3)	x	
	<i>Zornia albiflora</i>	x	
<b>Goodeniaceae</b>	<i>Dampiera candidans</i>	x	
	<i>Goodenia cusackiana</i>	x	
	<i>Goodenia forrestii</i>	x	
	<i>Goodenia lamprosperma</i>	x	
	<i>Goodenia microptera</i>	x	
	<i>Goodenia muelleriana</i>	x	
	<i>Goodenia stobbsiana</i>	x	
	<i>Goodenia triodiophila</i>	x	
	<i>Scaevola browniana</i> subsp. <i>browniana</i>	x	
	<i>Scaevola spinescens</i>	x	
	<i>Velleia connata</i>		x
<b>Gyrostemonaceae</b>	<i>Codonocarpus cotinifolius</i>	x	
<b>Haloragaceae</b>	<i>Gonocarpus ephemerus</i>	x	
	<i>Haloragis gossei</i>	x	
<b>Lamiaceae</b>	<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	x	
<b>Lauraceae</b>	<i>Cassytha capillaris</i>	x	
	<i>Cassytha filiformis</i>		x
<b>Loganiaceae</b>	<i>Mitrasacme connata</i>	x	
<b>Lythraceae</b>	<i>Ammannia baccifera</i>	x	
<b>Malvaceae</b>	<i>Abutilon</i> aff. <i>hannii</i>	x	
	<i>Abutilon</i> sp. Dioicum (A.A. Mitchell PRP 1618)	x	
	<i>Abutilon</i> sp. Pilbara (W.R. Barker 2025)	x	
	<i>Corchorus</i> ? <i>incanus</i> subsp. <i>incanus</i>		x



Family	Taxon	2018/2019 Survey	Study Area*
<b>Malvaceae cont.</b>	<i>Corchorus parviflorus</i>	x	
	<i>Corchorus tridens</i>		x
	<i>Gossypium australe</i>	x	
	<i>Gossypium robinsonii</i>		x
	<i>Hibiscus coatesii</i>	x	
	<i>Hibiscus goldsworthii</i>	x	
	<i>Hibiscus leptocladus</i>	x	
	<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	x	
	<i>Melhania oblongifolia</i>	x	
	<i>Seringia nephrosperma</i>	x	
	<i>Sida arenicola</i>	x	
	<i>Sida clementii</i>	x	
	<i>Sida fibulifera</i>	x	
	<i>Sida rohlenae</i> subsp. <i>rohlenae</i>	x	
	<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	x	
	<i>Triumfetta chaetocarpa</i>	x	
	<i>Triumfetta clementii</i>	x	
	<i>Triumfetta johnstonii</i>	x	
	<i>Triumfetta maconochieana</i>	x	
	<i>Triumfetta propinqua</i>	x	
	<i>Triumfetta ramosa</i>	x	
	<i>Waltheria indica</i>	x	
<b>Menispermaceae</b>	<i>Tinospora smilacina</i>	x	
<b>Molluginaceae</b>	<i>Trigastrotheca molluginea</i>	x	
<b>Montiaceae</b>	<i>Calandrinia pumila</i>	x	
	<i>Calandrinia stagnensis</i>	x	
<b>Moraceae</b>	<i>Ficus brachypoda</i>	x	
<b>Myrtaceae</b>	<i>Corymbia deserticola</i>	x	
	<i>Corymbia ferriticola</i>	x	
	<i>Corymbia hamersleyana</i>	x	
	<i>Corymbia zygomphylla</i>	x	
	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	x	
	<i>Eucalyptus victrix</i>	x	
	<i>Melaleuca argentea</i>	x	
	<i>Melaleuca glomerata</i>	x	
	<i>Melaleuca linophylla</i>	x	
<b>Nyctaginaceae</b>	<i>Boerhavia burbridgeana</i>	x	
	<i>Boerhavia coccinea</i>	x	
	<i>Boerhavia gardneri</i>	x	
	<i>Boerhavia repleta</i>		x
	<i>Boerhavia schomburgkiana</i>	x	
<b>Oleaceae</b>	<i>Jasminum didymum</i> subsp. <i>lineare</i>	x	
<b>Onagraceae</b>	<i>Ludwigia perennis</i>	x	
<b>Orobanchaceae</b>	<i>Striga curviflora</i>		x
	<i>Striga squamigera</i>	x	



Family	Taxon	2018/2019 Survey	Study Area*
<b>Passifloraceae</b>	<i>*Passiflora foetida</i> var. <i>hispida</i>	x	
<b>Phyllanthaceae</b>	<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	x	
	<i>Notoleptopus decaisnei</i>	x	
	<i>Phyllanthus maderaspatensis</i>	x	
<b>Plantaginaceae</b>	<i>Stemodia grossa</i>	x	
	<i>Stemodia viscosa</i>	x	
<b>Poaceae</b>	<i>Aristida burbridgeae</i>	x	
	<i>Aristida contorta</i>	x	
	<i>Aristida holathera</i> var. <i>holathera</i>	x	
	<i>*Cenchrus ciliaris</i>	x	
	<i>*Cenchrus setiger</i>	x	
	<i>*Chloris barbata</i>	x	
	<i>Chrysopogon fallax</i>	x	
	<i>Cymbopogon ambiguus</i>	x	
	<i>*Cynodon dactylon</i>	x	
	<i>Cynodon prostratus</i>	x	
	<i>Dactyloctenium radulans</i>		x
	<i>Dichanthium fecundum</i>		x
	<i>Digitaria brownii</i>	x	
	<i>Enneapogon caerulescens</i>	x	
	<i>Enneapogon lindleyanus</i>	x	
	<i>Eragrostis ?xerophila</i>	x	
	<i>Eragrostis cumingii</i>	x	
	<i>Eragrostis desertorum</i>	x	
	<i>Eragrostis dielsii</i>	x	
	<i>Eragrostis eriopoda</i>	x	
	<i>*Eragrostis minor</i>		x
	<i>Eragrostis speciosa</i>		x
	<i>Eragrostis tenellula</i>	x	
	<i>Eriachne aristidea</i>	x	
	<i>Eriachne benthamii</i>		x
	<i>Eriachne mucronata</i>	x	
	<i>Eriachne obtusa</i>	x	
	<i>Eriachne pulchella</i> subsp. <i>dominii</i>	x	
	<i>Eriachne tenuiculmis</i>	x	
	<i>Eriachne</i> sp. Dugald River (B.K. Simon+ 3007)	x	
	<i>Eulalia aurea</i>	x	
	<i>Paraneurachne muelleri</i>	x	
	<i>Paspalidium clementii</i>	x	
	<i>Paspalidium rarum</i>	x	
	<i>Paspalidium tabulatum</i>	x	
	<i>Perotis rara</i>	x	
	<i>Schizachyrium fragile</i>	x	
	<i>Sorghum plumosum</i> var. <i>plumosum</i>	x	
	<i>Sporobolus australasicus</i>	x	



Family	Taxon	2018/2019 Survey	Study Area*
<b>Poaceae cont.</b>	<i>Themeda triandra</i>	x	
	<i>Triodia angusta</i>	x	
	<i>Triodia brizoides</i>	x	
	<i>Triodia chichesterensis</i> (P3)	x	
	<i>Triodia epactia</i>	x	
	<i>Triodia lanigera</i>	x	
	<i>Triodia longiceps</i>	x	
	<i>Triodia schinzii</i>	x	
	<i>Triodia scintillans</i>	x	
	<i>Triodia wiseana</i>	x	
	<i>Tripogonella loliiformis</i>	x	
	<i>Yakirra australiensis</i> var. <i>australiensis</i>	x	
<b>Polygalaceae</b>	<i>Polygala glaucifolia</i>	x	
	<i>Polygala</i> aff. <i>saccopetala</i>		x
<b>Portulacaceae</b>	<i>Portulaca oleracea</i>	x	
<b>Proteaceae</b>	<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	x	
	<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	x	
	<i>Hakea lorea</i> subsp. <i>lorea</i>	x	
<b>Pteridaceae</b>	<i>Cheilanthes brownii</i>	x	
	<i>Cheilanthes contigua</i>	x	
	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	x	
<b>Rubiaceae</b>	<i>Oldenlandia crouchiana</i>	x	
	<i>Oldenlandia galioides</i>	x	
	<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>	x	
<b>Santalaceae</b>	<i>Santalum lanceolatum</i>	x	
<b>Sapindaceae</b>	<i>Atalaya hemiglauc</i>		x
	<i>Dodonaea coriacea</i>	x	
<b>Solanaceae</b>	<i>Nicotiana benthamiana</i>	x	
	<i>Nicotiana ?rosulata</i>		x
	* <i>Physalis angulata</i>		x
	<i>Solanum diversiflorum</i>	x	
	<i>Solanum horridum</i>	x	
	<i>Solanum lasiophyllum</i>		x
	<i>Solanum phlomoides</i>	x	
<b>Typhaceae</b>	<i>Typha domingensis</i>		x
<b>Violaceae</b>	<i>Hybanthus aurantiacus</i>	x	
<b>Zygophyllaceae</b>	<i>Tribulopsis angustifolia</i>	x	
	<i>Tribulus hirsutus</i>	x	
	<i>Tribulus platypterus</i>	x	
	<i>Tribulus suberosus</i>	x	

\*Includes taxa with locations in the Study Area from surveys: Western Botanical (2017); Woodman Environmental (2011a; 2011b; 2013a; 2013b; 2013c).

Taxa not included from the following surveys:

- Mattiske (2000); Outback Ecology (2008; 2009) – data outdated;



- 360 Environmental (2018a; 2018b) - surveys included areas (and taxa) outside Study Area; and
- 360 Environmental (2018c) – full list of taxa not presented in report or appendices.



**Appendix G: Location Details of Significant Flora and Introduced Flora  
Recorded within the Survey Area in 2018/2019**

**GOVERNMENT AGENCY REFERENCE ONLY  
NOT FOR PUBLIC DISSEMINATION  
CONTAINS LOCATIONS OF SIGNIFICANT FLORA TAXA**



Note: All flora locations are in datum GDA94, Zone 50

### Significant Flora

Taxon	Significance	Count	Easting	Northing	Comments
<i>Abutilon</i> aff. <i>hannii</i>	Potentially undescribed	5	670021	7653508	Opportunistic
<i>Abutilon</i> aff. <i>hannii</i>	Potentially undescribed	10	670326	7653360	Opportunistic
<i>Abutilon</i> aff. <i>hannii</i>	Potentially undescribed	1	672839	7653305	Opportunistic
<i>Abutilon</i> aff. <i>hannii</i>	Potentially undescribed	10	670696	7653373	Quadrat - WD25
<i>Abutilon</i> aff. <i>hannii</i>	Potentially undescribed	3	674043	7652926	Quadrat - WD90
<i>Abutilon</i> aff. <i>hannii</i>	Potentially undescribed	2	674734	7653978	Quadrat - WD64
<i>Abutilon</i> aff. <i>hannii</i>	Potentially undescribed	20	671224	7654427	Quadrat - WDM25
<i>Euphorbia clementii</i>	P3	500	670624	7658799	Opportunistic
<i>Euphorbia clementii</i>	P3	1	673796	7653684	Quadrat - TRH058
<i>Euphorbia clementii</i>	P3	1	677015	7661962	Quadrat - WD12
<i>Euphorbia clementii</i>	P3	1	669486	7653745	Quadrat - WD33
<i>Euphorbia clementii</i>	P3	3	673382	7662799	Quadrat - WDD02
<i>Euphorbia clementii</i>	P3	26	672894	7663619	Quadrat - WDD08
<i>Euphorbia clementii</i>	P3	3	675946	7663306	Quadrat - WDD14
<i>Euphorbia clementii</i>	P3	6	672948	7661371	Quadrat - WDD24
<i>Euphorbia clementii</i>	P3	1	671224	7654427	Quadrat - WDM25
<i>Euphorbia clementii</i>	P3	2	675664	7654547	Opportunistic
<i>Euphorbia clementii</i>	P3	1	675920	7654748	Opportunistic
<i>Euphorbia clementii</i>	P3	2	675841	7654749	Opportunistic
<i>Euphorbia clementii</i>	P3	2	675368	7654947	Opportunistic
<i>Euphorbia clementii</i>	P3	2	675338	7655033	Opportunistic
<i>Euphorbia clementii</i>	P3	1	676199	7655349	Opportunistic
<i>Euphorbia clementii</i>	P3	2	676211	7655356	Opportunistic
<i>Euphorbia clementii</i>	P3	1	676283	7655355	Opportunistic
<i>Euphorbia clementii</i>	P3	5	675918	7663219	Opportunistic
<i>Euphorbia clementii</i>	P3	1	675915	7663244	Opportunistic
<i>Euphorbia clementii</i>	P3	1	675709	7662369	Opportunistic
<i>Euphorbia clementii</i>	P3	1	675899	7662542	Opportunistic
<i>Euphorbia clementii</i>	P3	1	675903	7662675	Opportunistic
<i>Euphorbia clementii</i>	P3	2	675900	7662758	Opportunistic
<i>Euphorbia clementii</i>	P3	1	673522	7652414	Opportunistic
<i>Euphorbia clementii</i>	P3	1	675805	7662930	Opportunistic
<i>Euphorbia clementii</i>	P3	1	672808	7660885	Opportunistic
<i>Euphorbia clementii</i>	P3	2	672831	7660885	Opportunistic
<i>Euphorbia clementii</i>	P3	2	672843	7660897	Opportunistic
<i>Euphorbia clementii</i>	P3	3	672832	7660909	Opportunistic
<i>Euphorbia clementii</i>	P3	2	672794	7660946	Opportunistic
<i>Euphorbia clementii</i>	P3	14	672784	7660957	Opportunistic
<i>Euphorbia clementii</i>	P3	2	672761	7660981	Opportunistic
<i>Euphorbia clementii</i>	P3	1	672755	7661002	Opportunistic
<i>Euphorbia clementii</i>	P3	2	672736	7661013	Opportunistic
<i>Euphorbia clementii</i>	P3	1	672684	7661113	Opportunistic
<i>Euphorbia clementii</i>	P3	20	672829	7660781	Opportunistic
<i>Euphorbia clementii</i>	P3	20	672841	7660750	Opportunistic
<i>Euphorbia clementii</i>	P3	1	673120	7662187	Opportunistic
<i>Euphorbia clementii</i>	P3	100	673188	7662396	Opportunistic
<i>Euphorbia clementii</i>	P3	20	673204	7662403	Opportunistic
<i>Euphorbia clementii</i>	P3	50	673228	7662409	Opportunistic
<i>Euphorbia clementii</i>	P3	20	673254	7662425	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Euphorbia clementii</i>	P3	20	673282	7662431	Opportunistic
<i>Euphorbia clementii</i>	P3	50	673311	7662437	Opportunistic
<i>Euphorbia clementii</i>	P3	50	673336	7662441	Opportunistic
<i>Euphorbia clementii</i>	P3	200	673351	7662443	Opportunistic
<i>Euphorbia clementii</i>	P3	50	673352	7662460	Opportunistic
<i>Euphorbia clementii</i>	P3	50	673346	7662476	Opportunistic
<i>Euphorbia clementii</i>	P3	20	673345	7662502	Opportunistic
<i>Euphorbia clementii</i>	P3	50	673347	7662521	Opportunistic
<i>Euphorbia clementii</i>	P3	100	673348	7662546	Opportunistic
<i>Euphorbia clementii</i>	P3	100	673346	7662569	Opportunistic
<i>Euphorbia clementii</i>	P3	200	673348	7662587	Opportunistic
<i>Euphorbia clementii</i>	P3	100	673349	7662610	Opportunistic
<i>Euphorbia clementii</i>	P3	300	673353	7662625	Opportunistic
<i>Euphorbia clementii</i>	P3	500	673354	7662642	Opportunistic
<i>Euphorbia clementii</i>	P3	300	673356	7662658	Opportunistic
<i>Euphorbia clementii</i>	P3	100	673331	7662611	Opportunistic
<i>Euphorbia clementii</i>	P3	500	673323	7662585	Opportunistic
<i>Euphorbia clementii</i>	P3	500	673320	7662562	Opportunistic
<i>Euphorbia clementii</i>	P3	200	673321	7662528	Opportunistic
<i>Euphorbia clementii</i>	P3	50	673321	7662496	Opportunistic
<i>Euphorbia clementii</i>	P3	50	673316	7662471	Opportunistic
<i>Euphorbia clementii</i>	P3	50	673294	7662461	Opportunistic
<i>Euphorbia clementii</i>	P3	1	673351	7659936	Opportunistic
<i>Euphorbia clementii</i>	P3	14	673183	7660114	Opportunistic
<i>Euphorbia clementii</i>	P3	1	673140	7660146	Opportunistic
<i>Euphorbia clementii</i>	P3	1	673052	7660273	Opportunistic
<i>Euphorbia clementii</i>	P3	13	672957	7660492	Opportunistic
<i>Euphorbia clementii</i>	P3	2	672958	7660507	Opportunistic
<i>Euphorbia clementii</i>	P3	2	673064	7660413	Opportunistic
<i>Euphorbia clementii</i>	P3	10	673231	7660162	Opportunistic
<i>Euphorbia clementii</i>	P3	16	673275	7660116	Opportunistic
<i>Euphorbia clementii</i>	P3	50	673389	7659938	Opportunistic
<i>Euphorbia clementii</i>	P3	2	673446	7659875	Opportunistic
<i>Euphorbia clementii</i>	P3	10	673520	7659786	Opportunistic
<i>Euphorbia clementii</i>	P3	9	675400	7658654	Opportunistic
<i>Euphorbia clementii</i>	P3	1	669406	7653060	Opportunistic
<i>Euphorbia clementii</i>	P3	10	669382	7653095	Opportunistic
<i>Euphorbia clementii</i>	P3	1	669318	7653107	Opportunistic
<i>Euphorbia clementii</i>	P3	100	669186	7653134	Opportunistic
<i>Euphorbia clementii</i>	P3	1	677203	7663427	Opportunistic
<i>Euphorbia clementii</i>	P3	1	675378	7654912	Opportunistic
<i>Euphorbia clementii</i>	P3	6	675376	7654943	Opportunistic
<i>Euphorbia clementii</i>	P3	3	676722	7655849	Opportunistic
<i>Euphorbia clementii</i>	P3	1	676655	7655855	Opportunistic
<i>Euphorbia clementii</i>	P3	3	676597	7657189	Opportunistic
<i>Euphorbia clementii</i>	P3	2	675805	7662933	Opportunistic
<i>Euphorbia clementii</i>	P3	25	675619	7662146	Opportunistic
<i>Euphorbia clementii</i>	P3	2	669454	7652996	Opportunistic
<i>Euphorbia clementii</i>	P3	4	669262	7653121	Opportunistic
<i>Euphorbia clementii</i>	P3	1	669233	7654954	Opportunistic
<i>Euphorbia clementii</i>	P3	1	669109	7655083	Opportunistic
<i>Euphorbia clementii</i>	P3	3	669110	7655117	Opportunistic
<i>Euphorbia clementii</i>	P3	1	668488	7655234	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Euphorbia clementii</i>	P3	1	669198	7655252	Opportunistic
<i>Euphorbia clementii</i>	P3	1	669440	7655256	Opportunistic
<i>Euphorbia clementii</i>	P3	1	669415	7655169	Opportunistic
<i>Euphorbia clementii</i>	P3	1	669399	7655106	Opportunistic
<i>Euphorbia clementii</i>	P3	1	669458	7655351	Opportunistic
<i>Euphorbia clementii</i>	P3	8	669351	7655351	Opportunistic
<i>Euphorbia clementii</i>	P3	1	669069	7655348	Opportunistic
<i>Euphorbia clementii</i>	P3	2	668915	7655354	Opportunistic
<i>Euphorbia clementii</i>	P3	3	668936	7655448	Opportunistic
<i>Euphorbia clementii</i>	P3	3	669233	7655450	Opportunistic
<i>Euphorbia clementii</i>	P3	10	669495	7655455	Opportunistic
<i>Euphorbia clementii</i>	P3	1	677246	7663440	Opportunistic
<i>Euphorbia clementii</i>	P3	10000	673397	7662673	Opportunistic
<i>Euphorbia clementii</i>	P3	5	674514	7662253	Opportunistic
<i>Euphorbia clementii</i>	P3	10	674216	7662554	Opportunistic
<i>Euphorbia clementii</i>	P3	500	674010	7662719	Opportunistic
<i>Euphorbia clementii</i>	P3	50	673982	7662805	Opportunistic
<i>Euphorbia clementii</i>	P3	50	673958	7662911	Opportunistic
<i>Euphorbia clementii</i>	P3	500	673943	7662986	Opportunistic
<i>Euphorbia clementii</i>	P3	500	673944	7663084	Opportunistic
<i>Euphorbia clementii</i>	P3	10	674619	7662208	Opportunistic
<i>Euphorbia clementii</i>	P3	10	676023	7663082	Opportunistic
<i>Euphorbia clementii</i>	P3	10	675942	7663229	Opportunistic
<i>Euphorbia clementii</i>	P3	50	671449	7661278	Opportunistic
<i>Euphorbia clementii</i>	P3	100	671503	7661298	Opportunistic
<i>Euphorbia clementii</i>	P3	300	671546	7661278	Opportunistic
<i>Euphorbia clementii</i>	P3	2	672736	7661014	Opportunistic
<i>Euphorbia clementii</i>	P3	1	672646	7660871	Opportunistic
<i>Euphorbia clementii</i>	P3	1	672711	7660887	Opportunistic
<i>Euphorbia clementii</i>	P3	1	672852	7660909	Opportunistic
<i>Euphorbia clementii</i>	P3	7	672811	7660982	Opportunistic
<i>Euphorbia clementii</i>	P3	10	672806	7661004	Opportunistic
<i>Euphorbia clementii</i>	P3	7	672796	7661029	Opportunistic
<i>Euphorbia clementii</i>	P3	5	672785	7661062	Opportunistic
<i>Euphorbia clementii</i>	P3	1	672966	7660519	Opportunistic
<i>Euphorbia clementii</i>	P3	2	672898	7660811	Opportunistic
<i>Euphorbia clementii</i>	P3	1	672888	7660836	Opportunistic
<i>Euphorbia clementii</i>	P3	4	672883	7660859	Opportunistic
<i>Euphorbia clementii</i>	P3	300	673151	7662106	Opportunistic
<i>Euphorbia clementii</i>	P3	500	673153	7662163	Opportunistic
<i>Euphorbia clementii</i>	P3	15	673171	7662334	Opportunistic
<i>Euphorbia clementii</i>	P3	200	673254	7662397	Opportunistic
<i>Euphorbia clementii</i>	P3	200	673295	7662406	Opportunistic
<i>Euphorbia clementii</i>	P3	2000	673340	7662418	Opportunistic
<i>Euphorbia clementii</i>	P3	6000	673367	7662422	Opportunistic
<i>Euphorbia clementii</i>	P3	3000	673372	7662468	Opportunistic
<i>Euphorbia clementii</i>	P3	10000	673397	7662487	Opportunistic
<i>Euphorbia clementii</i>	P3	1500	673375	7662533	Opportunistic
<i>Euphorbia clementii</i>	P3	8000	673407	7662561	Opportunistic
<i>Euphorbia clementii</i>	P3	3000	673376	7662599	Opportunistic
<i>Euphorbia clementii</i>	P3	2000	673377	7662641	Opportunistic
<i>Euphorbia clementii</i>	P3	1000	673280	7662565	Opportunistic
<i>Euphorbia clementii</i>	P3	100	673257	7662526	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Euphorbia clementii</i>	P3	100	673247	7662464	Opportunistic
<i>Euphorbia clementii</i>	P3	10	674571	7658497	Opportunistic
<i>Euphorbia clementii</i>	P3	1	674524	7658511	Opportunistic
<i>Euphorbia clementii</i>	P3	2	674533	7658402	Opportunistic
<i>Euphorbia clementii</i>	P3	1	675385	7658703	Opportunistic
<i>Euphorbia clementii</i>	P3	1	675369	7658403	Opportunistic
<i>Euphorbia clementii</i>	P3	1	676444	7658792	Opportunistic
<i>Euphorbia clementii</i>	P3	1	675159	7657971	Opportunistic
<i>Euphorbia clementii</i>	P3	6	676760	7655893	Opportunistic
<i>Euphorbia clementii</i>	P3	4	675865	7662587	Opportunistic
<i>Euphorbia clementii</i>	P3	1	675850	7662771	Opportunistic
<i>Euphorbia clementii</i>	P3	3	675347	7654975	Opportunistic
<i>Euphorbia clementii</i>	P3	5	675358	7655000	Opportunistic
<i>Euphorbia clementii</i>	P3	3	675330	7655000	Opportunistic
<i>Euphorbia clementii</i>	P3	3	675372	7655001	Opportunistic
<i>Euphorbia clementii</i>	P3	2	675961	7663096	Opportunistic
<i>Euphorbia clementii</i>	P3	1	675955	7663180	Opportunistic
<i>Euphorbia clementii</i>	P3	2	675953	7663207	Opportunistic
<i>Euphorbia clementii</i>	P3	5	675944	7663229	Opportunistic
<i>Euphorbia clementii</i>	P3	4	675953	7663258	Opportunistic
<i>Euphorbia clementii</i>	P3	5	675953	7663623	Opportunistic
<i>Euphorbia clementii</i>	P3	10	675952	7662982	Opportunistic
<i>Euphorbia clementii</i>	P3	1	675452	7663403	Opportunistic
<i>Euphorbia clementii</i>	P3	8	673905	7659439	Opportunistic
<i>Heliotropium muticum</i>	P3	20	677060	7662625	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670072	7653581	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670077	7653422	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670087	7656382	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	670125	7653607	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	670179	7654656	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	670189	7653570	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670208	7656399	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	670283	7654728	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670290	7655309	Opportunistic
<i>Terminalia supranitifolia</i>	P3	9	670547	7655704	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670480	7656275	Opportunistic
<i>Terminalia supranitifolia</i>	P3	9	670530	7656287	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671513	7655806	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672366	7655955	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672440	7655564	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	673922	7653588	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674080	7656543	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674081	7656560	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	674103	7656499	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674372	7655542	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	674403	7655575	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674980	7657201	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	675065	7656660	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674250	7656708	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	674218	7656573	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	674809	7656731	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	674980	7656463	Opportunistic
<i>Terminalia supranitifolia</i>	P3	10	674847	7655871	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Terminalia supranitifolia</i>	P3	1	674162	7656441	Quadrat - WD36
<i>Terminalia supranitifolia</i>	P3	1	673553	7653900	Quadrat - TRH057
<i>Terminalia supranitifolia</i>	P3	1	671966	7655873	Quadrat - WD07
<i>Terminalia supranitifolia</i>	P3	1	670127	7656414	Quadrat - WD47
<i>Terminalia supranitifolia</i>	P3	1	672700	7657610	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672698	7658043	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672712	7658117	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672687	7658169	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672694	7658317	Opportunistic
<i>Terminalia supranitifolia</i>	P3	5	672681	7658333	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672674	7658344	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672682	7658353	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673409	7657406	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673229	7658530	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672669	7658394	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672529	7658650	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672520	7658616	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672453	7659012	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672390	7659040	Opportunistic
<i>Terminalia supranitifolia</i>	P3	6	672593	7659043	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672609	7659025	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	672617	7658893	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672722	7657748	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672533	7658869	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672609	7658837	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672590	7658791	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672697	7658642	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672690	7658611	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672665	7658580	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672645	7658446	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672551	7658966	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672515	7658963	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672846	7658568	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672871	7658567	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672882	7658589	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672899	7658576	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672957	7658579	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	672387	7663948	Quadrat - WDD07
<i>Terminalia supranitifolia</i>	P3		672697	7661630	Quadrat - WDD23
<i>Terminalia supranitifolia</i>	P3	4	670924	7654524	Quadrat - WDM24
<i>Terminalia supranitifolia</i>	P3	3	674991	7656165	Opportunistic
<i>Terminalia supranitifolia</i>	P3	5	674973	7656155	Opportunistic
<i>Terminalia supranitifolia</i>	P3	4	674960	7656141	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	674942	7656131	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	674914	7656123	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674840	7656155	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674834	7656191	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674717	7656092	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674666	7656054	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674576	7656054	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674511	7655975	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674579	7656233	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674527	7656241	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Terminalia supranitifolia</i>	P3	2	674361	7656175	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674343	7656159	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	674339	7656199	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674296	7656246	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	674365	7656231	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674348	7656348	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	674370	7656356	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674597	7656270	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674631	7656290	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674691	7656323	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674704	7656335	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674706	7656324	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674862	7656227	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674869	7656198	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674917	7656204	Opportunistic
<i>Terminalia supranitifolia</i>	P3	4	672870	7658425	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674100	7654397	Opportunistic
<i>Terminalia supranitifolia</i>	P3	5	674064	7654328	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674380	7655528	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	674419	7655541	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	674428	7655546	Opportunistic
<i>Terminalia supranitifolia</i>	P3	5	674427	7655563	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674458	7655577	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674468	7655580	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674470	7655587	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674478	7655587	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674460	7655592	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674486	7655603	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674485	7655610	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674495	7655612	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674505	7655612	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	674498	7655618	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	674515	7655633	Opportunistic
<i>Terminalia supranitifolia</i>	P3	5	674514	7655643	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674533	7655640	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674537	7655643	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674536	7655648	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674538	7655655	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674537	7655659	Opportunistic
<i>Terminalia supranitifolia</i>	P3	10	674527	7655665	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674554	7655656	Opportunistic
<i>Terminalia supranitifolia</i>	P3	7	674554	7655672	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674566	7655684	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674587	7655703	Opportunistic
<i>Terminalia supranitifolia</i>	P3	6	674583	7655703	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674605	7655707	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674616	7655715	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674615	7655717	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674623	7655725	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674625	7655728	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674637	7655735	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674648	7655733	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674652	7655732	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Terminalia supranitifolia</i>	P3	1	674655	7655740	Opportunistic
<i>Terminalia supranitifolia</i>	P3	10	674647	7655758	Opportunistic
<i>Terminalia supranitifolia</i>	P3	10	674676	7655761	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674696	7655750	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674697	7655753	Opportunistic
<i>Terminalia supranitifolia</i>	P3	6	674694	7655780	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	674723	7655793	Opportunistic
<i>Terminalia supranitifolia</i>	P3	4	674753	7655808	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674827	7655825	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674823	7655817	Opportunistic
<i>Terminalia supranitifolia</i>	P3	5	674798	7655844	Opportunistic
<i>Terminalia supranitifolia</i>	P3	4	673193	7658657	Opportunistic
<i>Terminalia supranitifolia</i>	P3	4	673339	7659439	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672931	7658577	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672900	7658373	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672907	7658316	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673324	7659420	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	673113	7659468	Opportunistic
<i>Terminalia supranitifolia</i>	P3	10	671886	7658321	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671899	7658253	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671893	7658235	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	674540	7656729	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674529	7656761	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674541	7656767	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674550	7656772	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674531	7656792	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674442	7656779	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674396	7656748	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674386	7656756	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	674290	7656555	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674111	7656393	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673924	7656367	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673884	7656357	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673840	7656397	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673812	7656418	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	673772	7656362	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	673762	7656302	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673760	7656251	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673825	7656212	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674074	7656267	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674100	7656307	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674293	7656265	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674355	7656332	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674372	7656351	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674384	7656373	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	674385	7656506	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674403	7656522	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674417	7656540	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	674448	7656587	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674564	7656366	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	674518	7656597	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674429	7656656	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674513	7656652	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Terminalia supranitifolia</i>	P3	2	674537	7656714	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674836	7656666	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674990	7656795	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675228	7657160	Opportunistic
<i>Terminalia supranitifolia</i>	P3	4	675339	7657359	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	675413	7657385	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675163	7657362	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675069	7657287	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674627	7656756	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	673496	7659474	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672791	7658407	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672850	7658314	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672767	7657818	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673096	7659442	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673437	7659612	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674560	7655927	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	673530	7654406	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673511	7654348	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673567	7654337	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674577	7655792	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674597	7655826	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674828	7655950	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674742	7655889	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674701	7656015	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675188	7656386	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	675111	7656380	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674709	7656504	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674720	7656566	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	674871	7656007	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674912	7656048	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675018	7656126	Opportunistic
<i>Terminalia supranitifolia</i>	P3	4	674415	7656926	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674545	7656916	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674638	7656624	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	674852	7656841	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	674969	7656867	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674971	7656984	Opportunistic
<i>Terminalia supranitifolia</i>	P3	4	674986	7656915	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675152	7657138	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675161	7657091	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675138	7657048	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675148	7656990	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673609	7654884	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673730	7655170	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673740	7655139	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673711	7655118	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673888	7655260	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673940	7655282	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674047	7655516	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674035	7655501	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674045	7655503	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674030	7655481	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674012	7655470	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Terminalia supranitifolia</i>	P3	1	674018	7655462	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673952	7655409	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673938	7655413	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673965	7655418	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673995	7655417	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674008	7655428	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674014	7655415	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674021	7655437	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674024	7655449	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674053	7655532	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674071	7655530	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673971	7655279	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673964	7655334	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673970	7655297	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673980	7655288	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673988	7655307	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673999	7655307	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674011	7655313	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674027	7655317	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674033	7655325	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674044	7655339	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674048	7655344	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674055	7655341	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674070	7655351	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674084	7655358	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674117	7655388	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674160	7655423	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674168	7655427	Opportunistic
<i>Terminalia supranitifolia</i>	P3	5	674164	7655442	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674155	7655418	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675125	7656281	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674923	7656450	Opportunistic
<i>Terminalia supranitifolia</i>	P3	6	675525	7656852	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675557	7656914	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672610	7657426	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672682	7657612	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672661	7658249	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672645	7658336	Opportunistic
<i>Terminalia supranitifolia</i>	P3	4	672659	7658348	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672793	7658424	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672790	7658411	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672423	7658583	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672409	7658586	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672419	7658577	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672370	7658641	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672392	7658637	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672386	7658637	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672411	7658718	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672407	7658752	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672392	7658753	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672394	7658791	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672381	7658805	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672392	7658826	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Terminalia supranitifolia</i>	P3	1	672393	7658832	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672413	7658835	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672337	7658961	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672328	7658976	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672328	7658986	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672340	7659070	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672325	7659089	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672711	7658858	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672702	7658852	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672691	7658865	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672695	7658869	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672755	7658851	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672775	7658840	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672787	7658840	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672798	7658840	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672763	7658832	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672770	7658794	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672778	7658800	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672784	7658794	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672762	7658783	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672750	7658747	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672749	7658692	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672757	7658670	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672769	7658668	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672778	7658656	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672781	7658593	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672652	7659148	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672736	7659025	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672870	7658615	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672896	7658636	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672985	7658591	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673001	7658645	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672814	7658601	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672810	7658611	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672930	7658594	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672808	7657460	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671874	7658238	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	676113	7656937	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675882	7657356	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675752	7657211	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675763	7657211	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	676062	7657264	Opportunistic
<i>Terminalia supranitifolia</i>	P3	4	670633	7656077	Opportunistic
<i>Terminalia supranitifolia</i>	P3	4	670648	7656093	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	670653	7656117	Opportunistic
<i>Terminalia supranitifolia</i>	P3	20	670890	7656168	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	670840	7655843	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	670848	7655037	Opportunistic
<i>Terminalia supranitifolia</i>	P3	4	670829	7654981	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672604	7661279	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672546	7661203	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672541	7661177	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672531	7661115	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Terminalia supranitifolia</i>	P3	1	672504	7661044	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672495	7660988	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672511	7660988	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672709	7662139	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672678	7662090	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672650	7662055	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672650	7662050	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672649	7662035	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672678	7662074	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672692	7662036	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672702	7662041	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672695	7662033	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672689	7662029	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672700	7662024	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672705	7662016	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672701	7661999	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672679	7662018	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672675	7662009	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672698	7661975	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672708	7661976	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672692	7661965	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672667	7661934	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672646	7661930	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672636	7661914	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672623	7661903	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672681	7661922	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672690	7661918	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672696	7661937	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672675	7661903	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672673	7661898	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672600	7661875	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672711	7661830	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672715	7661817	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672686	7661801	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672721	7661778	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672702	7661751	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672703	7661730	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672758	7661722	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672708	7661717	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672707	7661689	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672678	7661684	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672706	7661665	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672705	7661655	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672671	7661652	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672679	7661597	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672675	7661585	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672652	7661578	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672629	7661575	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672642	7661560	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672640	7661535	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672631	7661531	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672641	7662846	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672607	7662837	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Terminalia supranitifolia</i>	P3	1	672592	7662833	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672597	7662775	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672602	7662768	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672664	7662748	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672610	7662748	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672608	7662741	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672603	7662734	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672602	7662730	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672598	7662724	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672593	7662720	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672638	7662721	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672697	7662726	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672691	7662730	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672726	7662720	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672704	7662708	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672714	7662697	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672704	7662687	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672700	7662670	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672721	7662671	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672714	7662657	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672689	7662641	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672669	7662662	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672662	7662657	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672637	7662668	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672596	7662619	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672699	7662594	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672728	7662609	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672711	7662613	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672671	7662537	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672686	7662557	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672715	7662564	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672723	7662518	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672749	7662521	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672750	7662524	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672773	7662541	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672703	7662498	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672703	7662488	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672732	7662438	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672766	7662411	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672796	7662452	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672778	7662382	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	669742	7652152	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670924	7654522	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670072	7652725	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	670129	7652331	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670387	7652701	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670691	7652273	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670765	7652092	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670773	7651934	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672536	7663008	Opportunistic
<i>Terminalia supranitifolia</i>	P3	7	672505	7662971	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672444	7662945	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672480	7663008	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Terminalia supranitifolia</i>	P3	1	672530	7663027	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672489	7663072	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672512	7663097	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672484	7663131	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672448	7663096	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672418	7663089	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672397	7663139	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672374	7663029	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672371	7662978	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672359	7662919	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672148	7662686	Opportunistic
<i>Terminalia supranitifolia</i>	P3	12	672319	7663961	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672382	7663971	Opportunistic
<i>Terminalia supranitifolia</i>	P3	28	672481	7663911	Opportunistic
<i>Terminalia supranitifolia</i>	P3	7	672490	7663855	Opportunistic
<i>Terminalia supranitifolia</i>	P3	9	672490	7663748	Opportunistic
<i>Terminalia supranitifolia</i>	P3	9	672473	7663714	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672425	7663726	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672431	7663631	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672441	7663605	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	672439	7663545	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672108	7661653	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672424	7661737	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672460	7661752	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672466	7661769	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672442	7661797	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672359	7661756	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672508	7661896	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672536	7661966	Opportunistic
<i>Terminalia supranitifolia</i>	P3	4	672493	7661944	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672473	7661919	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672485	7661201	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672489	7661182	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672477	7661122	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672508	7661102	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672659	7662243	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672574	7662207	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	672615	7662167	Opportunistic
<i>Terminalia supranitifolia</i>	P3	4	672563	7662001	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672644	7661928	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672622	7661903	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672598	7661876	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672591	7661898	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672542	7661873	Opportunistic
<i>Terminalia supranitifolia</i>	P3	4	672516	7661830	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672551	7661791	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672535	7661796	Opportunistic
<i>Terminalia supranitifolia</i>	P3	5	672502	7661782	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	672525	7661779	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672505	7661746	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672594	7661757	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672635	7661712	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672619	7661684	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Terminalia supranitifolia</i>	P3	1	672599	7661683	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672613	7661663	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672580	7661671	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672484	7661691	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672567	7661538	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672610	7661573	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672635	7661585	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672621	7661592	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672630	7661634	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672558	7661501	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672553	7661487	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672510	7661458	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672547	7661441	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672575	7661426	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672609	7661462	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672615	7661483	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672557	7662846	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672557	7662811	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	672513	7662857	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672358	7662914	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672382	7662817	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672408	7662850	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672445	7662827	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672439	7662816	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672418	7662806	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672403	7662789	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672397	7662783	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672476	7662693	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672456	7662724	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672471	7662750	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672487	7662756	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672490	7662734	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672526	7662725	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	672514	7662706	Opportunistic
<i>Terminalia supranitifolia</i>	P3	4	672509	7662702	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672515	7662693	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672557	7662676	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672564	7662672	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672572	7662672	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672563	7662593	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672601	7662473	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672625	7662417	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672624	7662405	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672624	7662398	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672674	7662374	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672657	7662333	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672694	7662313	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672722	7662310	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672738	7662407	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672747	7662362	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672831	7662333	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	676651	7658566	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	676620	7658551	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Terminalia supranitifolia</i>	P3	3	676463	7658302	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675672	7657614	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672371	7664170	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672377	7664135	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672362	7664115	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672411	7664108	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672425	7664094	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672441	7664109	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	672442	7664137	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	672451	7664131	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672476	7664113	Opportunistic
<i>Terminalia supranitifolia</i>	P3	12	672487	7664090	Opportunistic
<i>Terminalia supranitifolia</i>	P3	8	672499	7664060	Opportunistic
<i>Terminalia supranitifolia</i>	P3	6	672523	7664022	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672539	7663982	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672585	7663963	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672600	7663946	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672271	7664070	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672157	7664159	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672107	7664188	Opportunistic
<i>Terminalia supranitifolia</i>	P3	6	672081	7664197	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671972	7664379	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671890	7664481	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671879	7664490	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671826	7664557	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671869	7664554	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671830	7664720	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	671831	7664712	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671961	7664815	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672430	7660481	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672274	7660515	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672152	7660432	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672305	7660435	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672312	7660465	Opportunistic
<i>Terminalia supranitifolia</i>	P3	8	672086	7660096	Opportunistic
<i>Terminalia supranitifolia</i>	P3	8	672073	7660049	Opportunistic
<i>Terminalia supranitifolia</i>	P3	6	672100	7659991	Opportunistic
<i>Terminalia supranitifolia</i>	P3	8	672124	7659885	Opportunistic
<i>Terminalia supranitifolia</i>	P3	8	672116	7659798	Opportunistic
<i>Terminalia supranitifolia</i>	P3	8	672064	7659760	Opportunistic
<i>Terminalia supranitifolia</i>	P3	7	672042	7659719	Opportunistic
<i>Terminalia supranitifolia</i>	P3	5	672084	7659706	Opportunistic
<i>Terminalia supranitifolia</i>	P3	20	672021	7659629	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672333	7664147	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672333	7664134	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672320	7664118	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672305	7664142	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672282	7664164	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672249	7664205	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672243	7664226	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672230	7664235	Opportunistic
<i>Terminalia supranitifolia</i>	P3	5	672219	7664243	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672208	7664256	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Terminalia supranitifolia</i>	P3	2	672175	7664273	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672161	7664280	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672162	7664281	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672140	7664293	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672129	7664311	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672069	7664342	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	672029	7664366	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672011	7664366	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671983	7664445	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671919	7664507	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671922	7664561	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671931	7664581	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	671939	7664686	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671915	7664761	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	671897	7664787	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671866	7664826	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	671879	7664837	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671872	7664852	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671842	7664898	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671832	7664923	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671809	7665023	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671754	7664904	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671766	7664869	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671736	7664859	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671752	7664836	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671776	7664814	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671800	7664803	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671792	7664789	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671904	7664808	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672500	7660498	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672476	7660489	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672467	7660457	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672445	7660465	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672426	7660434	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672441	7660417	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672450	7660409	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672421	7660329	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672387	7660388	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	672117	7660021	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672480	7660299	Opportunistic
<i>Terminalia supranitifolia</i>	P3	4	672507	7660263	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	676515	7657760	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	676332	7657423	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	676151	7657322	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	673406	7651457	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672873	7650294	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674164	7655430	Opportunistic
<i>Terminalia supranitifolia</i>	P3	6	674169	7655492	Opportunistic
<i>Terminalia supranitifolia</i>	P3	6	674149	7655490	Opportunistic
<i>Terminalia supranitifolia</i>	P3	6	674168	7655483	Opportunistic
<i>Terminalia supranitifolia</i>	P3	6	674154	7655479	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675374	7656329	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675389	7656336	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Terminalia supranitifolia</i>	P3	1	675335	7656453	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675321	7656451	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675364	7656397	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675375	7656394	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675421	7656407	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675459	7656399	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675470	7656415	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675451	7656418	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675434	7656448	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675480	7656423	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675487	7656434	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675494	7656447	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675500	7656461	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675529	7656517	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675509	7656499	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675512	7656482	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675508	7656471	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675542	7656611	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675546	7656625	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675557	7656696	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675565	7656709	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675598	7656727	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675712	7656804	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675609	7656848	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675628	7656852	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675632	7656863	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675596	7656869	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675622	7656878	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675601	7656861	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675540	7656943	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675602	7656925	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675677	7656936	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675671	7656919	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675523	7657148	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675496	7657136	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675377	7657117	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675287	7657022	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675306	7657035	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675281	7656380	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674949	7656453	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674973	7656532	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675051	7656636	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675045	7656624	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675187	7656669	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675212	7656666	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675210	7656675	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675228	7656685	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675272	7656771	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	674061	7656910	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	673279	7659451	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	672422	7660429	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672773	7659670	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672758	7659743	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Terminalia supranitifolia</i>	P3	8	672738	7659798	Opportunistic
<i>Terminalia supranitifolia</i>	P3	15	672608	7663920	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	672200	7662487	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675500	7657505	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675805	7657615	Opportunistic
<i>Terminalia supranitifolia</i>	P3	9	670799	7655245	Opportunistic
<i>Terminalia supranitifolia</i>	P3	4	670834	7655162	Opportunistic
<i>Terminalia supranitifolia</i>	P3	8	670893	7654901	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	670934	7654874	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670969	7654825	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670874	7654791	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	670787	7654842	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670444	7654822	Opportunistic
<i>Terminalia supranitifolia</i>	P3	5	670363	7654633	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670473	7654588	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670924	7654618	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670798	7654314	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	670823	7654302	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670861	7654300	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670681	7654106	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670608	7653980	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670316	7654206	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670383	7654192	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670266	7654105	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670244	7654024	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	677457	7659574	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	677478	7659515	Opportunistic
<i>Terminalia supranitifolia</i>	P3	9	676482	7658003	Opportunistic
<i>Terminalia supranitifolia</i>	P3	5	676551	7657981	Opportunistic
<i>Terminalia supranitifolia</i>	P3	16	676373	7657800	Opportunistic
<i>Terminalia supranitifolia</i>	P3	11	676376	7657737	Opportunistic
<i>Terminalia supranitifolia</i>	P3	6	676304	7657678	Opportunistic
<i>Terminalia supranitifolia</i>	P3	6	676220	7657609	Opportunistic
<i>Terminalia supranitifolia</i>	P3	4	676151	7657540	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	675973	7657397	Opportunistic
<i>Terminalia supranitifolia</i>	P3	5	676201	7657344	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	676304	7657416	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	676267	7657372	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	676420	7657522	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	676498	7657669	Opportunistic
<i>Terminalia supranitifolia</i>	P3	6	677011	7659781	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	677044	7659873	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	677118	7659975	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	677165	7660116	Opportunistic
<i>Terminalia supranitifolia</i>	P3	12	675815	7657002	Opportunistic
<i>Terminalia supranitifolia</i>	P3	14	676023	7657147	Opportunistic
<i>Terminalia supranitifolia</i>	P3	6	676250	7657103	Opportunistic
<i>Terminalia supranitifolia</i>	P3	3	676262	7657286	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	676599	7657468	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	676582	7657438	Opportunistic
<i>Terminalia supranitifolia</i>	P3	5	676525	7657390	Opportunistic
<i>Terminalia supranitifolia</i>	P3	5	676449	7657271	Opportunistic
<i>Terminalia supranitifolia</i>	P3	8	676362	7657261	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Terminalia supranitifolia</i>	P3	3	676388	7657176	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	675785	7657160	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	675900	7657231	Opportunistic
<i>Terminalia supranitifolia</i>	P3	8	675904	7657373	Opportunistic
<i>Terminalia supranitifolia</i>	P3	4	671552	7654967	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	671491	7655358	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671324	7655506	Opportunistic
<i>Terminalia supranitifolia</i>	P3	6	671206	7655659	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	671089	7655562	Opportunistic
<i>Terminalia supranitifolia</i>	P3	7	670871	7655468	Opportunistic
<i>Terminalia supranitifolia</i>	P3	8	670928	7655801	Opportunistic
<i>Terminalia supranitifolia</i>	P3	5	670858	7655905	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670598	7656045	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670603	7656080	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670605	7656106	Opportunistic
<i>Terminalia supranitifolia</i>	P3	9	670674	7656066	Opportunistic
<i>Terminalia supranitifolia</i>	P3	9	670642	7655912	Opportunistic
<i>Terminalia supranitifolia</i>	P3	16	670470	7655390	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670567	7655509	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670593	7655464	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	670551	7655413	Opportunistic
<i>Terminalia supranitifolia</i>	P3	11	670712	7655284	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	670525	7655184	Opportunistic
<i>Terminalia supranitifolia</i>	P3	8	670814	7655059	Opportunistic
<i>Terminalia supranitifolia</i>	P3	2	670985	7655172	Opportunistic
<i>Terminalia supranitifolia</i>	P3	1	670964	7655123	Opportunistic
<i>Terminalia supranitifolia</i>	P3	22	670920	7655027	Opportunistic
<i>Terminalia supranitifolia</i>	P3	9	670457	7654855	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675067	7660840	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675138	7662354	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	675250	7662081	Opportunistic
<i>Triodia chichesterensis</i>	P3	8000	675275	7662612	Opportunistic
<i>Triodia chichesterensis</i>	P3	10000	675429	7662433	Opportunistic
<i>Triodia chichesterensis</i>	P3	10000	675564	7662390	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675010	7660894	Quadrat - WD89
<i>Triodia chichesterensis</i>	P3	200	674553	7661325	Quadrat - WD55
<i>Triodia chichesterensis</i>	P3	100	675858	7663069	Quadrat - W03
<i>Triodia chichesterensis</i>	P3	8000	675360	7662097	Quadrat - WD59
<i>Triodia chichesterensis</i>	P3	1500	673958	7659456	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674050	7659500	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	674123	7659568	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674190	7659629	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	674271	7660249	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674344	7660254	Opportunistic
<i>Triodia chichesterensis</i>	P3	20	674458	7660250	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	674735	7660254	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	674642	7655121	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	674641	7655070	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	674651	7655031	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	674653	7654860	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674659	7654181	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	674649	7654094	Opportunistic
<i>Triodia chichesterensis</i>	P3	35	674201	7654099	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	600	673921	7653788	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	673825	7653732	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673790	7653692	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	673722	7653660	Opportunistic
<i>Triodia chichesterensis</i>	P3	2500	673646	7653663	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	673540	7653670	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	673468	7653682	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	673284	7653779	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673268	7653814	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	673258	7653935	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673335	7653974	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	674902	7654258	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	674907	7654317	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	674899	7654414	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674899	7654462	Opportunistic
<i>Triodia chichesterensis</i>	P3	40	674899	7654903	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674898	7655009	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674903	7655089	Opportunistic
<i>Triodia chichesterensis</i>	P3	900	675106	7655096	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675101	7654813	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675250	7654671	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675294	7654870	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675309	7654959	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675300	7654988	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675065	7655205	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674981	7655201	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674883	7655192	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674794	7655209	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	674684	7655349	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674861	7655351	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	674984	7655365	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675053	7655350	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675266	7655353	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675268	7655491	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	675117	7655505	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	674916	7655490	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674845	7655509	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674795	7655514	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674730	7655505	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	674651	7655498	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	674590	7655513	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674745	7655654	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674831	7655654	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	674972	7655647	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	675155	7655636	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	673906	7660412	Opportunistic
<i>Triodia chichesterensis</i>	P3	10	674514	7661281	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	674499	7661342	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674650	7661303	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	674663	7661261	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	674656	7661129	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	675226	7655897	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675118	7655906	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	1000	675032	7655914	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675090	7656100	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	675148	7660908	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675040	7660916	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	674922	7660906	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674900	7660965	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675127	7661092	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	675245	7661108	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675278	7661100	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	674565	7659853	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	674507	7659847	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	674425	7659839	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674200	7659701	Opportunistic
<i>Triodia chichesterensis</i>	P3	10	672504	7657151	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672506	7657247	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	672508	7657341	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672508	7657416	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	672499	7657538	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	672502	7657662	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672497	7657883	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	672508	7658010	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	672504	7658088	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672497	7658306	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672305	7658352	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672296	7658188	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672307	7658066	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672297	7657723	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	672302	7657605	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	672320	7657398	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	672313	7657262	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	672301	7657132	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	672304	7657092	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	672294	7657015	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	672305	7656959	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	672310	7656876	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	672301	7656799	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672502	7656832	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	672500	7656920	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	672504	7657039	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	672095	7657304	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	672097	7657666	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672094	7657727	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	672108	7657819	Opportunistic
<i>Triodia chichesterensis</i>	P3	900	672116	7658017	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	672112	7658110	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673198	7658674	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673304	7658646	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672684	7656955	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	672801	7656997	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672808	7657105	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	672792	7657330	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672667	7657909	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	671998	7658268	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	1000	671998	7658134	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672001	7658082	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672012	7658042	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	671995	7657804	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	671995	7657684	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674490	7660095	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674447	7660105	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674393	7660102	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674309	7660108	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	674280	7660287	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674725	7660298	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674752	7660301	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674800	7660300	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674782	7660455	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674689	7655085	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674698	7655034	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674700	7654956	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674700	7654874	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674702	7654157	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674134	7654180	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674135	7654138	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673990	7653990	Opportunistic
<i>Triodia chichesterensis</i>	P3	5000	673753	7653833	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673684	7653800	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673612	7653752	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673587	7653752	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673558	7653749	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673540	7653746	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673519	7653745	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673503	7653747	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673457	7653746	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673346	7653789	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673342	7653811	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673334	7653840	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673308	7653917	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673343	7653935	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674851	7654103	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674846	7654261	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	674853	7655013	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674837	7655074	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675049	7655095	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675044	7655017	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675053	7654887	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675058	7654519	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675250	7654882	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675251	7654972	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675257	7655046	Opportunistic
<i>Triodia chichesterensis</i>	P3	1	675566	7656486	Opportunistic
<i>Triodia chichesterensis</i>	P3	1	675576	7656489	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675573	7656462	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675502	7656310	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676902	7656433	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	677070	7656435	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	2000	677343	7656440	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673961	7658017	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674073	7658052	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674137	7658086	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674130	7658121	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674162	7658138	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674224	7658210	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674240	7658180	Opportunistic
<i>Triodia chichesterensis</i>	P3	30	674310	7658287	Opportunistic
<i>Triodia chichesterensis</i>	P3	30	674319	7658295	Opportunistic
<i>Triodia chichesterensis</i>	P3	30	674329	7658300	Opportunistic
<i>Triodia chichesterensis</i>	P3	30	674331	7658315	Opportunistic
<i>Triodia chichesterensis</i>	P3	30	674358	7658324	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674400	7658329	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674381	7658378	Opportunistic
<i>Triodia chichesterensis</i>	P3	1	674339	7658359	Opportunistic
<i>Triodia chichesterensis</i>	P3	1	674096	7658155	Opportunistic
<i>Triodia chichesterensis</i>	P3	1	674091	7658151	Opportunistic
<i>Triodia chichesterensis</i>	P3	1	674085	7658146	Opportunistic
<i>Triodia chichesterensis</i>	P3	1	674079	7658143	Opportunistic
<i>Triodia chichesterensis</i>	P3	1	674071	7658132	Opportunistic
<i>Triodia chichesterensis</i>	P3	1	674072	7658131	Opportunistic
<i>Triodia chichesterensis</i>	P3	7	674056	7658131	Opportunistic
<i>Triodia chichesterensis</i>	P3	40	674008	7658109	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	673972	7658098	Opportunistic
<i>Triodia chichesterensis</i>	P3	1	673965	7658118	Opportunistic
<i>Triodia chichesterensis</i>	P3	10	673951	7658128	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673734	7658280	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	673683	7658216	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673554	7658196	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673722	7658323	Opportunistic
<i>Triodia chichesterensis</i>	P3	1	673870	7658371	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	673766	7659617	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	673984	7659357	Opportunistic
<i>Triodia chichesterensis</i>	P3	900	674074	7659251	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	674175	7659099	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672620	7657486	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	673707	7657044	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	673285	7657087	Opportunistic
<i>Triodia chichesterensis</i>	P3	350	674495	7659130	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	674437	7659040	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	674346	7658919	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674396	7658730	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674455	7658580	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674505	7658523	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674438	7658466	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	673877	7658568	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	673942	7658657	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	673666	7659642	Opportunistic
<i>Triodia chichesterensis</i>	P3	20	674385	7658449	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674383	7658506	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674359	7658628	Opportunistic
<i>Triodia chichesterensis</i>	P3	20	674302	7658760	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	200	674275	7658945	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674399	7659139	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	674421	7659202	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673916	7658558	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674051	7658700	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674024	7658754	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673965	7658767	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673942	7658708	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673943	7658655	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674607	7660050	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674509	7660046	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674429	7660049	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674381	7660055	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674267	7660057	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674255	7660200	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674328	7660202	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674389	7660197	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674501	7660206	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674543	7660191	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674611	7655128	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674598	7654853	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674117	7653925	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	673918	7653826	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	673812	7653761	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673757	7653738	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673707	7653731	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673620	7653727	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673555	7653718	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673466	7653714	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673324	7653800	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	673305	7653852	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674960	7654439	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	674954	7655006	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674954	7655068	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675161	7654914	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675150	7654854	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675150	7654797	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675151	7654728	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675099	7655258	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674974	7655258	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674857	7655257	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674730	7655253	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674672	7655258	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674646	7655401	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674761	7655400	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674952	7655411	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675007	7655392	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675248	7655546	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674991	7655566	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674886	7655552	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674795	7655560	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674721	7655553	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674665	7655553	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	1000	674784	7655700	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674924	7655699	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675002	7655696	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675081	7655700	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675298	7655951	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675226	7655946	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675129	7655952	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675032	7655942	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674975	7655959	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675168	7656153	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675225	7656150	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675096	7660950	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675033	7660958	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674966	7660961	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675240	7661152	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	672898	7657275	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674595	7659904	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674482	7659907	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674433	7659905	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	672452	7657120	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672445	7657199	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672448	7657313	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	672442	7657464	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672449	7657553	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672448	7657660	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	672448	7657771	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	672452	7657850	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	672445	7657955	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672448	7658051	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672453	7658163	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	672442	7658299	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672256	7658311	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	672250	7658194	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672273	7657965	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672267	7657865	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672252	7657763	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672262	7657666	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672256	7657468	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672257	7657344	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	672246	7657217	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672259	7657148	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672252	7657077	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	672257	7656988	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	672261	7656937	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672446	7656755	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672448	7656880	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672455	7656985	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672441	7657074	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672043	7657538	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	672054	7657664	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672053	7657806	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	672051	7658040	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	672048	7658172	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	1000	672654	7657026	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672652	7657076	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672653	7657128	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672650	7657263	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	673367	7658586	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672746	7657061	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672751	7657159	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672747	7657261	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	672749	7657356	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672749	7657449	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	672950	7657266	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674606	7659953	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674537	7659966	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674307	7659936	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674484	7659737	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674520	7659734	Opportunistic
<i>Triodia chichesterensis</i>	P3		675901	7663065	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672600	7657083	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672592	7657238	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672601	7657387	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672597	7657689	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672596	7658116	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672397	7658341	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672394	7658284	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672402	7658197	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672396	7658084	Opportunistic
<i>Triodia chichesterensis</i>	P3	10000	672402	7657846	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672405	7657654	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672399	7657466	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672399	7657334	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672410	7657262	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672411	7657133	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672394	7656852	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672405	7656720	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672606	7656839	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672602	7656902	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672601	7657055	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672201	7657209	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672201	7657525	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672209	7657610	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672201	7657718	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672201	7657778	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672201	7657893	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672209	7657977	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672204	7658123	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674905	7655753	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674973	7655749	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675012	7655728	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675128	7655737	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674603	7661287	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	674601	7661243	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674609	7661188	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674604	7661160	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	200	675137	7655806	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675086	7655794	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674977	7655805	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674987	7656000	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	675060	7655998	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	675127	7656002	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675268	7655988	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675081	7660848	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675047	7660867	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675062	7661053	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675133	7661045	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675318	7656249	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	674133	7654236	Opportunistic
<i>Triodia chichesterensis</i>	P3	10	673662	7653811	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	673376	7653765	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	673341	7653740	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	673292	7653731	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673259	7653880	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673265	7653987	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674800	7654149	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674804	7654295	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674790	7654346	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	674803	7654476	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674823	7654894	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675004	7655097	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674994	7654889	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675002	7654463	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675022	7654406	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675069	7654432	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675200	7654795	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675206	7654888	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675199	7654964	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675168	7655155	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675085	7655164	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674898	7655155	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674802	7655158	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	674749	7655160	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	674651	7655170	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	674678	7655297	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674760	7655296	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	674945	7655299	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675042	7655313	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	675271	7655306	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675321	7655408	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674756	7655453	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674680	7655461	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674614	7655455	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674692	7655595	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674766	7655603	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674851	7655599	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	674962	7655598	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675055	7655601	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675110	7655602	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	2000	673949	7660472	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	673956	7660357	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674547	7661173	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674741	7661283	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	674759	7661225	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674740	7661166	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	674702	7661150	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674697	7661181	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674692	7661244	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675253	7655849	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675171	7655855	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675123	7655844	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675059	7655845	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674998	7655846	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674962	7655854	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675029	7656050	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675067	7656049	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675160	7656056	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675208	7656054	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674737	7660835	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674973	7660999	Opportunistic
<i>Triodia chichesterensis</i>	P3	750	675012	7660997	Opportunistic
<i>Triodia chichesterensis</i>	P3	750	675060	7661004	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	675151	7660997	Opportunistic
<i>Triodia chichesterensis</i>	P3	80	675139	7656204	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	672996	7657432	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674595	7659998	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674527	7659996	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674490	7660002	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674415	7659999	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	674412	7659805	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	674492	7659796	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	674538	7659798	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672552	7657088	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	672547	7657180	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672550	7657351	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672549	7657403	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672554	7657469	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672566	7657711	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672554	7657830	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	672550	7657882	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	672557	7657936	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672547	7658176	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672558	7658232	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672495	7658360	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672352	7658353	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672347	7658325	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672354	7658263	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672339	7658178	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672349	7658115	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672349	7658049	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672347	7657957	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672354	7657905	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	500	672351	7657810	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672358	7657775	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672354	7657584	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672351	7657414	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672345	7657365	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672350	7657278	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672363	7657210	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672360	7657129	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672350	7656946	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672349	7656873	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672353	7656806	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672360	7656706	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672554	7656799	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672555	7656848	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672546	7656922	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672156	7657068	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672139	7657226	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672151	7657287	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	672149	7657356	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672155	7657513	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672155	7657573	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672147	7657635	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672153	7657683	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672148	7657791	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672151	7657861	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672148	7658015	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	672147	7658171	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	671931	7658292	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	671955	7658222	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	671951	7658163	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	671956	7658124	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	671948	7657832	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	674798	7660141	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	674543	7660152	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674457	7660144	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674409	7660154	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674306	7660152	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	674238	7660157	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	674744	7660346	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	674817	7660358	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674856	7660355	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	674851	7660407	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674796	7660396	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	674757	7655028	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674757	7654369	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	674756	7654239	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674743	7654120	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674670	7654048	Opportunistic
<i>Triodia chichesterensis</i>	P3	30	673957	7658113	Opportunistic
<i>Triodia chichesterensis</i>	P3	80	673958	7658060	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	673922	7658020	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	673962	7657756	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673696	7657580	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	1000	673660	7657576	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	673544	7657612	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	671135	7654351	Quadrat - WDM26
<i>Triodia chichesterensis</i>	P3	1500	670611	7654192	Quadrat - WDM27
<i>Triodia chichesterensis</i>	P3	30	676388	7654468	Quadrat - WDM07
<i>Triodia chichesterensis</i>	P3	1000	672707	7656963	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672699	7657047	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672694	7657161	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	672693	7657283	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676561	7659045	Quadrat - WDM13
<i>Triodia chichesterensis</i>	P3	2000	676643	7659130	Quadrat - WDM14
<i>Triodia chichesterensis</i>	P3	1	676298	7659393	Quadrat - WDM16
<i>Triodia chichesterensis</i>	P3	2000	675881	7658224	Quadrat - WDM20
<i>Triodia chichesterensis</i>	P3	1200	675501	7658467	Quadrat - WDM21
<i>Triodia chichesterensis</i>	P3	8	675240	7658543	Quadrat - WDM22
<i>Triodia chichesterensis</i>	P3	1	676311	7655678	Quadrat - WDK16
<i>Triodia chichesterensis</i>	P3	1000	676668	7660278	Quadrat - WDK17
<i>Triodia chichesterensis</i>	P3		676217	7659883	Quadrat - WDK19
<i>Triodia chichesterensis</i>	P3		671136	7655167	Quadrat - WDK23
<i>Triodia chichesterensis</i>	P3	250	675798	7654042	Quadrat - WDM01
<i>Triodia chichesterensis</i>	P3	150	676464	7654091	Quadrat - WDM03
<i>Triodia chichesterensis</i>	P3	120	675975	7654957	Quadrat - WDM04
<i>Triodia chichesterensis</i>	P3	10	675763	7656809	Quadrat - WDK01
<i>Triodia chichesterensis</i>	P3	60	675733	7656635	Quadrat - WDK02
<i>Triodia chichesterensis</i>	P3	2	675677	7656265	Quadrat - WDK03
<i>Triodia chichesterensis</i>	P3		675683	7655796	Quadrat - WDK06
<i>Triodia chichesterensis</i>	P3	1000	676471	7657056	Quadrat - WDK13
<i>Triodia chichesterensis</i>	P3	5000	675745	7663848	Quadrat - WDD15
<i>Triodia chichesterensis</i>	P3	5000	675705	7663389	Quadrat - WDD22
<i>Triodia chichesterensis</i>	P3	800	672502	7659001	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672703	7657865	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	672707	7657955	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	673809	7658298	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673818	7658216	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	673657	7658265	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	677986	7659981	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	677884	7659929	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	677725	7659921	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	677410	7659993	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675573	7654545	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675939	7654561	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676014	7654560	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676071	7654560	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676140	7654555	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676241	7654551	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676341	7654548	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	676391	7654555	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676496	7654553	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676581	7654555	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	676681	7654560	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676746	7654563	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676817	7654560	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676758	7654748	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	50	676659	7654755	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676474	7654757	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	676210	7654758	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675782	7654754	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675659	7654745	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675675	7654948	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675947	7654957	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676163	7654948	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676324	7654959	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676761	7655154	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676221	7655154	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675425	7655144	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675378	7655350	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675411	7655349	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675440	7655354	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675461	7655356	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675502	7655348	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675553	7655353	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675578	7655350	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675620	7655356	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675780	7655344	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675826	7655354	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676093	7655350	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676642	7655345	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676718	7655554	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676471	7655547	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676312	7655553	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675600	7655554	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675503	7655555	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675668	7655758	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675799	7655747	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676468	7655748	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676692	7655957	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	676801	7656154	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675649	7656151	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675604	7656155	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675536	7656345	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675601	7656359	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675703	7656353	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675766	7656350	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675897	7656355	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675939	7656352	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676549	7656342	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676626	7656350	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676811	7656354	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676512	7657072	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676298	7656995	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676299	7656926	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	676298	7656790	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676106	7656505	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676094	7656886	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676081	7656932	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	675904	7656793	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	1000	675906	7656689	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675893	7656451	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675704	7656472	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675699	7656555	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675688	7656684	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675897	7663007	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675899	7663079	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675910	7663147	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675700	7663956	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675700	7663888	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675698	7663791	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675697	7663740	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675696	7663657	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675702	7663600	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675710	7663522	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675712	7663439	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675707	7663387	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675698	7663346	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675712	7663222	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675701	7663168	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675689	7663122	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675705	7662903	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675701	7662818	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675707	7662717	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675702	7662578	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	673181	7652523	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	673761	7652436	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674368	7652780	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674698	7652275	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674594	7652137	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674813	7652181	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674996	7652161	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675455	7652367	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675625	7652550	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676133	7652764	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676242	7652722	Opportunistic
<i>Triodia chichesterensis</i>	P3	10000	676463	7652786	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676565	7651084	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675652	7650598	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675571	7650602	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675467	7650595	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675365	7650607	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675249	7650601	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675150	7650599	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675081	7650589	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674719	7650607	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674034	7650601	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673932	7650595	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	673820	7650499	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674511	7650494	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674551	7650501	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674622	7650471	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674703	7650506	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	500	674742	7650495	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	674896	7650498	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674917	7650486	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675058	7650499	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675138	7650494	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675212	7650505	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675643	7650492	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675745	7650499	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675799	7650489	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675830	7650492	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	675500	7662798	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675510	7662852	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675504	7662891	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675501	7662976	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675493	7663119	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675496	7663194	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675498	7663331	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675498	7663410	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675504	7663775	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675501	7663873	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675410	7664127	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675404	7663820	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675396	7663739	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675400	7663554	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675401	7663459	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675402	7663403	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675406	7663313	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675399	7663239	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675403	7663166	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675386	7663080	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675398	7663011	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675396	7662878	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675393	7662770	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675405	7662687	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675402	7662489	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675397	7662413	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	675400	7662342	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	675402	7662238	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675409	7662189	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675503	7662304	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675507	7662365	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675499	7662452	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675504	7662603	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	673950	7659333	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	673868	7659273	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	673835	7659229	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673795	7659218	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	673789	7659196	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	673741	7659184	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673699	7659151	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673683	7659126	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673639	7659094	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	673576	7659064	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	2000	673466	7658981	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673424	7658947	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	673187	7658808	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	673105	7658897	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	673181	7658958	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673246	7659002	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	673557	7659216	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673371	7659906	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	673339	7659946	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	674744	7658745	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	674618	7658750	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	674519	7658649	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674552	7658649	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674590	7658649	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674628	7658650	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674679	7658651	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674745	7658651	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674786	7658652	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674822	7658649	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674846	7658649	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674881	7658652	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675028	7658549	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674994	7658550	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674971	7658552	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674949	7658549	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674912	7658550	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674875	7658547	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674840	7658551	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674799	7658553	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674762	7658547	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674727	7658549	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674687	7658546	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674638	7658551	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674603	7658551	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674567	7658551	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674526	7658550	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674491	7658549	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674458	7658526	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	674515	7658451	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674541	7658449	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674577	7658453	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674620	7658450	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	674660	7658451	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674700	7658451	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674746	7658453	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674803	7658453	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674986	7658449	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675011	7658447	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675008	7658348	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674853	7658352	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674802	7658349	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674766	7658349	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674742	7658351	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	3000	674690	7658352	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	674634	7658348	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674576	7658324	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674690	7658253	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674751	7658250	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674792	7658252	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674857	7658249	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674961	7658251	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675028	7658250	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674981	7658150	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674937	7658152	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674897	7658153	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	674853	7658150	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674822	7658152	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674786	7658148	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674764	7658140	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674702	7658141	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674663	7658142	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674798	7658049	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674829	7658049	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	674876	7658050	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674733	7658838	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674791	7659007	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675307	7658749	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675260	7658752	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	675186	7658750	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675151	7658751	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675157	7658646	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675258	7658652	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675299	7658650	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675344	7658650	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675373	7658648	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675400	7658654	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675512	7658552	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675457	7658549	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675407	7658545	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675354	7658551	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675286	7658551	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675336	7658450	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675370	7658453	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675414	7658450	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	675473	7658450	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675538	7658449	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675586	7658450	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675657	7658451	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	675700	7658447	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675803	7658452	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	675849	7658458	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675909	7658447	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	675967	7658455	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676024	7658452	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	676076	7658450	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676117	7658451	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	100	676380	7658452	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676317	7658553	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676275	7658552	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676227	7658546	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676183	7658542	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	676089	7658536	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675953	7658542	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675914	7658548	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675860	7658543	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675938	7658662	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675995	7658654	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	676040	7658650	Opportunistic
<i>Triodia chichesterensis</i>	P3	2500	676078	7658654	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	676124	7658651	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676188	7658646	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676359	7658654	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676647	7658753	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	676499	7658751	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676462	7658753	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676324	7658756	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676265	7658753	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676202	7658749	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	676146	7658749	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	676376	7658857	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	676541	7658845	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676592	7658852	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676652	7658854	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	676684	7658849	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676725	7658854	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676794	7658964	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676433	7658953	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676441	7659054	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676474	7659051	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676569	7659055	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676600	7659054	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676635	7659056	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	676670	7659147	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	676625	7659147	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676566	7659154	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	676709	7659247	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676754	7659243	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676055	7658350	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675973	7658351	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675804	7658350	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675735	7658352	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675693	7658345	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675641	7658355	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675565	7658355	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675515	7658353	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675473	7658342	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675406	7658358	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675316	7658349	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675249	7658345	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	300	675241	7658250	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675353	7658247	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675425	7658244	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675477	7658244	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675616	7658250	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675664	7658251	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675720	7658251	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675780	7658249	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675843	7658251	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675926	7658249	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676000	7658254	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676094	7658149	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675943	7658150	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675870	7658157	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675810	7658160	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675749	7658149	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675700	7658161	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675636	7658157	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675605	7658154	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675518	7658151	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675461	7658147	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675386	7658155	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675295	7658150	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675251	7658150	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675197	7658051	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675287	7658050	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675431	7658048	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675482	7658049	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675669	7658037	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675727	7658052	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675829	7658053	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675867	7658038	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675896	7658058	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	675998	7658046	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676046	7658052	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	676142	7658044	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676087	7657962	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675985	7657949	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675943	7657953	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675882	7657945	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675738	7657954	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675695	7657953	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675655	7657965	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675608	7657950	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675564	7657953	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675485	7657957	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675353	7657949	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675302	7657956	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675277	7657847	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675572	7657849	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675598	7657852	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675639	7657855	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675675	7657852	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	500	675736	7657850	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675777	7657853	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675839	7657846	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675737	7657758	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675708	7657784	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675583	7657773	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675562	7657762	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675386	7657749	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675097	7657737	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675097	7657765	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675092	7657800	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675097	7657859	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	669944	7653048	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	669977	7653131	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	669990	7653177	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	669834	7653169	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	669000	7655004	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	668946	7654997	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	668878	7654997	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	668808	7654995	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	668728	7655000	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	668651	7654999	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	668577	7654996	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	668515	7655003	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	668527	7655101	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	668595	7655100	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	668662	7655103	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	668740	7655100	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	668792	7655102	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	668849	7655101	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	668904	7655100	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	668951	7655100	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	669006	7655100	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	668899	7655202	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	668852	7655203	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	668789	7655199	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	668724	7655203	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	668642	7655207	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	668580	7655197	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	668541	7655197	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	668537	7655298	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	668612	7655303	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	668657	7655296	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	668724	7655298	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	668824	7655302	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	668733	7655403	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	668682	7655399	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	668644	7655403	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	668583	7655397	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	668546	7655401	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	668493	7655395	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	668451	7655399	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	668463	7655500	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	1000	668566	7655503	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	668603	7655497	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	668644	7655501	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	677401	7663884	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	677399	7663923	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	677396	7663982	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	677399	7664025	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	677300	7663839	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	677303	7663770	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	677203	7663785	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	677201	7663819	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	677201	7663938	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	677167	7664119	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	677105	7664188	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	677102	7664157	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	677098	7664120	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	677209	7663679	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	677207	7663636	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	677291	7663500	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	677311	7663573	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	677298	7663630	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	677300	7663699	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	677301	7663742	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	677410	7663773	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	678208	7660038	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	678198	7660083	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	678205	7660130	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	678310	7660192	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	678310	7660112	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	678308	7660063	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	678308	7660010	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	678301	7659969	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	678305	7659906	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	678399	7660079	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	678396	7660126	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	678399	7660169	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	678400	7660293	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	678474	7660410	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	678502	7660474	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	678515	7660445	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	678510	7660404	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	678500	7660356	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	678500	7660308	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	678506	7660251	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	678501	7660189	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	678503	7660123	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	678491	7660070	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	678604	7660080	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	678602	7660116	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	678597	7660171	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	678604	7660222	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	678599	7660277	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	678604	7660335	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	1000	678599	7660373	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	678677	7660533	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	678704	7660516	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	678705	7660469	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	678698	7660427	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	678701	7660363	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	678697	7660298	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	678710	7660222	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	678701	7660160	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	678698	7660113	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	676593	7653847	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	676457	7653853	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	676318	7653850	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	675949	7653852	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	675820	7653858	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675698	7653854	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675568	7653854	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	675438	7653853	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	675328	7653850	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	675666	7653953	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	675936	7653953	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	676077	7653950	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	676206	7653954	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676519	7653953	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	676488	7654054	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676348	7654051	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	676187	7654048	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	676048	7654055	Opportunistic
<i>Triodia chichesterensis</i>	P3	60	675896	7654054	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	675719	7654053	Opportunistic
<i>Triodia chichesterensis</i>	P3	60	675486	7654055	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675335	7654050	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675363	7654159	Opportunistic
<i>Triodia chichesterensis</i>	P3	350	675566	7654150	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	675961	7654159	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	676102	7654148	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	676245	7654154	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	676499	7654151	Opportunistic
<i>Triodia chichesterensis</i>	P3	2500	676602	7654250	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	676454	7654263	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676317	7654248	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676038	7654251	Opportunistic
<i>Triodia chichesterensis</i>	P3	1200	675500	7654250	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	675334	7654348	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	675624	7654352	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	675743	7654352	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675887	7654350	Opportunistic
<i>Triodia chichesterensis</i>	P3	350	676226	7654349	Opportunistic
<i>Triodia chichesterensis</i>	P3	900	676356	7654347	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	676479	7654349	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676598	7654353	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	670596	7654543	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	670673	7654613	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	1500	671173	7654489	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	671192	7654374	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	670669	7654294	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675466	7654440	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675650	7654449	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675825	7654449	Opportunistic
<i>Triodia chichesterensis</i>	P3	350	675946	7654449	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	676537	7654447	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	676629	7654449	Opportunistic
<i>Triodia chichesterensis</i>	P3	80	676738	7654445	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676836	7654447	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	676550	7654640	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	676449	7654650	Opportunistic
<i>Triodia chichesterensis</i>	P3	5	676249	7654653	Opportunistic
<i>Triodia chichesterensis</i>	P3	1200	676062	7654653	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	675844	7654661	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675631	7654648	Opportunistic
<i>Triodia chichesterensis</i>	P3	350	675336	7654850	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	675546	7654853	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	675947	7654851	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676665	7654849	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	676825	7654848	Opportunistic
<i>Triodia chichesterensis</i>	P3	3	676373	7655050	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	676225	7655057	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676004	7655049	Opportunistic
<i>Triodia chichesterensis</i>	P3	125	675569	7655049	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	675458	7655246	Opportunistic
<i>Triodia chichesterensis</i>	P3	350	676003	7655248	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	676142	7655248	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	676467	7655248	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676608	7655247	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676663	7655251	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676765	7655261	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	676875	7655254	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676812	7655451	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676725	7655460	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	676594	7655452	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676372	7655451	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676166	7655454	Opportunistic
<i>Triodia chichesterensis</i>	P3	900	676036	7655452	Opportunistic
<i>Triodia chichesterensis</i>	P3	80	675839	7655454	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	675575	7655451	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675943	7655655	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	676060	7655658	Opportunistic
<i>Triodia chichesterensis</i>	P3	30	676462	7655654	Opportunistic
<i>Triodia chichesterensis</i>	P3	40	676775	7655652	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676921	7655771	Opportunistic
<i>Triodia chichesterensis</i>	P3	350	676507	7655850	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	676328	7655849	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	675671	7655852	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676803	7656052	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	675337	7656252	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675491	7656252	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	2	675666	7656251	Opportunistic
<i>Triodia chichesterensis</i>	P3	350	675754	7656246	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	675951	7656250	Opportunistic
<i>Triodia chichesterensis</i>	P3	180	676492	7656254	Opportunistic
<i>Triodia chichesterensis</i>	P3	350	676600	7656450	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676601	7657020	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676603	7657221	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	676412	7657085	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676403	7656953	Opportunistic
<i>Triodia chichesterensis</i>	P3	550	676198	7656760	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676200	7656969	Opportunistic
<i>Triodia chichesterensis</i>	P3	750	676194	7657062	Opportunistic
<i>Triodia chichesterensis</i>	P3	750	675996	7656919	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	676001	7656524	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	675799	7656448	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	675802	7656566	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675798	7656726	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675600	7656474	Opportunistic
<i>Triodia chichesterensis</i>	P3	4000	675792	7663126	Opportunistic
<i>Triodia chichesterensis</i>	P3	5000	675807	7663235	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	675799	7663459	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	675798	7663627	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675786	7663803	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675799	7663915	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	675598	7664015	Opportunistic
<i>Triodia chichesterensis</i>	P3	5000	675601	7663860	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675606	7663754	Opportunistic
<i>Triodia chichesterensis</i>	P3	4000	675602	7663649	Opportunistic
<i>Triodia chichesterensis</i>	P3	5000	675599	7663528	Opportunistic
<i>Triodia chichesterensis</i>	P3	5000	675597	7663402	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675599	7663278	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	675603	7663139	Opportunistic
<i>Triodia chichesterensis</i>	P3	2500	675605	7663005	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	675602	7662850	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675603	7662786	Opportunistic
<i>Triodia chichesterensis</i>	P3	4000	675598	7662658	Opportunistic
<i>Triodia chichesterensis</i>	P3	4000	675594	7662532	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675604	7662317	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	670020	7652803	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	670116	7652747	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	670211	7652653	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	670295	7652518	Opportunistic
<i>Triodia chichesterensis</i>	P3	1250	670369	7652405	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	670538	7652301	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	670755	7652208	Opportunistic
<i>Triodia chichesterensis</i>	P3	1200	669029	7654946	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	668907	7654950	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	668749	7654950	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	668646	7654951	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	668503	7655051	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	668619	7655053	Opportunistic
<i>Triodia chichesterensis</i>	P3	1700	668744	7655049	Opportunistic
<i>Triodia chichesterensis</i>	P3	1800	668866	7655048	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	1500	668989	7655050	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	669012	7655151	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	668914	7655154	Opportunistic
<i>Triodia chichesterensis</i>	P3	1200	668788	7655153	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	668667	7655155	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	668568	7655253	Opportunistic
<i>Triodia chichesterensis</i>	P3	1200	668747	7655250	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	668851	7655251	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	668808	7655352	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	668646	7655353	Opportunistic
<i>Triodia chichesterensis</i>	P3	1200	668532	7655353	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	668425	7655453	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	668532	7655449	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	668644	7655450	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	677453	7663923	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	677449	7664072	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	677349	7664033	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	677351	7663921	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	677352	7663800	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	677248	7663734	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	677251	7663832	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	677251	7663998	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	677148	7664201	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	677243	7663614	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	677349	7663658	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	678104	7659974	Opportunistic
<i>Triodia chichesterensis</i>	P3	350	678154	7660127	Opportunistic
<i>Triodia chichesterensis</i>	P3	350	678252	7660171	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	678248	7660041	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	678353	7659995	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	678353	7660128	Opportunistic
<i>Triodia chichesterensis</i>	P3	20	678356	7660241	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	678452	7660391	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	678451	7660249	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	678447	7660166	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	678557	7660086	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	678550	7660200	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	678550	7660353	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	678550	7660469	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	678650	7660535	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	678649	7660442	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	678647	7660342	Opportunistic
<i>Triodia chichesterensis</i>	P3	900	678651	7660240	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	671910	7663165	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675101	7663729	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675058	7663543	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675050	7663439	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	673557	7659757	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	673716	7659514	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	673732	7659478	Opportunistic
<i>Triodia chichesterensis</i>	P3	1	673817	7659387	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	673983	7659193	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674013	7659173	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	1000	674043	7659139	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	674018	7659103	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674058	7659109	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674082	7659089	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674124	7659043	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674164	7659000	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674192	7658976	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674244	7658912	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	674255	7658992	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	674231	7659026	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674195	7659062	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674137	7659099	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	674097	7659145	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674083	7659170	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674059	7659209	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674029	7659251	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	673984	7659300	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673952	7659340	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	673783	7659525	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	673743	7659576	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674827	7658692	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	674620	7658690	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674571	7658693	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	674523	7658604	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674572	7658602	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674644	7658598	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674687	7658602	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674770	7658605	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674829	7658599	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674911	7658610	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674953	7658615	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674999	7658590	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675031	7658506	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	674982	7658498	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674905	7658493	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674848	7658494	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674783	7658502	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674729	7658506	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674660	7658502	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674600	7658502	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674571	7658497	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	674524	7658511	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	674557	7658402	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	674615	7658410	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674656	7658404	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	674695	7658401	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674756	7658406	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674810	7658404	Opportunistic
<i>Triodia chichesterensis</i>	P3	20	674887	7658410	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674915	7658410	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674964	7658396	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675033	7658397	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675061	7658398	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	400	675065	7658304	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675003	7658302	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	674871	7658301	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674839	7658308	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674791	7658299	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	674750	7658297	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	674711	7658304	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	674680	7658304	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	674638	7658296	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	674596	7658298	Opportunistic
<i>Triodia chichesterensis</i>	P3	25	674618	7658198	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674730	7658200	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	674790	7658199	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674847	7658198	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	674896	7658195	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	674942	7658200	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675007	7658199	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675057	7658194	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	674985	7658108	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674955	7658103	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674891	7658098	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674827	7658099	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	674772	7658098	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674724	7658092	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674826	7658004	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674878	7658004	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	674925	7658000	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675265	7658785	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675385	7658703	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675337	7658697	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675282	7658698	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	675111	7658704	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675063	7658709	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	675182	7658614	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675251	7658603	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	675282	7658594	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675346	7658606	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	675415	7658605	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675554	7658501	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675493	7658497	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675443	7658497	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675376	7658498	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675315	7658505	Opportunistic
<i>Triodia chichesterensis</i>	P3	40	675283	7658501	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675316	7658398	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	675357	7658404	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675404	7658395	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675471	7658405	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675530	7658396	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675581	7658401	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675642	7658401	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675704	7658404	Opportunistic
<i>Triodia chichesterensis</i>	P3	80	675763	7658403	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	500	675817	7658404	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	675974	7658401	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676104	7658401	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676390	7658413	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	676419	7658406	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676216	7658509	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	676184	7658498	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676130	7658497	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	676091	7658498	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	676044	7658502	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675877	7658500	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675835	7658497	Opportunistic
<i>Triodia chichesterensis</i>	P3	350	675943	7658599	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	676016	7658601	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676064	7658601	Opportunistic
<i>Triodia chichesterensis</i>	P3	850	676132	7658597	Opportunistic
<i>Triodia chichesterensis</i>	P3	750	676265	7658602	Opportunistic
<i>Triodia chichesterensis</i>	P3	80	676636	7658719	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676396	7658698	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676291	7658703	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	676240	7658696	Opportunistic
<i>Triodia chichesterensis</i>	P3	350	676179	7658699	Opportunistic
<i>Triodia chichesterensis</i>	P3	750	676143	7658696	Opportunistic
<i>Triodia chichesterensis</i>	P3	80	676076	7658705	Opportunistic
<i>Triodia chichesterensis</i>	P3	350	676028	7658697	Opportunistic
<i>Triodia chichesterensis</i>	P3	80	675970	7658703	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	676151	7658801	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	676278	7658800	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	676324	7658812	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	676354	7658813	Opportunistic
<i>Triodia chichesterensis</i>	P3	900	676645	7658807	Opportunistic
<i>Triodia chichesterensis</i>	P3	350	676679	7658815	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676713	7658895	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	676644	7658900	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676375	7658896	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	676424	7658998	Opportunistic
<i>Triodia chichesterensis</i>	P3	30	676483	7658999	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676531	7659004	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676680	7659103	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	676641	7659101	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676603	7659094	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676578	7659088	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676536	7659120	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676651	7659194	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	676730	7659177	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	676748	7659159	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	675987	7658305	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675947	7658298	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675895	7658295	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675860	7658298	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	675726	7658300	Opportunistic
<i>Triodia chichesterensis</i>	P3	900	675678	7658302	Opportunistic
<i>Triodia chichesterensis</i>	P3	750	675611	7658299	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	850	675494	7658294	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	675452	7658306	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675406	7658296	Opportunistic
<i>Triodia chichesterensis</i>	P3	650	675358	7658299	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	675319	7658308	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675275	7658302	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675241	7658298	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675215	7658211	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675244	7658194	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	675300	7658203	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	675373	7658199	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675422	7658199	Opportunistic
<i>Triodia chichesterensis</i>	P3	650	675476	7658204	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	675511	7658194	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675586	7658200	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675622	7658202	Opportunistic
<i>Triodia chichesterensis</i>	P3	650	675671	7658202	Opportunistic
<i>Triodia chichesterensis</i>	P3	900	675719	7658206	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675761	7658207	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675820	7658198	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675872	7658204	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675909	7658205	Opportunistic
<i>Triodia chichesterensis</i>	P3	20	675995	7658199	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	676028	7658194	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	676099	7658113	Opportunistic
<i>Triodia chichesterensis</i>	P3	450	676025	7658105	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675896	7658096	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	675851	7658101	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675774	7658104	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675731	7658103	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675593	7658109	Opportunistic
<i>Triodia chichesterensis</i>	P3	60	675542	7658106	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	675492	7658109	Opportunistic
<i>Triodia chichesterensis</i>	P3	350	675447	7658104	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	675418	7658098	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675377	7658111	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675311	7658112	Opportunistic
<i>Triodia chichesterensis</i>	P3	750	675258	7658114	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675202	7658091	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675223	7658008	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675268	7658003	Opportunistic
<i>Triodia chichesterensis</i>	P3	850	675310	7657998	Opportunistic
<i>Triodia chichesterensis</i>	P3	450	675463	7657996	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675594	7658001	Opportunistic
<i>Triodia chichesterensis</i>	P3	750	675676	7657998	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675732	7658006	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	675768	7658003	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675826	7658001	Opportunistic
<i>Triodia chichesterensis</i>	P3	450	675872	7657999	Opportunistic
<i>Triodia chichesterensis</i>	P3	850	675970	7657999	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	676070	7658002	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675967	7657906	Opportunistic
<i>Triodia chichesterensis</i>	P3	700	675892	7657910	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	150	675823	7657911	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675775	7657909	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	675705	7657912	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675634	7657903	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675590	7657896	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675520	7657902	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	675458	7657906	Opportunistic
<i>Triodia chichesterensis</i>	P3	150	675417	7657901	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	675368	7657904	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675296	7657915	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	675230	7657910	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	675276	7657808	Opportunistic
<i>Triodia chichesterensis</i>	P3	950	675582	7657812	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	675718	7657799	Opportunistic
<i>Triodia chichesterensis</i>	P3	850	675770	7657805	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675836	7657809	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	675883	7657822	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675145	7657761	Opportunistic
<i>Triodia chichesterensis</i>	P3	20	675143	7657872	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675159	7658000	Opportunistic
<i>Triodia chichesterensis</i>	P3	650	675156	7658066	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676554	7653907	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676476	7653904	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676339	7653900	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676163	7653918	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676064	7653911	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676006	7653910	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675943	7653907	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675880	7653907	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675826	7653906	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675759	7653901	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675629	7653906	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675538	7653911	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	675372	7653906	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675383	7653999	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675676	7654000	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675781	7654009	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675859	7654002	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675963	7653998	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676061	7653991	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676142	7654009	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676234	7654001	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676336	7654004	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676455	7654005	Opportunistic
<i>Triodia chichesterensis</i>	P3	20	676557	7654109	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676442	7654100	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676365	7654100	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	676253	7654093	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676135	7654102	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676062	7654100	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675633	7654104	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675517	7654096	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675421	7654101	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	1000	675338	7654204	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675417	7654195	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675494	7654224	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675615	7654197	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675803	7654199	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676162	7654208	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676319	7654204	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676410	7654208	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676545	7654209	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676587	7654301	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676512	7654296	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676382	7654305	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676273	7654301	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676195	7654306	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675677	7654304	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675610	7654303	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675495	7654307	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675418	7654298	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675362	7654309	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675390	7654395	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675469	7654419	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675642	7654416	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675704	7654405	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675778	7654405	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675861	7654408	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675957	7654405	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676243	7654402	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676419	7654404	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676536	7654402	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676599	7654404	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675496	7654499	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675683	7654506	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675757	7654502	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675836	7654504	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675982	7654495	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676086	7654503	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676336	7654511	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	676452	7654510	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676575	7654494	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676697	7654501	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676797	7654516	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676737	7654702	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676662	7654707	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676597	7654698	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676451	7654697	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675850	7654713	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675790	7654700	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675713	7654705	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675489	7654709	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675372	7654706	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675319	7654893	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676051	7654898	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676139	7654895	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	1000	676775	7654907	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676711	7655105	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676583	7655103	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676528	7655094	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676199	7655106	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676122	7655102	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675464	7655100	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675432	7655308	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675557	7655294	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675967	7655305	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676051	7655301	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676204	7655299	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676466	7655303	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676561	7655299	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676654	7655298	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	676786	7655295	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676821	7655516	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676739	7655505	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676464	7655506	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676374	7655498	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676282	7655506	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675958	7655497	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675871	7655504	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675773	7655508	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675647	7655496	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675568	7655505	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675487	7655509	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675747	7655698	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676111	7655700	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676251	7655703	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676383	7655713	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676511	7655712	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	676826	7655696	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676687	7655916	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676595	7655900	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676704	7656095	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675398	7656100	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675395	7656285	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675498	7656313	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675643	7656310	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675737	7656296	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675874	7656302	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675982	7656306	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676726	7656302	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676834	7656310	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676551	7657008	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676558	7657273	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676352	7656984	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676159	7656772	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676143	7656938	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675952	7656910	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675952	7656831	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675956	7656710	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	300	675947	7656474	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675736	7656419	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675751	7656521	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675742	7656603	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675749	7656655	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675849	7662984	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675862	7663100	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675853	7663191	Opportunistic
<i>Triodia chichesterensis</i>	P3	4000	675853	7663256	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	675852	7663373	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	675651	7663986	Opportunistic
<i>Triodia chichesterensis</i>	P3	4000	675656	7663919	Opportunistic
<i>Triodia chichesterensis</i>	P3	4000	675646	7663800	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675638	7663709	Opportunistic
<i>Triodia chichesterensis</i>	P3	4000	675653	7663624	Opportunistic
<i>Triodia chichesterensis</i>	P3	4000	675647	7663519	Opportunistic
<i>Triodia chichesterensis</i>	P3	4000	675647	7663409	Opportunistic
<i>Triodia chichesterensis</i>	P3	4000	675641	7663303	Opportunistic
<i>Triodia chichesterensis</i>	P3	4000	675646	7663133	Opportunistic
<i>Triodia chichesterensis</i>	P3	4000	675652	7663016	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675645	7662918	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675660	7662795	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675654	7662668	Opportunistic
<i>Triodia chichesterensis</i>	P3	4000	675667	7662605	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675636	7662472	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675647	7662331	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675585	7654597	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675614	7654603	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675945	7654615	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	676036	7654607	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676081	7654582	Opportunistic
<i>Triodia chichesterensis</i>	P3	4000	676177	7654594	Opportunistic
<i>Triodia chichesterensis</i>	P3	5000	676355	7654598	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676460	7654606	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676565	7654598	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676622	7654599	Opportunistic
<i>Triodia chichesterensis</i>	P3	20	676835	7654804	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676794	7654805	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676738	7654803	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676634	7654800	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	676552	7654801	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676045	7654801	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675963	7654801	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675374	7654814	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675912	7654999	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675972	7655004	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676043	7655000	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	676216	7655004	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676272	7655002	Opportunistic
<i>Triodia chichesterensis</i>	P3	5000	676818	7655198	Opportunistic
<i>Triodia chichesterensis</i>	P3	5000	676714	7655202	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676641	7655203	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	676477	7655199	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	200	675463	7655209	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675387	7655202	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	675363	7655399	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	675515	7655404	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	675559	7655398	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675577	7655390	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675766	7655406	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676042	7655401	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676116	7655403	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676187	7655403	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	676257	7655402	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	676338	7655409	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676372	7655400	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	676546	7655401	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676759	7655404	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	676810	7655400	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	676799	7655599	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	676544	7655604	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	676489	7655599	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676378	7655603	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676306	7655601	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676178	7655605	Opportunistic
<i>Triodia chichesterensis</i>	P3	600	676111	7655608	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	676039	7655593	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675773	7655596	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	675693	7655619	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675572	7655597	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	675470	7655590	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675630	7655799	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	675688	7655800	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	676356	7655797	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676422	7655801	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	676529	7655800	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	676605	7655804	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	676881	7655976	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	676728	7656010	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	676007	7656199	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675925	7656206	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675806	7656202	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675760	7656201	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675713	7656188	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675649	7656186	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	675603	7656212	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675537	7656201	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675486	7656205	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675559	7656403	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675596	7656432	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675634	7656398	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675697	7656404	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675825	7656400	Opportunistic
<i>Triodia chichesterensis</i>	P3	1	675885	7656395	Opportunistic
<i>Triodia chichesterensis</i>	P3	250	676761	7656403	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	676824	7656400	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	5000	676452	7656887	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	676444	7656988	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676443	7657140	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676255	7657011	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676261	7656939	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	676248	7656882	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	676254	7656811	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	676044	7656479	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	676046	7656821	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	676049	7656891	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	675867	7656855	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675864	7656807	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675854	7656741	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675851	7656669	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675838	7656519	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675642	7656446	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675647	7656516	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675655	7656565	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675947	7663038	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675954	7663093	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675753	7664004	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675757	7663967	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675752	7663903	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675747	7663833	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675745	7663762	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675751	7663673	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675748	7663628	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675748	7663541	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675749	7663499	Opportunistic
<i>Triodia chichesterensis</i>	P3	900	675748	7663461	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675750	7663430	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675748	7663280	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675751	7663238	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675751	7663178	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675742	7663133	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675736	7663068	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675749	7662945	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675750	7662816	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675750	7662777	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675747	7662751	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675750	7662714	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675752	7662669	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675751	7662540	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675951	7662613	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673400	7652034	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	673308	7651668	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673203	7651189	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675699	7650654	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675607	7650652	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	675537	7650650	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	675413	7650651	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	675277	7650651	Opportunistic
<i>Triodia chichesterensis</i>	P3	3000	675170	7650650	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	3000	675061	7650650	Opportunistic
<i>Triodia chichesterensis</i>	P3	400	674661	7650649	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673991	7650649	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673827	7650557	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673965	7650559	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	674037	7650551	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674550	7650542	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674653	7650547	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674746	7650559	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	674895	7650551	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	674963	7650551	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675076	7650550	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675206	7650550	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675444	7650552	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675606	7650546	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675679	7650555	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675790	7650543	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675550	7662854	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675551	7662901	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675548	7662990	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675548	7663057	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675551	7663188	Opportunistic
<i>Triodia chichesterensis</i>	P3	1500	675552	7663231	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675551	7663315	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675550	7663404	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675551	7663469	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675551	7663710	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675553	7663815	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675553	7663915	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675448	7663865	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675446	7663485	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675452	7663403	Opportunistic
<i>Triodia chichesterensis</i>	P3	800	675446	7663322	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675450	7663274	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675451	7663191	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675447	7663131	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675448	7663035	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675457	7662961	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675451	7662858	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675454	7662768	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675453	7662710	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675445	7662652	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675451	7662592	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675456	7662548	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	675452	7662463	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675441	7662293	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675462	7662210	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675548	7662259	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675551	7662388	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675553	7662483	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675549	7662552	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	675547	7662632	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675554	7662708	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	300	673981	7659295	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673886	7659220	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	673815	7659117	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	673684	7659059	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673610	7659027	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	673537	7658977	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673461	7658915	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	673405	7658862	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673357	7658799	Opportunistic
<i>Triodia chichesterensis</i>	P3	5000	673290	7658790	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673170	7658766	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673190	7658896	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673246	7658931	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673305	7658960	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673374	7659019	Opportunistic
<i>Triodia chichesterensis</i>	P3	300	673474	7659061	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673517	7659133	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	673652	7659183	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673700	7659243	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	673770	7659308	Opportunistic
<i>Triodia chichesterensis</i>	P3	8000	669480	7653632	Opportunistic
<i>Triodia chichesterensis</i>	P3	8000	669758	7653473	Opportunistic
<i>Triodia chichesterensis</i>	P3	10000	669774	7653867	Opportunistic
<i>Triodia chichesterensis</i>	P3	10000	669830	7653569	Opportunistic
<i>Triodia chichesterensis</i>	P3	10000	670206	7654811	Opportunistic
<i>Triodia chichesterensis</i>	P3	10000	670240	7655180	Opportunistic
<i>Triodia chichesterensis</i>	P3	8000	670437	7653405	Opportunistic
<i>Triodia chichesterensis</i>	P3	5000	671378	7653244	Opportunistic
<i>Triodia chichesterensis</i>	P3	8000	671540	7653274	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	671624	7653337	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	671708	7654223	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	671768	7653718	Opportunistic
<i>Triodia chichesterensis</i>	P3	50	671786	7653387	Opportunistic
<i>Triodia chichesterensis</i>	P3	8000	672617	7653195	Opportunistic
<i>Triodia chichesterensis</i>	P3	8000	672693	7653254	Opportunistic
<i>Triodia chichesterensis</i>	P3	4000	672820	7653287	Opportunistic
<i>Triodia chichesterensis</i>	P3	8000	673117	7653340	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	673253	7653942	Opportunistic
<i>Triodia chichesterensis</i>	P3	8000	673385	7653582	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	673964	7652929	Opportunistic
<i>Triodia chichesterensis</i>	P3	10000	673990	7651740	Opportunistic
<i>Triodia chichesterensis</i>	P3	10000	674028	7652819	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674045	7656578	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674123	7654138	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674124	7653922	Opportunistic
<i>Triodia chichesterensis</i>	P3	10000	674224	7651961	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674289	7658737	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674382	7658343	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	674390	7655458	Opportunistic
<i>Triodia chichesterensis</i>	P3	10000	674475	7651894	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674532	7652078	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674535	7658421	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	674651	7658453	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Triodia chichesterensis</i>	P3	500	674744	7658351	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	674764	7658862	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674784	7658267	Opportunistic
<i>Triodia chichesterensis</i>	P3	100	674822	7658805	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674844	7653978	Opportunistic
<i>Triodia chichesterensis</i>	P3	5000	674845	7658157	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674901	7658031	Opportunistic
<i>Triodia chichesterensis</i>	P3	5000	674910	7655515	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	674930	7654444	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	674940	7654230	Opportunistic
<i>Triodia chichesterensis</i>	P3	2000	675009	7655179	Opportunistic
<i>Triodia chichesterensis</i>	P3	500	675011	7658504	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675073	7654335	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675083	7653859	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675168	7653734	Opportunistic
<i>Triodia chichesterensis</i>	P3	1000	675216	7656159	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	677119	7661121	Opportunistic
<i>Triodia chichesterensis</i>	P3	200	675288	7654729	Quadrat - WD80
<i>Triodia chichesterensis</i>	P3	300	674996	7655241	Quadrat - TRH063
<i>Triodia chichesterensis</i>	P3	500	674623	7655046	Quadrat - WD60
<i>Triodia chichesterensis</i>	P3	200	674911	7655515	Quadrat - TRH066
<i>Triodia chichesterensis</i>	P3	100	674785	7654254	Quadrat - WD62
<i>Triodia chichesterensis</i>	P3		673059	7653962	Quadrat - W04A
<i>Triodia chichesterensis</i>	P3		669865	7653424	Quadrat - WD29
<i>Triodia chichesterensis</i>	P3		671622	7654093	Quadrat - WD19
<i>Triodia chichesterensis</i>	P3	2000	675261	7653742	Quadrat - WD70
<i>Triodia chichesterensis</i>	P3	10000	674337	7651847	Quadrat - WD83
<i>Triodia chichesterensis</i>	P3	2000	669634	7653542	Quadrat - WD31
<i>Triodia chichesterensis</i>	P3	100	674186	7652665	Quadrat - WD92
<i>Triodia chichesterensis</i>	P3	100	673941	7653144	Quadrat - WD86
<i>Triodia chichesterensis</i>	P3	5000	674958	7652144	Quadrat - WD77
<i>Triodia chichesterensis</i>	P3	1	675312	7654780	Quadrat - WD82
<i>Triodia chichesterensis</i>	P3	200	674916	7658464	Quadrat - WD50
<i>Triodia chichesterensis</i>	P3	2000	673280	7653422	Quadrat - TRH056
<i>Triodia chichesterensis</i>	P3	10000	669878	7654237	Quadrat - WD35
<i>Triodia chichesterensis</i>	P3	1000	675107	7657788	Quadrat - WD48
<i>Triodia chichesterensis</i>	P3	6000	674821	7658360	Quadrat - WD52
<i>Triodia chichesterensis</i>	P3	10000	674656	7658575	Quadrat - WD44
<i>Triodia chichesterensis</i>	P3	1000	675030	7654362	Quadrat - WD78
<i>Vigna triodiophila</i>	P3	8	672948	7658458	Opportunistic
<i>Vigna triodiophila</i>	P3	30	672949	7658439	Opportunistic
<i>Vigna triodiophila</i>	P3	20	672891	7658433	Opportunistic
<i>Vigna triodiophila</i>	P3	50	672833	7658415	Opportunistic
<i>Vigna triodiophila</i>	P3	100	672807	7658433	Opportunistic
<i>Vigna triodiophila</i>	P3	50	672514	7658627	Opportunistic
<i>Vigna triodiophila</i>	P3	50	672498	7658640	Opportunistic
<i>Vigna triodiophila</i>	P3	50	672487	7658654	Opportunistic
<i>Vigna triodiophila</i>	P3	50	672495	7658687	Opportunistic
<i>Vigna triodiophila</i>	P3	5	672646	7658391	Opportunistic
<i>Vigna triodiophila</i>	P3	50	672613	7658373	Opportunistic
<i>Vigna triodiophila</i>	P3	20	672566	7658521	Opportunistic
<i>Vigna triodiophila</i>	P3	50	672529	7658650	Opportunistic
<i>Vigna triodiophila</i>	P3	5	672682	7658353	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Vigna triodiophila</i>	P3	2	672705	7658357	Opportunistic
<i>Vigna triodiophila</i>	P3	10	672805	7658371	Opportunistic
<i>Vigna triodiophila</i>	P3	15	672822	7658387	Opportunistic
<i>Vigna triodiophila</i>	P3	30	672870	7658425	Opportunistic
<i>Vigna triodiophila</i>	P3	2	672690	7658327	Opportunistic
<i>Vigna triodiophila</i>	P3	10	672722	7657748	Opportunistic
<i>Vigna triodiophila</i>	P3	8	672541	7658948	Opportunistic
<i>Vigna triodiophila</i>	P3	10	672645	7658446	Opportunistic
<i>Vigna triodiophila</i>	P3	10	672609	7658885	Opportunistic
<i>Vigna triodiophila</i>	P3	10	672608	7658867	Opportunistic
<i>Vigna triodiophila</i>	P3	50	672609	7658837	Opportunistic
<i>Vigna triodiophila</i>	P3	20	672854	7658579	Opportunistic
<i>Vigna triodiophila</i>	P3	25	672871	7658567	Opportunistic
<i>Vigna triodiophila</i>	P3	10	672882	7658589	Opportunistic
<i>Vigna triodiophila</i>	P3	10	672899	7658576	Opportunistic
<i>Vigna triodiophila</i>	P3	50	672978	7658576	Opportunistic
<i>Vigna triodiophila</i>	P3	50	672989	7658576	Opportunistic
<i>Vigna triodiophila</i>	P3	1	673009	7658595	Opportunistic
<i>Vigna triodiophila</i>	P3	8	673018	7658619	Opportunistic
<i>Vigna triodiophila</i>	P3	10	672912	7658566	Opportunistic
<i>Vigna triodiophila</i>	P3	10	672923	7658574	Opportunistic
<i>Vigna triodiophila</i>	P3	25	672931	7658577	Opportunistic
<i>Vigna triodiophila</i>	P3	50	672693	7657542	Opportunistic
<i>Vigna triodiophila</i>	P3	20	672705	7657580	Opportunistic
<i>Vigna triodiophila</i>	P3	5	672182	7658317	Opportunistic
<i>Vigna triodiophila</i>	P3	4	672745	7657625	Opportunistic
<i>Vigna triodiophila</i>	P3	4	672745	7657791	Opportunistic
<i>Vigna triodiophila</i>	P3	10	672744	7657822	Opportunistic
<i>Vigna triodiophila</i>	P3	10	672749	7657851	Opportunistic
<i>Vigna triodiophila</i>	P3	8	673319	7659446	Opportunistic
<i>Vigna triodiophila</i>	P3	9	673311	7659447	Opportunistic
<i>Vigna triodiophila</i>	P3	5	673304	7659449	Opportunistic
<i>Vigna triodiophila</i>	P3	6	673284	7659453	Opportunistic
<i>Vigna triodiophila</i>	P3	4	673269	7659449	Opportunistic
<i>Vigna triodiophila</i>	P3	3	673257	7659441	Opportunistic
<i>Vigna triodiophila</i>	P3	10	673324	7659390	Opportunistic
<i>Vigna triodiophila</i>	P3	3	673433	7659593	Opportunistic
<i>Vigna triodiophila</i>	P3	12	673489	7659603	Opportunistic
<i>Vigna triodiophila</i>	P3	10	673535	7659617	Opportunistic
<i>Vigna triodiophila</i>	P3	15	673540	7659610	Opportunistic
<i>Vigna triodiophila</i>	P3	10	673545	7659603	Opportunistic
<i>Vigna triodiophila</i>	P3	3	673167	7659422	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672911	7657772	Opportunistic
<i>Vigna triodiophila</i>	P3	3	672919	7658360	Opportunistic
<i>Vigna triodiophila</i>	P3	50	672938	7658581	Opportunistic
<i>Vigna triodiophila</i>	P3	20	672957	7658579	Opportunistic
<i>Vigna triodiophila</i>	P3	3	673580	7659659	Opportunistic
<i>Vigna triodiophila</i>	P3	2	673572	7659652	Opportunistic
<i>Vigna triodiophila</i>	P3	2	673567	7659654	Opportunistic
<i>Vigna triodiophila</i>	P3	1	673562	7659647	Opportunistic
<i>Vigna triodiophila</i>	P3	3	673552	7659639	Opportunistic
<i>Vigna triodiophila</i>	P3	2	673546	7659638	Opportunistic
<i>Vigna triodiophila</i>	P3	12	673529	7659623	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Vigna triodiophila</i>	P3	7	673517	7659612	Opportunistic
<i>Vigna triodiophila</i>	P3	3	673512	7659608	Opportunistic
<i>Vigna triodiophila</i>	P3	10	673435	7659516	Opportunistic
<i>Vigna triodiophila</i>	P3	12	673431	7659517	Opportunistic
<i>Vigna triodiophila</i>	P3	3	673426	7659507	Opportunistic
<i>Vigna triodiophila</i>	P3	15	673417	7659513	Opportunistic
<i>Vigna triodiophila</i>	P3	5	673417	7659462	Opportunistic
<i>Vigna triodiophila</i>	P3	5	673413	7659453	Opportunistic
<i>Vigna triodiophila</i>	P3	2	673406	7659440	Opportunistic
<i>Vigna triodiophila</i>	P3	9	673396	7659431	Opportunistic
<i>Vigna triodiophila</i>	P3	2	673383	7659431	Opportunistic
<i>Vigna triodiophila</i>	P3	10	673373	7659433	Opportunistic
<i>Vigna triodiophila</i>	P3	5	673344	7659435	Opportunistic
<i>Vigna triodiophila</i>	P3	20	673573	7659673	Opportunistic
<i>Vigna triodiophila</i>	P3	3	673547	7659635	Opportunistic
<i>Vigna triodiophila</i>	P3	40	673524	7659631	Opportunistic
<i>Vigna triodiophila</i>	P3	50	673523	7659605	Opportunistic
<i>Vigna triodiophila</i>	P3	30	673514	7659543	Opportunistic
<i>Vigna triodiophila</i>	P3	25	673259	7659508	Opportunistic
<i>Vigna triodiophila</i>	P3	20	673421	7659612	Opportunistic
<i>Vigna triodiophila</i>	P3	10	672783	7657826	Opportunistic
<i>Vigna triodiophila</i>	P3	25	672796	7658379	Opportunistic
<i>Vigna triodiophila</i>	P3	20	672844	7657702	Opportunistic
<i>Vigna triodiophila</i>	P3	6	672857	7657612	Opportunistic
<i>Vigna triodiophila</i>	P3	10	673440	7659486	Opportunistic
<i>Vigna triodiophila</i>	P3	50	673412	7659491	Opportunistic
<i>Vigna triodiophila</i>	P3	40	673399	7659456	Opportunistic
<i>Vigna triodiophila</i>	P3	75	673366	7659486	Opportunistic
<i>Vigna triodiophila</i>	P3	55	673328	7659481	Opportunistic
<i>Vigna triodiophila</i>	P3	8	673299	7659471	Opportunistic
<i>Vigna triodiophila</i>	P3	80	673278	7659483	Opportunistic
<i>Vigna triodiophila</i>	P3	65	673215	7659432	Opportunistic
<i>Vigna triodiophila</i>	P3	5	673354	7659223	Opportunistic
<i>Vigna triodiophila</i>	P3	50	673384	7659220	Opportunistic
<i>Vigna triodiophila</i>	P3	30	673428	7659235	Opportunistic
<i>Vigna triodiophila</i>	P3	55	673474	7659262	Opportunistic
<i>Vigna triodiophila</i>	P3	75	673455	7659616	Opportunistic
<i>Vigna triodiophila</i>	P3	5	673527	7659662	Opportunistic
<i>Vigna triodiophila</i>	P3	35	673552	7659664	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672930	7658498	Opportunistic
<i>Vigna triodiophila</i>	P3	9	672926	7658496	Opportunistic
<i>Vigna triodiophila</i>	P3	5	672925	7658494	Opportunistic
<i>Vigna triodiophila</i>	P3	3	672919	7658493	Opportunistic
<i>Vigna triodiophila</i>	P3	2	672917	7658490	Opportunistic
<i>Vigna triodiophila</i>	P3	2	672912	7658488	Opportunistic
<i>Vigna triodiophila</i>	P3	6	672909	7658485	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672903	7658486	Opportunistic
<i>Vigna triodiophila</i>	P3	6	672900	7658488	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672893	7658494	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672889	7658497	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672887	7658500	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672883	7658502	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672881	7658501	Opportunistic



Taxon	Significance	Count	Easting	Northing	Comments
<i>Vigna triodiophila</i>	P3	6	672880	7658499	Opportunistic
<i>Vigna triodiophila</i>	P3	2	672839	7658470	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672833	7658466	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672833	7658457	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672830	7658445	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672830	7658437	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672835	7658433	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672834	7658422	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672822	7658417	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672815	7658421	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672812	7658426	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672808	7658425	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672801	7658424	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672613	7657437	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672604	7657450	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672689	7658348	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672713	7658350	Opportunistic
<i>Vigna triodiophila</i>	P3	30	672409	7658600	Opportunistic
<i>Vigna triodiophila</i>	P3	10	672410	7658616	Opportunistic
<i>Vigna triodiophila</i>	P3	10	672406	7658630	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672787	7658411	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672652	7658434	Opportunistic
<i>Vigna triodiophila</i>	P3	5	672368	7659086	Opportunistic
<i>Vigna triodiophila</i>	P3	5	672399	7658831	Opportunistic
<i>Vigna triodiophila</i>	P3	10	672423	7658731	Opportunistic
<i>Vigna triodiophila</i>	P3	10	672422	7658743	Opportunistic
<i>Vigna triodiophila</i>	P3	5	672410	7658643	Opportunistic
<i>Vigna triodiophila</i>	P3	5	672424	7658669	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672427	7658680	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672421	7658688	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672424	7658699	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672425	7658705	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672421	7658707	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672906	7658615	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672912	7658608	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672751	7659012	Opportunistic
<i>Vigna triodiophila</i>	P3	20	672738	7659040	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672787	7658594	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672805	7658590	Opportunistic
<i>Vigna triodiophila</i>	P3	25	672505	7657603	Opportunistic
<i>Vigna triodiophila</i>	P3	45	672784	7657591	Opportunistic
<i>Vigna triodiophila</i>	P3	20	672804	7657624	Opportunistic
<i>Vigna triodiophila</i>	P3	3	672809	7657695	Opportunistic
<i>Vigna triodiophila</i>	P3	10	672772	7657801	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672970	7658589	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672980	7658595	Opportunistic
<i>Vigna triodiophila</i>	P3	1	672830	7658608	Opportunistic



**Introduced Flora**

Taxon	Count	Easting	Northing	Comments
<i>Aerva javanica</i>	1	674821	7656536	Quadrat - WD56
<i>Aerva javanica</i>	1	673946	7653210	Quadrat - WD84
<i>Aerva javanica</i>	1	674043	7652926	Quadrat - WD90
<i>Aerva javanica</i>	2	674930	7657046	Opportunistic
<i>Aerva javanica</i>	5	674762	7655327	Opportunistic
<i>Aerva javanica</i>	5	674374	7655530	Opportunistic
<i>Aerva javanica</i>	9	674005	7656557	Quadrat - WD34
<i>Aerva javanica</i>	10	674085	7656603	Opportunistic
<i>Aerva javanica</i>	10	674086	7656674	Opportunistic
<i>Aerva javanica</i>	15	674734	7653978	Quadrat - WD64
<i>Aerva javanica</i>	20	674023	7656576	Opportunistic
<i>Aerva javanica</i>	20	675028	7657932	Opportunistic
<i>Aerva javanica</i>	30	674405	7658892	Opportunistic
<i>Aerva javanica</i>	30	674162	7656441	Quadrat - WD36
<i>Aerva javanica</i>	50	674064	7656498	Opportunistic
<i>Aerva javanica</i>	50	675170	7658193	Opportunistic
<i>Aerva javanica</i>	50	675022	7656688	Opportunistic
<i>Aerva javanica</i>	50	674930	7656374	Opportunistic
<i>Aerva javanica</i>	50	674979	7657976	Opportunistic
<i>Aerva javanica</i>	50	674915	7656516	Opportunistic
<i>Aerva javanica</i>	50	674218	7658307	Opportunistic
<i>Aerva javanica</i>	50	674266	7657046	Opportunistic
<i>Aerva javanica</i>	100	674989	7656588	Opportunistic
<i>Aerva javanica</i>	100	674772	7656907	Opportunistic
<i>Aerva javanica</i>	100	674784	7657481	Opportunistic
<i>Aerva javanica</i>	100	674787	7658750	Opportunistic
<i>Aerva javanica</i>	100	674229	7658670	Opportunistic
<i>Aerva javanica</i>	200	675140	7658288	Opportunistic
<i>Aerva javanica</i>	200	675150	7655490	Opportunistic
<i>Aerva javanica</i>	200	674698	7658810	Opportunistic
<i>Aerva javanica</i>	500	674124	7656311	Opportunistic
<i>Aerva javanica</i>	500	675087	7656669	Quadrat - WD54
<i>Aerva javanica</i>		670127	7656414	Quadrat - WD47
<i>Aerva javanica</i>		675159	7655527	Quadrat - TRH065
<i>Aerva javanica</i>		670696	7653373	Quadrat - WD25
<i>Aerva javanica</i>		675294	7655120	Quadrat - TRH064
<i>Aerva javanica</i>		672995	7654086	Quadrat - WD23
<i>Aerva javanica</i>		669634	7653542	Quadrat - WD31
<i>Aerva javanica</i>	1	676311	7655678	Quadrat - WDK16
<i>Aerva javanica</i>	100	676217	7659883	Quadrat - WDK19
<i>Aerva javanica</i>	5	676514	7654940	Quadrat - WDM05
<i>Aerva javanica</i>	3	676294	7654736	Quadrat - WDM06
<i>Aerva javanica</i>	100	675792	7657191	Opportunistic
<i>Aerva javanica</i>	20	675963	7657288	Opportunistic
<i>Aerva javanica</i>	20	676208	7657284	Opportunistic
<i>Aerva javanica</i>	150	676316	7657230	Opportunistic
<i>Aerva javanica</i>	2	676333	7654755	Opportunistic
<i>Aerva javanica</i>	1	673904	7659300	Opportunistic



Taxon	Count	Easting	Northing	Comments
<i>Aerva javanica</i>	150	675101	7658576	Opportunistic
<i>Aerva javanica</i>	75	675459	7654851	Opportunistic
<i>Aerva javanica</i>	70	676478	7654852	Opportunistic
<i>Aerva javanica</i>	50	675381	7655048	Opportunistic
<i>Aerva javanica</i>	10	676561	7654905	Opportunistic
<i>Aerva javanica</i>	10	676494	7657758	Opportunistic
<i>Aerva javanica</i>	50	676489	7654801	Opportunistic
<i>Aerva javanica</i>	200	675923	7654797	Opportunistic
<i>Calotropis procera</i>	1	674890	7656552	Opportunistic
<i>Calotropis procera</i>	2	674581	7655450	Opportunistic
<i>Calotropis procera</i>	1	674874	7656607	Opportunistic
<i>Cenchrus ciliaris</i>	2	674043	7652926	Quadrat - WD90
<i>Cenchrus ciliaris</i>	4	677015	7661962	Quadrat - WD12
<i>Cenchrus ciliaris</i>	8	675818	7660958	Opportunistic
<i>Cenchrus ciliaris</i>	8	675087	7656669	Quadrat - WD54
<i>Cenchrus ciliaris</i>	10	674085	7656603	Opportunistic
<i>Cenchrus ciliaris</i>	10	676820	7661630	Opportunistic
<i>Cenchrus ciliaris</i>	10	676807	7661526	Quadrat - WD16
<i>Cenchrus ciliaris</i>	15	676980	7661374	Opportunistic
<i>Cenchrus ciliaris</i>	30	676522	7661016	Quadrat - WD28
<i>Cenchrus ciliaris</i>	30	675312	7654780	Quadrat - WD82
<i>Cenchrus ciliaris</i>	50	676666	7661650	Opportunistic
<i>Cenchrus ciliaris</i>	50	675063	7659884	Opportunistic
<i>Cenchrus ciliaris</i>	100	676814	7661742	Opportunistic
<i>Cenchrus ciliaris</i>	100	675104	7656173	Opportunistic
<i>Cenchrus ciliaris</i>	100	674956	7657989	Opportunistic
<i>Cenchrus ciliaris</i>	100	674875	7657477	Opportunistic
<i>Cenchrus ciliaris</i>	100	674483	7658392	Opportunistic
<i>Cenchrus ciliaris</i>	100	674687	7657498	Opportunistic
<i>Cenchrus ciliaris</i>	100	674477	7658584	Opportunistic
<i>Cenchrus ciliaris</i>	100	674103	7656645	Opportunistic
<i>Cenchrus ciliaris</i>	200	674979	7657976	Opportunistic
<i>Cenchrus ciliaris</i>	200	674706	7657488	Opportunistic
<i>Cenchrus ciliaris</i>	200	674229	7658670	Opportunistic
<i>Cenchrus ciliaris</i>	500	674124	7656311	Opportunistic
<i>Cenchrus ciliaris</i>	1000	675028	7657932	Opportunistic
<i>Cenchrus ciliaris</i>	1000	675003	7659951	Opportunistic
<i>Cenchrus ciliaris</i>	1000	675016	7656233	Opportunistic
<i>Cenchrus ciliaris</i>	1000	674734	7653978	Quadrat - WD64
<i>Cenchrus ciliaris</i>	5000	674930	7656374	Opportunistic
<i>Cenchrus ciliaris</i>	10000	675140	7658288	Opportunistic
<i>Cenchrus ciliaris</i>	10000	675150	7655490	Opportunistic
<i>Cenchrus ciliaris</i>	10000	675170	7658193	Opportunistic
<i>Cenchrus ciliaris</i>	10000	675035	7659915	Opportunistic
<i>Cenchrus ciliaris</i>	10000	674798	7659543	Opportunistic
<i>Cenchrus ciliaris</i>	10000	674784	7657481	Opportunistic
<i>Cenchrus ciliaris</i>	10000	674787	7658750	Opportunistic
<i>Cenchrus ciliaris</i>	10000	674594	7658868	Opportunistic
<i>Cenchrus ciliaris</i>	10000	674698	7658810	Opportunistic
<i>Cenchrus ciliaris</i>	10000	674405	7658892	Opportunistic
<i>Cenchrus ciliaris</i>	10000	674218	7658307	Opportunistic



Taxon	Count	Easting	Northing	Comments
<i>Cenchrus ciliaris</i>	10000	674266	7657046	Opportunistic
<i>Cenchrus ciliaris</i>		676348	7663040	Quadrat - WD65
<i>Cenchrus ciliaris</i>		675678	7661814	Quadrat - WD73
<i>Cenchrus ciliaris</i>		674802	7662311	Quadrat - WD91
<i>Cenchrus ciliaris</i>		675294	7655120	Quadrat - TRH064
<i>Cenchrus ciliaris</i>		675159	7655527	Quadrat - TRH065
<i>Cenchrus ciliaris</i>		673796	7653684	Quadrat - TRH058
<i>Cenchrus ciliaris</i>		671224	7654427	Quadrat - WDM25
<i>Cenchrus ciliaris</i>	3000	676294	7654736	Quadrat - WDM06
<i>Cenchrus ciliaris</i>	200	676514	7654940	Quadrat - WDM05
<i>Cenchrus ciliaris</i>		676532	7658901	Quadrat - WDM12
<i>Cenchrus ciliaris</i>	1	676217	7659883	Quadrat - WDK19
<i>Cenchrus ciliaris</i>	20	675882	7654558	Opportunistic
<i>Cenchrus ciliaris</i>	1000	676333	7654755	Opportunistic
<i>Cenchrus ciliaris</i>	1000	675415	7654950	Opportunistic
<i>Cenchrus ciliaris</i>	1	676574	7654956	Opportunistic
<i>Cenchrus ciliaris</i>	1000	676718	7654958	Opportunistic
<i>Cenchrus ciliaris</i>	50	673936	7659306	Opportunistic
<i>Cenchrus ciliaris</i>	2000	673904	7659300	Opportunistic
<i>Cenchrus ciliaris</i>	2000	673619	7659273	Opportunistic
<i>Cenchrus ciliaris</i>	100	673864	7659445	Opportunistic
<i>Cenchrus ciliaris</i>	250	676204	7654663	Opportunistic
<i>Cenchrus ciliaris</i>	1500	676136	7654698	Opportunistic
<i>Cenchrus ciliaris</i>	600	675101	7658576	Opportunistic
<i>Cenchrus ciliaris</i>	70	676139	7653848	Opportunistic
<i>Cenchrus ciliaris</i>	60	676017	7653843	Opportunistic
<i>Cenchrus ciliaris</i>	150	675460	7654056	Opportunistic
<i>Cenchrus ciliaris</i>	200	675514	7654152	Opportunistic
<i>Cenchrus ciliaris</i>	60	675586	7654257	Opportunistic
<i>Cenchrus ciliaris</i>	60	675594	7654351	Opportunistic
<i>Cenchrus ciliaris</i>	250	675624	7654449	Opportunistic
<i>Cenchrus ciliaris</i>	150	675928	7654653	Opportunistic
<i>Cenchrus ciliaris</i>	500	675816	7654651	Opportunistic
<i>Cenchrus ciliaris</i>	100	675685	7654646	Opportunistic
<i>Cenchrus ciliaris</i>	700	675459	7654851	Opportunistic
<i>Cenchrus ciliaris</i>	30	676401	7654851	Opportunistic
<i>Cenchrus ciliaris</i>	500	676478	7654852	Opportunistic
<i>Cenchrus ciliaris</i>	300	675381	7655048	Opportunistic
<i>Cenchrus ciliaris</i>	1000	675567	7654207	Opportunistic
<i>Cenchrus ciliaris</i>	100	676415	7654697	Opportunistic
<i>Cenchrus ciliaris</i>	200	676320	7654701	Opportunistic
<i>Cenchrus ciliaris</i>	1000	676225	7654702	Opportunistic
<i>Cenchrus ciliaris</i>	1000	676120	7654703	Opportunistic
<i>Cenchrus ciliaris</i>	1000	675942	7654694	Opportunistic
<i>Cenchrus ciliaris</i>	1000	675439	7654905	Opportunistic
<i>Cenchrus ciliaris</i>	100	676494	7654902	Opportunistic
<i>Cenchrus ciliaris</i>	2000	676621	7654906	Opportunistic
<i>Cenchrus ciliaris</i>	2000	676739	7654907	Opportunistic
<i>Cenchrus ciliaris</i>	100	675614	7654603	Opportunistic
<i>Cenchrus ciliaris</i>	5000	676489	7654801	Opportunistic
<i>Cenchrus ciliaris</i>	3000	675923	7654797	Opportunistic

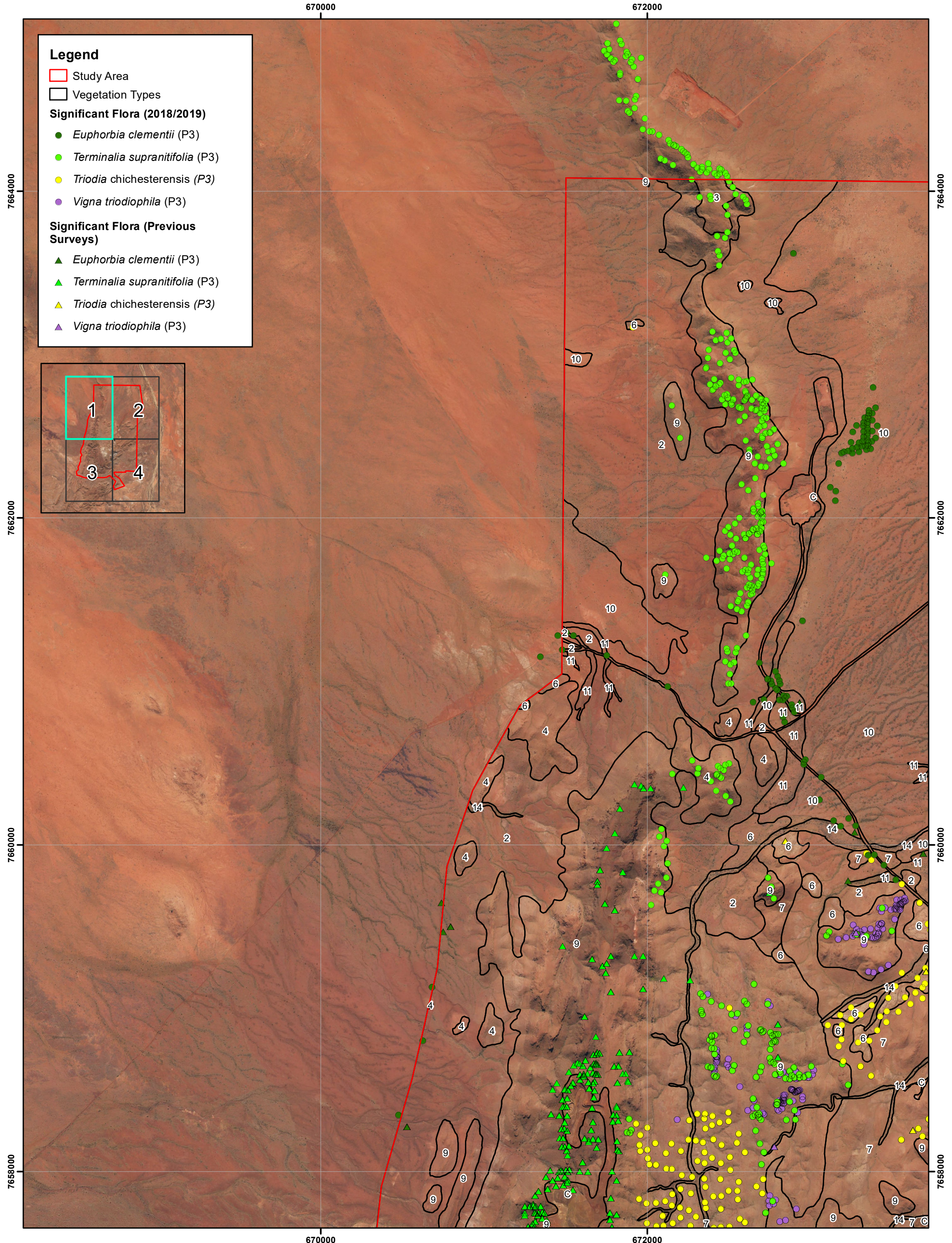


Taxon	Count	Easting	Northing	Comments
<i>Cenchrus ciliaris</i>	5000	675521	7654788	Opportunistic
<i>Cenchrus ciliaris</i>	300	676694	7655004	Opportunistic
<i>Cenchrus ciliaris</i>	1000	673928	7659258	Opportunistic
<i>Cenchrus setiger</i>	5	675003	7659951	Opportunistic
<i>Cenchrus setiger</i>	5	676522	7661016	Quadrat - WD28
<i>Cenchrus setiger</i>	20	674864	7659830	Opportunistic
<i>Cenchrus setiger</i>	70	674908	7659892	Opportunistic
<i>Cenchrus setiger</i>	100	674086	7656674	Opportunistic
<i>Cenchrus setiger</i>	200	676368	7660934	Opportunistic
<i>Cenchrus setiger</i>	1000	675150	7655490	Opportunistic
<i>Cenchrus setiger</i>	1000	675035	7659915	Opportunistic
<i>Cenchrus setiger</i>	5000	675000	7654036	Opportunistic
<i>Cenchrus setiger</i>		675294	7655120	Quadrat - TRH064
<i>Cenchrus setiger</i>		675159	7655527	Quadrat - TRH065
<i>Cenchrus setiger</i>		675678	7661814	Quadrat - WD73
<i>Cenchrus setiger</i>		676294	7654736	Quadrat - WDM06
<i>Cenchrus setiger</i>	500	675621	7654547	Opportunistic
<i>Cenchrus setiger</i>	1000	676333	7654755	Opportunistic
<i>Cenchrus setiger</i>	1000	675415	7654950	Opportunistic
<i>Cenchrus setiger</i>	10	676017	7653843	Opportunistic
<i>Cenchrus setiger</i>	200	675460	7654056	Opportunistic
<i>Cenchrus setiger</i>	100	675514	7654152	Opportunistic
<i>Cenchrus setiger</i>	40	675586	7654257	Opportunistic
<i>Cenchrus setiger</i>	30	675594	7654351	Opportunistic
<i>Cenchrus setiger</i>	50	675624	7654449	Opportunistic
<i>Cenchrus setiger</i>	250	675928	7654653	Opportunistic
<i>Cenchrus setiger</i>	1000	675816	7654651	Opportunistic
<i>Cenchrus setiger</i>	2000	675685	7654646	Opportunistic
<i>Cenchrus setiger</i>	500	675459	7654851	Opportunistic
<i>Cenchrus setiger</i>	150	675381	7655048	Opportunistic
<i>Cenchrus setiger</i>	10	675614	7654603	Opportunistic
<i>Chloris barbata</i>	5	674103	7656645	Opportunistic
<i>Cynodon dactylon</i>	10	674276	7657086	Opportunistic
<i>Flaveria trinervia</i>	20	674276	7657086	Opportunistic
<i>Flaveria trinervia</i>		672173	7656268	Quadrat - WD11
<i>Flaveria trinervia</i>		671224	7654427	Quadrat - WDM25
<i>Passiflora foetida</i> var. <i>hispida</i>	1	674086	7656674	Opportunistic
<i>Passiflora foetida</i> var. <i>hispida</i>	1	674124	7656311	Opportunistic
<i>Passiflora foetida</i> var. <i>hispida</i>	5	674162	7656441	Quadrat - WD36

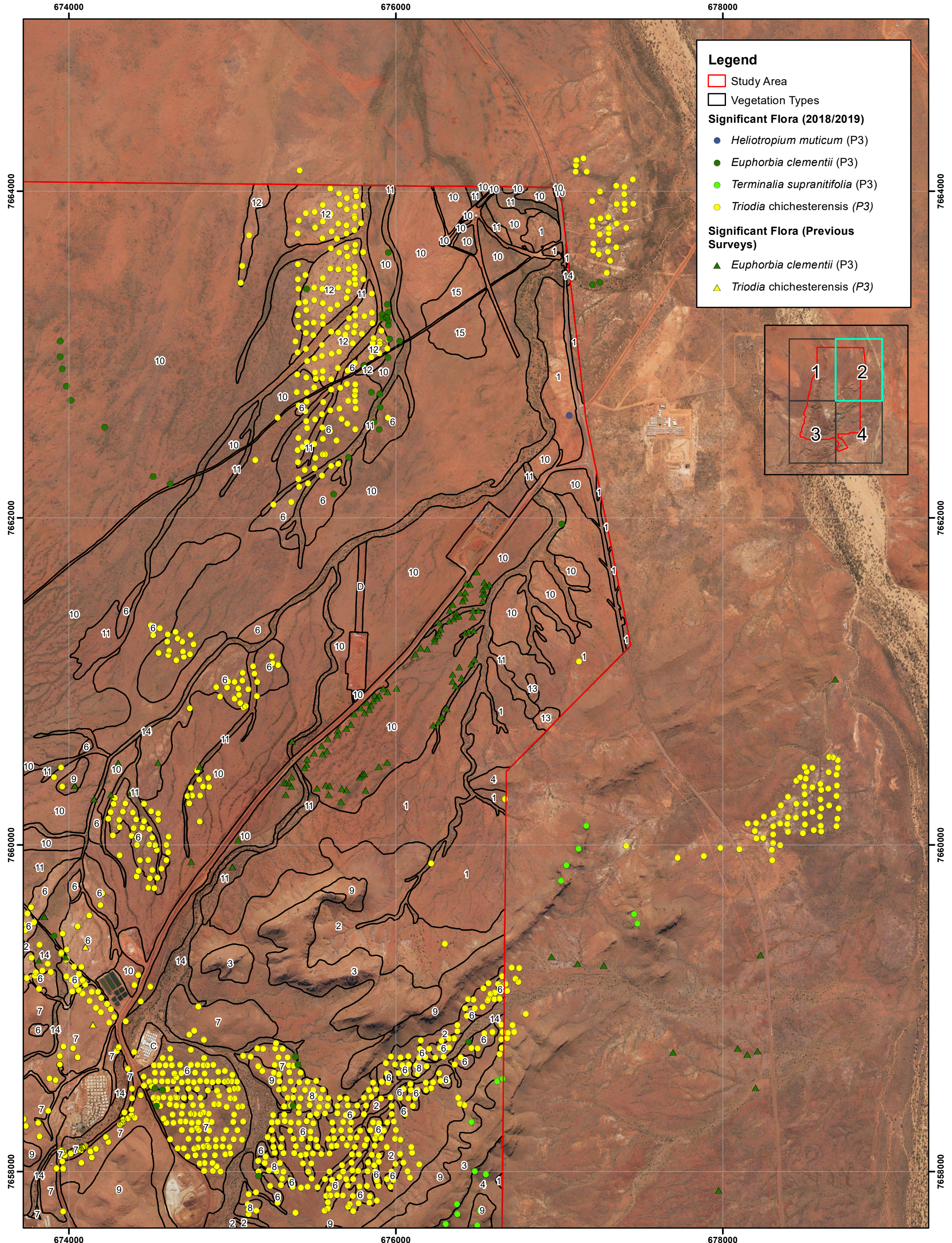


## Appendix H: Significant Flora Locations

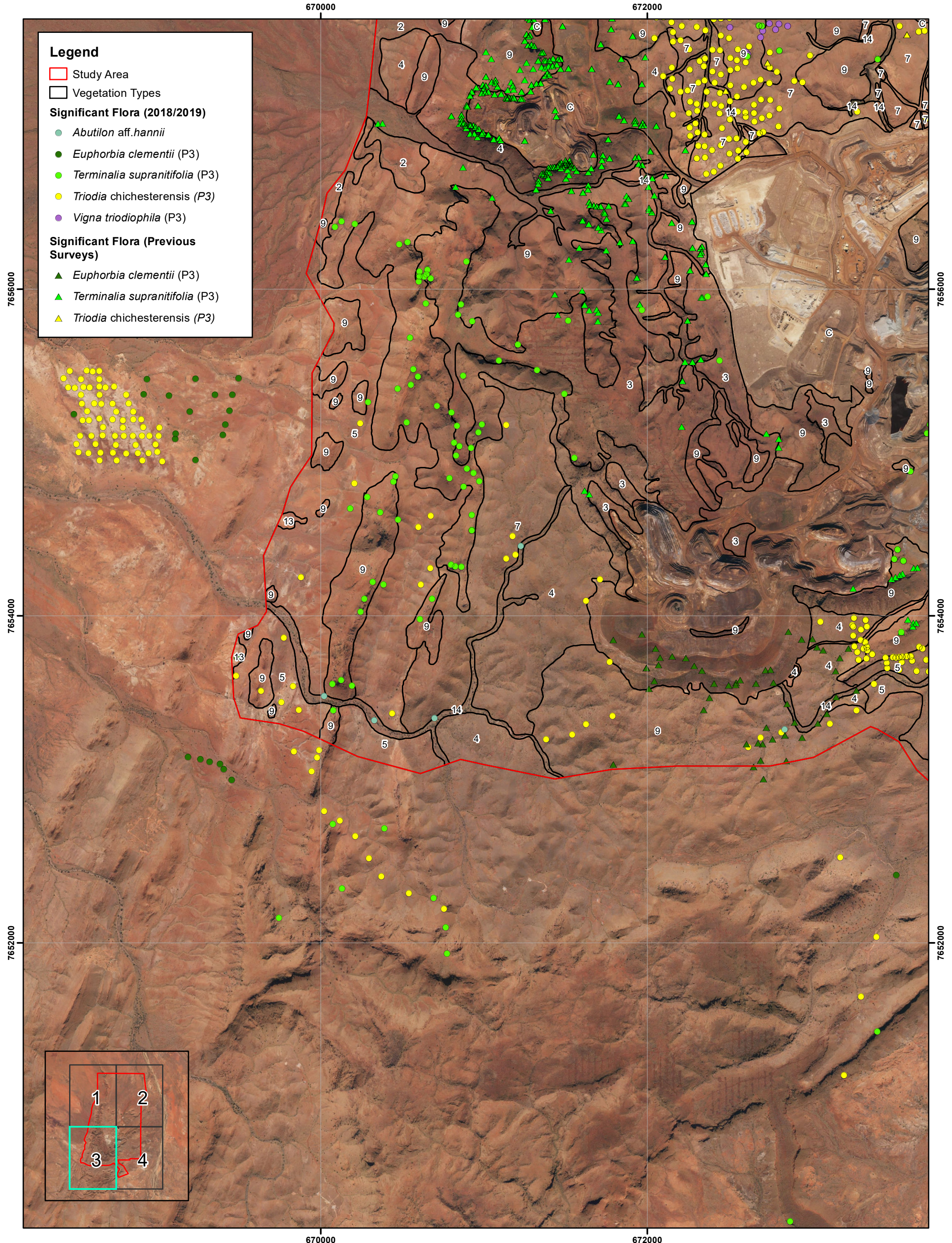












**Legend**

Study Area

Vegetation Types

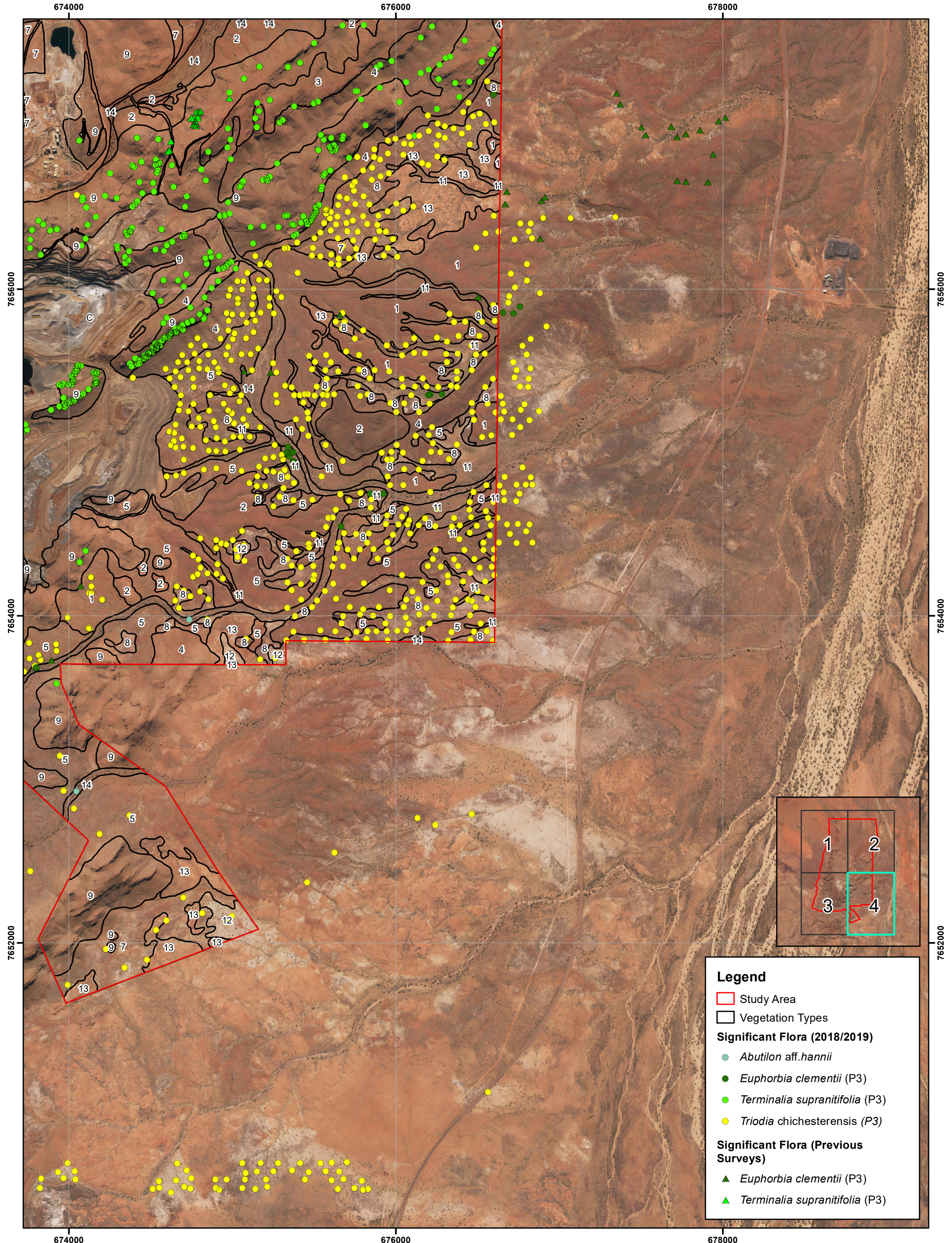
**Significant Flora (2018/2019)**

- Abutilon aff.hannii
- Euphorbia clementii (P3)
- Terminalia supranitifolia (P3)
- Triodia chichesterensis (P3)
- Vigna triodiophila (P3)

**Significant Flora (Previous Surveys)**

- Euphorbia clementii (P3)
- Terminalia supranitifolia (P3)
- Triodia chichesterensis (P3)





**Legend**

Study Area

Vegetation Types

**Significant Flora (2018/2019)**

- *Abutilon* aff. *hannii*
- *Euphorbia clementii* (P3)
- *Terminalia supranitifolia* (P3)
- *Triodia chichesterensis* (P3)

**Significant Flora (Previous Surveys)**

- ▲ *Euphorbia clementii* (P3)
- ▲ *Terminalia supranitifolia* (P3)



This map should only be used in conjunction with WEC report MRL19-19-04.



**Significant Flora Locations**

Revision: 0 - 4 Apr 2020

Scale: 1:20,000 (A3)

Author: David Coultas

WEC Ref: MRL19-19-04

Filename: MRL19-19-04-App-H.mxd

Projection: GDA 1994 MGA Zone 50

**Appendix**

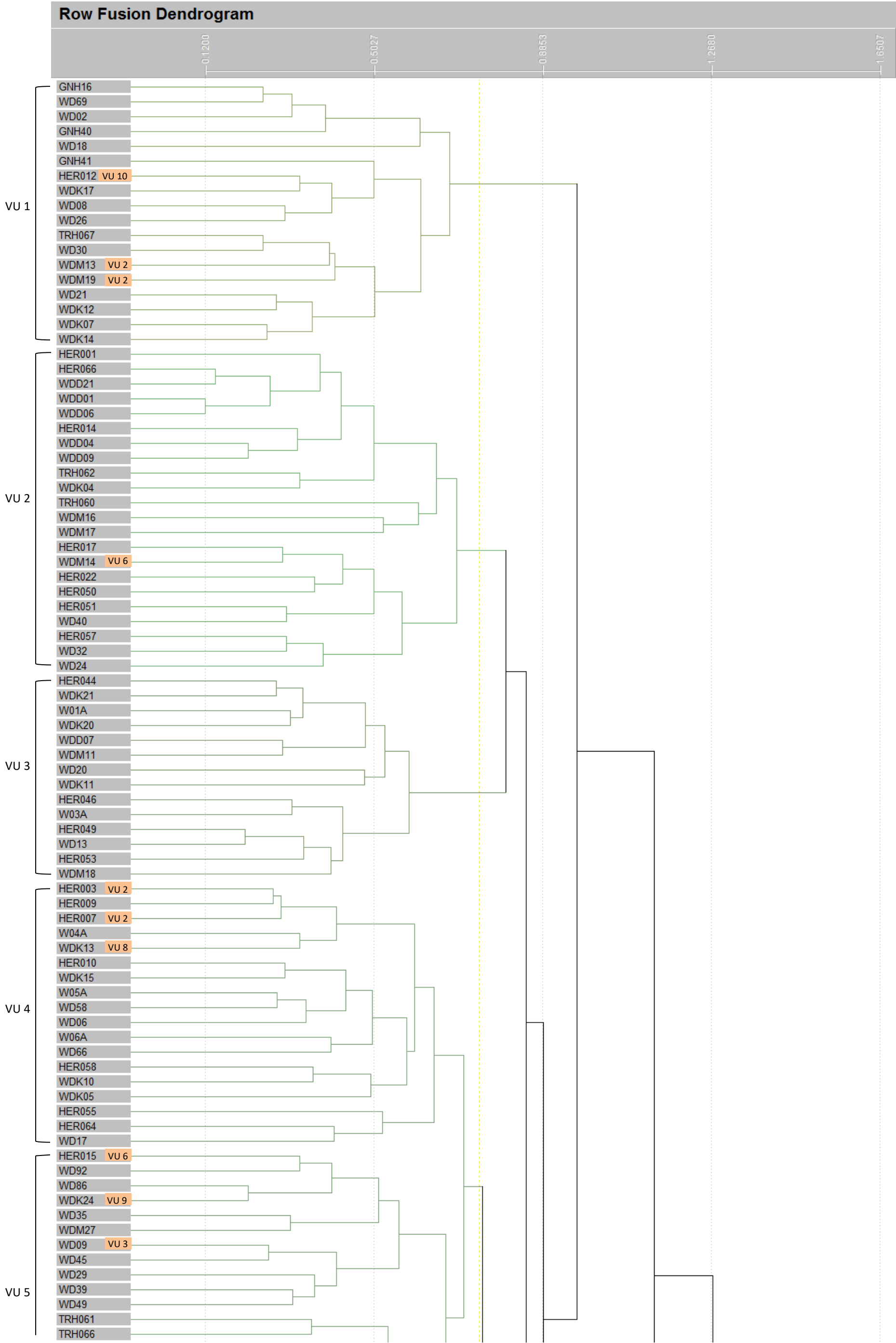
**H4**



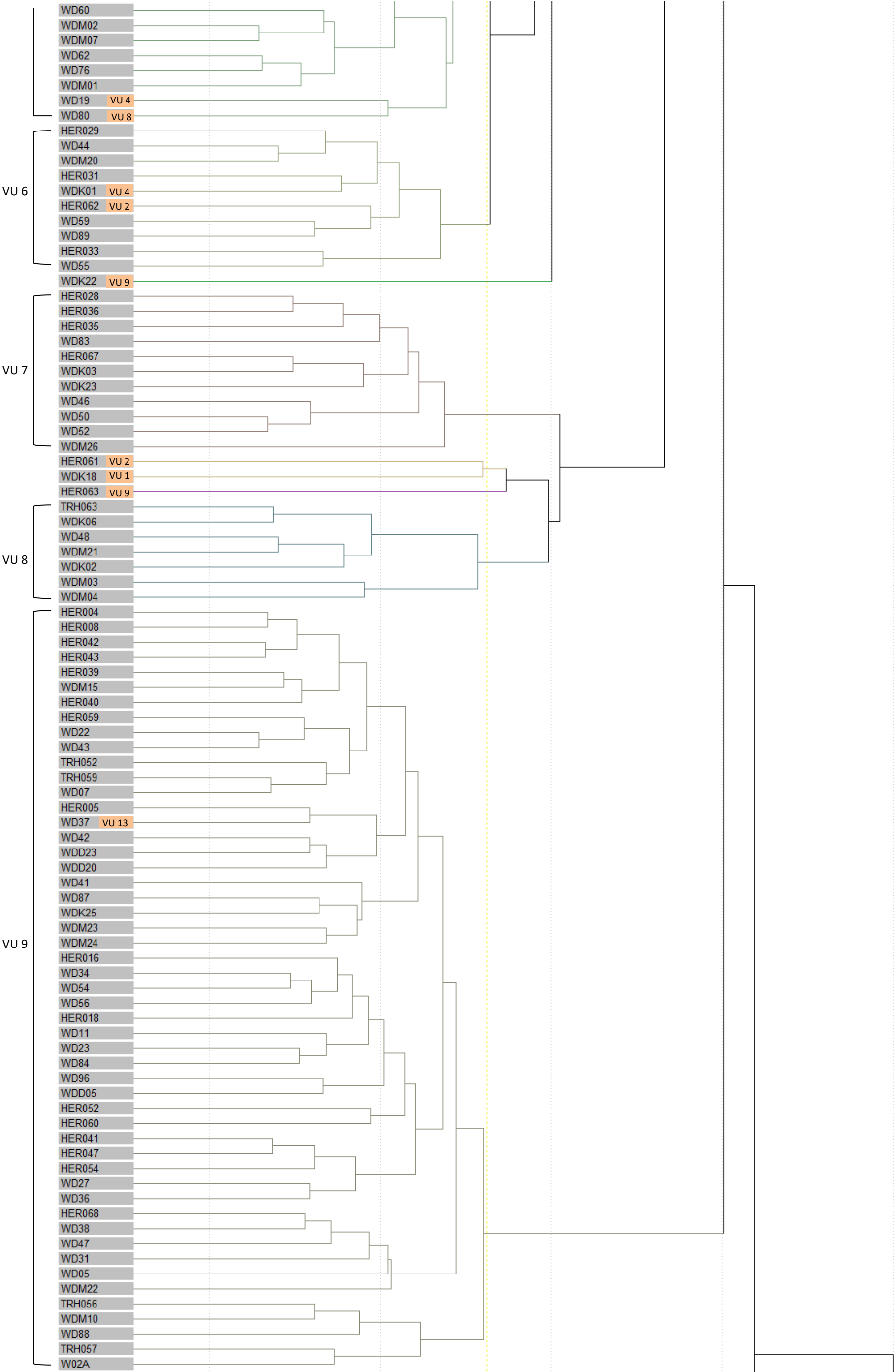
## **Appendix I: Classification Analysis Dendrogram of Quadrats Established in the Study Area**

Note: Original dendrogram groupings are indicated by different coloured clusters  
Quadrats shaded with orange have been manually reallocated to the VU as described

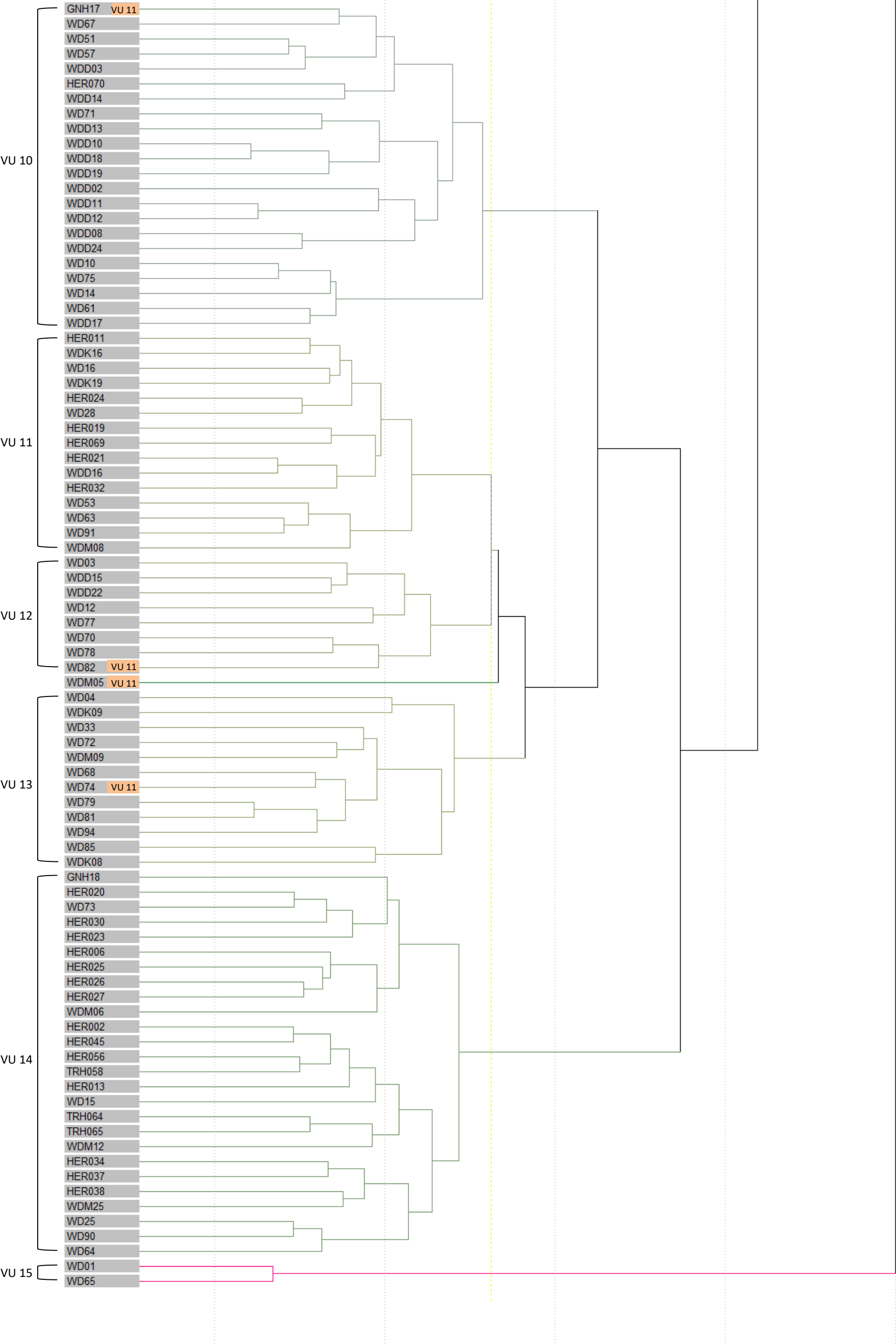














## Appendix J: Results of Indicator Species Analysis of Vegetation Units

Note: -Shading denotes highest indicator values per taxon;  
-Indicator values are shown only for taxa which were significant at  $P < 0.05$  (\* =  $p < 0.05$ ; \*\* =  $p < 0.01$ ; \*\*\* =  $p < 0.001$ )



Taxon	Vegetation Unit														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Triodia lanigera</i> ***	28	1	0	0	3	1	0	0	0	23	8	0	5	0	0
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> **	0	0	23	3	0	0	0	0	2	0	0	0	1	0	0
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)*	0	0	25	5	1	0	0	0	1	0	6	0	5	0	0
<i>Triumfetta maconochieana</i> *	0	0	16	8	0	0	0	0	9	0	0	0	1	1	0
<i>Senna glutinosa</i> subsp. <i>glutinosa</i> *	0	0	0	18	2	0	0	0	11	0	0	4	1	4	0
<i>Acacia spondylophylla</i> **	0	0	0	0	19	0	0	1	0	0	2	0	8	0	0
<i>Cassytha capillaris</i> *	0	0	1	2	1	17	0	5	1	0	10	3	0	1	0
<i>Boerhavia gardneri</i> *	0	0	0	1	1	7	22	0	5	0	0	1	0	2	0
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i> *	0	1	0	1	0	1	16	0	2	0	1	0	1	0	0
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)*	0	0	1	1	14	0	23	0	1	0	0	3	0	0	0
<i>Cymbopogon ambiguus</i> ***	0	0	3	1	0	0	0	0	31	0	0	0	1	28	0
<i>Cyperus hesperius</i> ***	0	0	6	3	0	0	0	0	28	0	0	0	6	1	0
<i>Euphorbia careyi</i> ***	0	0	4	5	0	0	4	0	26	0	0	0	4	11	0
<i>Solanum horridum</i> *	0	0	2	0	0	0	3	0	17	0	0	0	1	3	0
<i>Triumfetta propinqua</i> **	0	1	1	2	0	0	0	0	27	0	0	0	0	13	0
<i>Tribulus suberosus</i> *	0	3	0	8	1	1	0	0	22	0	1	0	0	1	0
<i>Acacia ancistrocarpa</i> *	3	3	0	1	0	0	0	0	0	24	13	6	0	2	0
<i>Bonamia erecta</i> ***	2	0	0	0	0	0	0	0	0	41	23	1	0	1	0
<i>Corymbia zygophylla</i> *	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0
<i>Triodia schinzii</i> **	0	0	0	0	0	0	0	0	0	36	0	0	0	0	0
<i>Acacia tumida</i> var. <i>pilbarensis</i> *	0	3	7	0	0	0	0	0	0	6	20	1	6	19	0
<i>Aristida holathera</i> var. <i>holathera</i> **	0	0	0	0	0	0	0	0	0	1	35	0	8	0	0
<i>Chrysopogon fallax</i> *	0	0	0	0	0	0	0	0	0	1	32	11	0	9	0
<i>Eragrostis eriopoda</i> *	0	0	0	0	0	0	0	0	0	10	18	2	0	0	0
<i>Isotropis atropurpurea</i> **	0	0	0	0	0	0	0	0	0	0	48	0	3	0	0
<i>Paraneurachne muelleri</i> **	0	0	0	0	0	0	0	0	0	0	21	8	0	2	0
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)*	0	0	0	0	0	1	0	0	0	6	16	11	0	0	0
<i>Acacia bivenosa</i> **	0	0	0	0	0	0	0	11	0	2	3	46	0	1	0
<i>Codonocarpus cotinifolius</i> **	3	0	0	0	7	0	0	1	0	0	1	51	0	0	0
<i>Heliotropium chrysocarpum</i> *	0	0	0	0	0	0	0	3	0	0	0	33	0	0	0
<i>Acacia maitlandii</i> ***	0	0	0	0	0	0	0	0	0	0	0	0	43	0	0



Taxon	Vegetation Unit														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Acacia orthocarpa</i> **	8	1	0	0	5	0	4	1	0	0	1	3	33	0	0
<i>Bonamia alatisemina</i> *	0	2	0	0	0	0	0	0	0	7	12	0	16	0	0
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i> *	0	0	0	1	0	0	0	0	0	0	0	0	19	0	0
<i>Fimbristylis dichotoma</i> **	0	0	0	0	0	0	0	1	0	0	0	0	52	0	13
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i> *	0	0	0	0	0	0	0	0	0	0	14	13	23	6	0
<i>Scaevola browniana</i> subsp. <i>browniana</i> ***	1	0	0	0	0	0	0	0	0	0	0	0	44	0	0
<i>Tripogonella loliiformis</i> ***	0	0	0	0	0	0	0	0	0	0	0	0	42	0	0
<i>Abutilon</i> aff. <i>hannii</i> *	0	0	0	0	0	0	0	0	0	0	0	0	0	23	0
<i>Acacia coriacea</i> subsp. <i>pendens</i> *	0	0	0	0	0	0	0	0	0	0	0	0	0	27	0
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i> ***	0	0	0	0	0	0	0	0	0	2	10	0	0	43	0
<i>Acacia trachycarpa</i> *	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0
<i>Boerhavia schomburgkiana</i> **	0	0	0	0	0	0	0	0	0	0	4	0	0	26	0
<i>Cajanus pubescens</i> ***	0	0	0	0	0	0	1	0	0	0	8	0	0	61	0
<i>Eucalyptus victrix</i> **	0	0	0	0	0	0	0	0	0	0	0	0	0	58	0
<i>Jasminum didymum</i> subsp. <i>lineare</i> *	0	0	0	0	0	0	0	0	6	0	6	2	0	20	0
<i>Melaleuca linophylla</i> **	0	0	0	0	0	0	0	0	0	0	0	0	0	46	0
<i>Phyllanthus maderaspatensis</i> ***	0	0	0	0	0	1	0	0	0	0	1	0	0	66	0
<i>Polymeria ambigua</i> *	0	0	0	0	0	0	0	0	0	0	21	5	0	24	0
<i>Pterocaulon sphacelatum</i> **	0	0	0	0	0	0	0	0	0	0	4	0	6	25	0
<i>Rhynchosia minima</i> *	0	0	0	0	0	0	4	0	3	0	1	1	2	30	0
<i>Stemodia grossa</i> **	0	0	1	0	0	1	0	0	0	0	0	0	1	23	0
<i>Tephrosia rosea</i> var. <i>clementii</i> ***	0	0	0	0	0	0	0	0	0	0	6	0	1	60	0
<i>Themeda triandra</i> **	0	0	0	0	0	0	0	0	0	0	1	0	0	27	0
<i>Acacia synchronica</i> ***	0	0	0	0	0	0	0	0	0	0	0	0	0	0	94
<i>Maireana</i> sp.***	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
<i>Sida fibulifera</i> *	0	0	0	0	0	0	0	0	0	0	0	3	0	2	33
<i>Triodia longiceps</i> ***	0	0	0	0	0	0	0	0	0	0	0	0	0	1	90



## **Appendix K: Raw Quadrat Data Recorded within the Study Area**



Site Name: GNH16  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 09/05/2013  
 GPS Location: GDA94 Zone 50 676993E 7663677N  
 Landform Type: Other, Undulating Plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: S  
 Soil Type: Sandy Loam  
 Soil Colour: Red  
 Rock Outcrop: Quartz (other), <2% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Limited Clearing, Track in south east corner of quadrat (other)  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia ancistrocarpa*

Lower Stratum 1: *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	2	0.5
<i>Acacia orthocarpa</i>	2	0.2
<i>Acacia stellaticeps</i>	0.6	0.2
<i>Acacia tumida</i> var. <i>pilbarensis</i>	0.6	0.1
<i>Bonamia erecta</i>	0.3	0.2
<i>Bonamia</i> aff. <i>pilbarensis</i>	0.1	0.1
<i>Cynodon prostratus</i>	0.1	0.1
<i>Eriachne obtusa</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia trigonosperma</i>	0.2	0.1
<i>Goodenia microptera</i>	0.3	0.1
<i>Goodenia stobbsiana</i>	0.5	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Trianthema triquetrum</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.4	0.2
<i>Triodia lanigera</i>	0.3	35
<i>Yakirra australiensis</i>	0.1	0.1



**PHOTO**





Site Name: GNH17  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 09/05/2013  
 GPS Location: GDA94 Zone 50 676972E 7663859N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: SE  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: <2%  
 CF Sizes: 2-6mm  
 CF Types: Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia ancistrocarpa*, *Acacia tumida* var. *pilbarensis*  
 Lower Stratum 1: *Triodia epactia*, *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	2	20
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3	30
<i>Bonamia erecta</i>	0.4	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Chrysopogon fallax</i>	0.6	0.3
<i>Corymbia hamersleyana</i>	6	2
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.3	0.1
<i>Hybanthus aurantiacus</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.6	0.1
<i>Isotropis atropurpurea</i>	0.5	0.1
<i>Paraneurachne muelleri</i>	0.3	0.1
<i>Polygala</i> aff. <i>saccopetala</i>	0.1	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.5	25
<i>Triodia lanigera</i>	0.4	5



**PHOTO**





Site Name: GNH18  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 10/05/2013  
 GPS Location: GDA94 Zone 50 677002E 7663577N  
 Landform Type: Other, Edge of Drainage Line (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: E  
 Soil Type: Light Clay  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 2-10%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - G - Good  
 Disturbance: Grazing, Exotic Weeds  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*, *Eucalyptus victrix*  
 Mid Stratum 1: *Acacia trachycarpa*  
 Lower Stratum 1: *\*Cenchrus ciliaris*, *Dichanthium fecundum*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa x arida</i>	3	0.3
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	1.5	0.2
<i>Acacia trachycarpa</i>	3	6
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2	0.1
<i>*Aerva javanica</i>	0.6	0.1
<i>Amaranthus undulatus</i>	0.1	0.1
<i>Boerhavia coccinea</i>	0.1	0.1
<i>Boerhavia repleta</i>	0.1	0.1
<i>Bonamia erecta</i>	0.3	0.1
<i>Cajanus cinereus</i>	1.2	0.1
<i>*Cenchrus ciliaris</i>	0.6	30
<i>Chrysopogon fallax</i>	0.7	0.2
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus ?incanus</i> subsp. <i>incanus</i>	0.2	0.1
<i>Corymbia hamersleyana</i>	6	1.5
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	0.5	0.1
<i>Dichanthium fecundum</i>	1	2
<i>Enneapogon caeruleus</i>	0.2	0.1
<i>Eragrostis cumingii</i>	0.2	0.1
<i>Eucalyptus victrix</i>	8	0.5
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia trigonosperma</i>	0.2	0.1
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	0.3	0.1
<i>Goodenia muelleriana</i>	0.3	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Heliotropium cunninghamii</i>	0.2	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.2	0.1
<i>Hybanthus aurantiacus</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.6	0.2
<i>Paspalidium rarum</i>	0.2	0.1
<i>Polymeria ambigua</i>		0.1
<i>Portulaca oleracea</i>	0.1	0.1



<i>Pterocaulon sphacelatum</i>	0.2	0.1
<i>Ptilotus fusiformis</i>	0.3	0.1
<i>Rhynchosia minima</i>		0.1
<i>Senna notabilis</i>	0.2	0.1
<i>Sida fibulifera</i>	0.2	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>	0.1	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	1	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.7	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.5	15
<i>Triumfetta propinqua</i>	0.2	0.1
<i>Waltheria indica</i>	0.4	0.1

**PHOTO**



Site Name: GNH40  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 09/05/2013  
 GPS Location: WGS84 Zone 50 677399E 7661270N  
 Landform Type: Plain  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: E  
 Soil Type: Loamy sand (other)  
 Soil Colour: Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: >5

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Acacia orthocarpa*  
 Mid Stratum 1: *Acacia stellaticeps*  
 Lower Stratum 1: *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa x arida</i>	2	0.1
<i>Acacia arida</i>	1.1	0.1
<i>Acacia orthocarpa</i>	2.2	3
<i>Acacia sphaerostachya</i>	1.1	0.1
<i>Acacia stellaticeps</i>	0.9	1
<i>Boerhavia coccinea</i>	0.1	0.1
<i>Bonamia erecta</i>	0.3	0.1
<i>Fimbristylis dichotoma</i>	0.2	0.1
<i>Goodenia microptera</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.2	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)		
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.3	0.1
<i>Triodia epactia</i>	0.5	0.5
<i>Triodia lanigera</i>	0.5	80
<i>Zornia albiflora</i>	0.1	0.1



**PHOTO**





Site Name: GNH41  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 09/05/2013  
 GPS Location: WGS84 Zone 50 676906E 7663792N  
 Landform Type: Plain  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: N  
 Soil Type: Loamy sand (other)  
 Soil Colour: Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Historical earth works (other)  
 Fire: >3

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Acacia ancistrocarpa*, *Acacia orthocarpa*  
 Mid Stratum 1: *Acacia stellaticeps*  
 Lower Stratum 1: *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	1.5	1
<i>Acacia inaequilatera</i>	0.6	0.1
<i>Acacia orthocarpa</i>	1.4	0.5
<i>Acacia sphaerostachya</i>	0.3	0.1
<i>Acacia stellaticeps</i>	0.5	2
<i>Bonamia pilbarensis</i>	0.2	0.1
<i>Codonocarpus cotinifolius</i>	1.2	0.1
<i>Corchorus ?incanus</i> subsp. <i>incanus</i>	0.4	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Portulaca oleracea</i>		0.1
<i>Ptilotus astrolasius</i>	0.3	0.2
<i>Ptilotus calostachyus</i>	0.4	0.1
<i>Scaevola browniana</i> subsp. <i>browniana</i>	0.3	0.1
<i>Senna symonii</i>	0.3	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Triodia lanigera</i>	0.3	60



**PHOTO**





Site Name: HER001  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 17/05/2011  
 GPS Location: WGS84 Zone 50 671709E 7660900N  
 Landform Type: Plain, Outwash from range (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: N  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Acacia inaequilatera*, *Acacia tumida* var. *pilbarensis*, *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 1: *Acacia acradenia*, *Acacia ancistrocarpa*, *Grevillea pyramidalis* subsp. *leucadendron*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	5
<i>Acacia ancistrocarpa</i>	2	0.5
<i>Acacia inaequilatera</i>	4	1.5
<i>Acacia tumida</i> var. <i>pilbarensis</i>	4	3
<i>Bonamia alatisemina</i>	0.1	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Cleome viscosa</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.3
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	0.4	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3.5	0.2
<i>Heliotropium cunninghamii</i>	0.1	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Paspalidium clementii</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.1	0.1
<i>Ptilotus nobilis</i>	0.1	0.1
<i>Senna notabilis</i>	0.3	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.1	0.1
<i>Triodia epactia</i>	0.3	50



**PHOTO**





Site Name: HER002  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 17/05/2011  
 GPS Location: GDA94 Zone 50 670934E 7660217N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: W  
 Soil Type: Loam (other)  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite, Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia tumida* var. *pilbarensis*, *Cajanus cinereus*  
 Mid Stratum 2: *Cajanus* ?*cinereus* 4m 10%  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia tumida</i> var. <i>pilbarensis</i>	4	2
* <i>Aerva javanica</i>	0.2	0.1
<i>Amaranthus undulatus</i>	0.4	0.1
<i>Ammannia baccifera</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cajanus cinereus</i>	2	10
<i>Cleome viscosa</i>	0.1	0.1
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	0.5	0.3
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Corymbia hamersleyana</i>	10	1
<i>Cymbopogon ambiguus</i>	0.7	0.1
<i>Enneapogon caeruleus</i>	0.3	0.1
<i>Eragrostis cumingii</i>	0.4	0.1
<i>Eragrostis tenellula</i>	0.4	0.1
<i>Euphorbia trigonosperma</i>	0.2	0.1
<i>Gossypium australe</i>	0.6	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.1	0.1
<i>Hybanthus aurantiacus</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.5	0.1
<i>Notoleptopus decaisnei</i>	0.2	0.1
<i>Operculina aequisejala</i>	0.1	0.1
<i>Paspalidium clementii</i>	0.2	0.1
<i>Paspalidium tabulatum</i>	0.3	0.1
<i>Phyllanthus maderaspatensis</i>	0.4	0.1
<i>Polymeria ambigua</i>	0.1	0.1
<i>Pterocaulon sphacelatum</i>	0.1	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.6	0.3
<i>Solanum phlomoides</i>	0.3	0.1
<i>Striga curviflora</i>	0.1	0.1
<i>Tephrosia virens</i>	0.6	0.1
<i>Themeda triandra</i>	1	5



<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	0.4	0.1
<i>Triodia epactia</i>	0.4	10
<i>Triumfetta propinqua</i>	0.3	0.1

**PHOTO**



Site Name: HER003  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 17/05/2011  
 GPS Location: GDA94 Zone 50 670795E 7659499N  
 Landform Type: Plain  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: W  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 3+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia inaequilatera*, *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 2: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1	0.1
<i>Acacia inaequilatera</i>	3	0.4
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Cyperus hesperius</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia clementii</i> (P3)	0.3	0.1
<i>Fimbristylis simulans</i>	0.1	0.2
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.4	0.1
<i>Triodia epactia</i>	0.3	60



**PHOTO**





Site Name: HER004  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 12/05/2011  
 GPS Location: GDA94 Zone 50 671616E 7658947N  
 Landform Type: Crest  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: W  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: Ironstone, >50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, >2000mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 3+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Terminalia supranitifolia*  
 Lower Stratum 1: *Indigofera monophylla*, *Triumfetta maconochieana*  
 Lower Stratum 2: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.4	0.1
<i>Amaranthus undulatus</i>	0.3	0.1
<i>Boerhavia coccinea</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.5	0.1
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	0.6	0.1
<i>Cymbopogon ambiguus</i>	0.5	0.2
<i>Cyperus hesperius</i>	0.1	0.1
<i>Dampiera candicans</i>	0.5	0.1
<i>Eriachne mucronata</i>	0.3	0.2
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.2	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.3	0.2
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	0.5	0.1
<i>Indigofera monophylla</i>	0.5	1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Paspalidium tabulatum</i>	0.2	0.1
<i>Phyllanthus maderaspatisensis</i>	0.4	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.2	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.4	0.1
<i>Ptilotus incanus</i>	0.2	0.1
<i>Senna symonii</i>	0.3	0.1
<i>Solanum horridum</i>	0.3	0.1
<i>Streptoglossa decurrens</i>	0.1	0.1
<i>Striga curviflora</i>	0.1	0.1
<i>Terminalia supranitifolia</i> (P3)	2	0.5
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.3	0.1
<i>Tribulus suberosus</i>	0.3	0.1
<i>Trichosanthes cucumerina</i> var. <i>cucumerina</i>	0.1	0.1



<i>Triodia epactia</i>	0.5	3
<i>Triodia wiseana</i>	0.3	20
<i>Triumfetta maconochieana</i>	1	1
<i>Triumfetta propinqua</i>	0.3	0.1

**PHOTO**



Site Name: HER005  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 11/06/2011  
 GPS Location: WGS84 Zone 50 672155E 7659177N  
 Landform Type: Mid Slope  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: SE  
 Soil Type: Sandy Loam  
 Soil Colour: Brown (other)  
 Rock Outcrop: Granite, >50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Ptilotus auriculifolius*  
 Lower Stratum 2: *Triodia brizoides*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.6	0.5
<i>Aristida holathera</i> var. <i>holathera</i>	0.6	0.1
<i>Boerhavia gardneri</i>		0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.4	0.1
<i>Corchorus parviflorus</i>	0.7	0.1
<i>Cymbopogon ambiguus</i>	0.3	0.1
<i>Dampiera candidans</i>	0.5	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.2	0.1
<i>Eriachne ciliata</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	0.4	0.1
<i>Fimbristylis elegans</i>	0.2	0.1
<i>Fimbristylis simulans</i>	0.2	0.1
<i>Gomphrena cunninghamii</i>	0.2	0.1
<i>Gossypium australe</i>	1.2	0.1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	0.8	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.8	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.5	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Paspalidium clementii</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.6	0.4
<i>Ptilotus calostachyus</i>	1	0.1
<i>Senna notabilis</i>	0.3	0.1
<i>Solanum horridum</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Tephrosia virens</i>	1.3	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Tribulus suberosus</i>	1	0.1



<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia brizoides</i>	0.5	20
<i>Triodia wiseana</i>	0.1	0.1
<i>Triumfetta propinqua</i>	0.3	0.1
<i>Yakirra australiensis</i>	0.1	0.1

**PHOTO**



Site Name: HER006  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 11/06/2011  
 GPS Location: WGS84 Zone 50 672286E 7659675N  
 Landform Type: Drainage Line  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: NNW  
 Soil Type: Sandy Loam  
 Soil Colour: Brown  
 Rock Outcrop: Granite, <2% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite, River stones, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Eucalyptus victrix*  
 Mid Stratum 1: *Acacia acradenia*, *Acacia pyrifolia* var. *pyrifolia*, *Acacia tumida* var. *pilbarensis*  
 Lower Stratum 1: *Cyperus vaginatus*  
 Lower Stratum 2: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2.8	0.3
<i>Acacia coriacea</i> subsp. <i>pendens</i>	2.5	0.1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	2.5	0.5
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3	0.2
* <i>Aerva javanica</i>	1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cajanus cinereus</i>	1	0.1
<i>Cassytha filiformis</i>		0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	0.4	0.1
<i>Cucumis variabilis</i>	0.1	0.1
<i>Cymbopogon ambiguus</i>	0.6	0.2
<i>Cyperus vaginatus</i>	1.1	10
<i>Eriachne benthamii</i>	0.3	0.1
<i>Eucalyptus victrix</i>	9	6
* <i>Flaveria trinervia</i>	0.3	0.1
<i>Gossypium australe</i>	1.6	0.1
<i>Indigofera monophylla</i>	0.1	0.1
<i>Indigofera trita</i>	0.1	0.1
<i>Melaleuca linophylla</i>	2	0.1
<i>Operculina aequisejala</i>		0.1
<i>Phyllanthus maderaspatensis</i>	0.3	0.1
<i>Pluchea ferdinandi-muelleri</i>	0.6	0.1
<i>Rhynchosia minima</i>	0.1	0.1
<i>Sesbania cannabina</i>	0.4	0.2
<i>Stemodia grossa</i>	0.5	0.1
<i>Swainsona formosa</i>	0.4	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	1	0.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.3	0.1
<i>Triodia epactia</i>	0.7	3
<i>Triodia wiseana</i>	0.5	0.1



**PHOTO**





Site Name: HER007  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 12/06/2011  
 GPS Location: WGS84 Zone 50 672241E 7660146N  
 Landform Type: Simple Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: E  
 Soil Type: Sandy Loam  
 Soil Colour: Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: 2 test pits (other)  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Acacia inaequilatera*  
 Mid Stratum 1: *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 2: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.8	8
<i>Acacia inaequilatera</i>	3.5	0.2
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Cucumis variabilis</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	0.6	0.1
<i>Fimbristylis simulans</i>	0.3	0.1
<i>Goodenia stobbsiana</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	0.2
<i>Indigofera monophylla</i>	0.5	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.4	0.1
<i>Senna notabilis</i>	0.2	0.1
<i>Solanum phlomoides</i>	0.1	0.1
<i>Tephrosia clementii</i>	0.2	0.1
<i>Triodia epactia</i>	0.6	75
<i>Triumfetta propinqua</i>	0.3	0.1



**PHOTO**





Site Name: HER008  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 12/05/2011  
 GPS Location: GDA94 Zone 50 671975E 7660345N  
 Landform Type: Ridge  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: E  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: Ironstone, >50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, >2000mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Mine exploration nearby (other)  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 1: *Acacia acradenia*, *Terminalia supranitifolia*  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.5	1.5
<i>Amaranthus undulatus</i>	0.1	0.1
<i>Bonamia pilbarensis</i>		0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cassytha capillaris</i>		0.1
<i>Cleome viscosa</i>	0.4	0.1
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	0.7	0.1
<i>Cucumis variabilis</i>	0.1	0.1
<i>Cymbopogon ambiguus</i>	0.4	0.1
<i>Cyperus hesperius</i>	0.1	0.1
<i>Dampiera candicans</i>	0.2	0.1
<i>Eriachne mucronata</i>	0.2	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Paspalidium tabulatum</i>	0.3	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.2	0.1
<i>Ptilotus incanus</i>	0.2	0.1
<i>Solanum horridum</i>	0.2	0.1
<i>Terminalia supranitifolia</i> (P3)	1.5	0.5
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.1	0.1
<i>Tribulus suberosus</i>	0.2	0.1
<i>Triodia epactia</i>	0.5	30
<i>Triodia wiseana</i>	0.4	30
<i>Triumfetta maconochieana</i>	0.3	0.1
<i>Triumfetta propinqua</i>	0.2	0.1



**PHOTO**





Site Name: HER009  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 12/06/2011  
 GPS Location: WGS84 Zone 50 672340E 7660420N  
 Landform Type: Mid Slope  
 Slope Class: Very Steep (37 degrees)  
 Aspect: SW  
 Soil Type: Sandy Loam  
 Soil Colour: Brown (other)  
 Rock Outcrop: Granite, <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia inaequilatera*, *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 2: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.8	0.2
<i>Acacia inaequilatera</i>	2.5	0.1
<i>Amaranthus undulatus</i>	0.6	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	1	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Dampiera candidans</i>	0.4	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	0.1
<i>Indigofera monophylla</i>	0.5	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Ptilotus fusiformis</i>	0.3	0.1
<i>Solanum phlomoides</i>	0.4	0.1
<i>Tribulus suberosus</i>	0.5	0.1
<i>Triodia epactia</i>	0.5	90
<i>Triumfetta maconochieana</i>	0.1	0.1
<i>Triumfetta propinqua</i>	0.1	0.1



**PHOTO**





Site Name: HER010  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 12/06/2011  
 GPS Location: WGS84 Zone 50 672462E 7660582N  
 Landform Type: Mid Slope  
 Slope Class: Very Steep (37 degrees)  
 Aspect: N  
 Soil Type: Sand  
 Soil Colour: Brown  
 Rock Outcrop: Granite, 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 3 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Corchorus parviflorus*  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.5	0.1
<i>Acacia ancistrocarpa</i>	1.3	0.1
<i>Acacia inaequilatera</i>	0.3	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.5	0.2
<i>Dampiera candidans</i>	0.4	0.1
<i>Eriachne mucronata</i>	0.2	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	0.8	0.1
<i>Hibiscus coatesii</i>	0.4	0.1
<i>Indigofera monophylla</i>	0.2	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.2	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.7	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.3	0.1
<i>Solanum phlomoides</i>	0.5	0.1
<i>Tribulus suberosus</i>	0.5	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.3	30
<i>Triodia wiseana</i>	0.4	3



**PHOTO**





Site Name: HER011  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 12/06/2011  
 GPS Location: WGS84 Zone 50 672932E 7660870N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: N  
 Soil Type: Sandy Loam  
 Soil Colour: Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: <2%  
 CF Sizes: 2-6mm, 6-20mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia ancistrocarpa*  
 Lower Stratum 1: *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	2.2	25
<i>Acacia inaequilatera</i>	0.5	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2.5	0.2
<i>Aristida holathera</i> var. <i>holathera</i>	0.4	0.1
<i>Bonamia alatisemina</i>		0.1
<i>Bonamia erecta</i>	0.6	0.2
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Cassytha filiformis</i>	0.1	0.1
<i>Chrysopogon fallax</i>	0.7	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.2	0.1
<i>Cleome viscosa</i>	0.3	0.1
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	1.8	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Corymbia hamersleyana</i>	5	1
<i>Cucumis variabilis</i>		0.1
<i>Cullen martinii</i>	0.2	0.1
<i>Dampiera candidans</i>	0.2	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eragrostis cumingii</i>	0.2	0.1
<i>Eragrostis eriopoda</i>	0.2	0.1
<i>Eriachne mucronata</i>	0.5	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.2	0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia clementii</i> (P3)	0.3	0.1
<i>Euphorbia trigonosperma</i>	0.4	0.1
<i>Fimbristylis simulans</i>	0.3	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
? <i>Goodenia stobbsiana</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1	0.1
<i>Haloragis gossei</i> var. <i>gossei</i>	0.3	0.1
<i>Heliotropium pachyphyllum</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Isotropis atropurpurea</i>	0.4	0.1



<i>Paraneurachne muelleri</i>	0.3	0.2
<i>Paspalidium clementii</i>	0.2	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
? <i>Polymeria ambigua</i>		0.1
<i>Pterocaulon sphacelatum</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Ptilotus axillaris</i>		0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Ptilotus fusiformis</i>	0.4	0.1
<i>Senna notabilis</i>	0.3	0.1
<i>Senna symonii</i>	0.1	0.1
<i>Sida arenicola</i>	1.7	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.7	0.1
<i>Solanum diversiflorum</i>	0.4	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.2	0.1
<i>Tinospora smilacina</i>		0.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.2	0.1
<i>Trianthema pilosum</i>	0.2	0.1
<i>Tribulus hirsutus</i>		0.1
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	0.5	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.4	0.3
<i>Triodia lanigera</i>	0.6	60
<i>Triumfetta johnstonii</i>	0.3	0.1
<i>Triumfetta propinqua</i>	0.2	0.1
<i>Yakirra australiensis</i>	0.2	0.1



**PHOTO**





Site Name: HER012  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 12/06/2011  
 GPS Location: WGS84 Zone 50 673283E 7660715N  
 Landform Type: Simple Slope  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: SE  
 Soil Type: Sandy Loam  
 Soil Colour: Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 2-3 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Goodenia stobbsiana*  
 Lower Stratum 1: *Triodia epactia*, *Triodia lanigera*  
 Lower Stratum 2: *Eriachne pulchella* subsp. *dominii*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	1.7	0.1
<i>Acacia stellaticeps</i>	0.4	0.1
<i>Bonamia erecta</i>	0.3	0.1
<i>Bonamia pilbarensis</i>		0.1
<i>Corchorus parviflorus</i>	0.4	0.1
<i>Dampiera candidans</i>	0.3	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.2	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.2	0.2
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.5	0.2
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.6	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Polycarpaea corymbosa</i>	0.2	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	1.2	0.1
<i>Tephrosia clementii</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.2	0.1
<i>Triodia epactia</i>	0.3	1
<i>Triodia lanigera</i>	0.2	20



**PHOTO**





Site Name: HER013  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 11/06/2011  
 GPS Location: WGS84 Zone 50 673272E 7660020N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: E  
 Soil Type: Sandy Loam  
 Soil Colour: Brown  
 Rock Outcrop: Granite, <2% bedrock exposed  
 CF Abundance: 10-20%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - G - Good  
 Disturbance: Grazing, Cattle (other)  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Acacia tumida* var. *pilbarensis*  
 Mid Stratum 1: *Acacia pyrifolia* var. *pyrifolia*  
 Lower Stratum 1: *Triodia epactia*  
 Lower Stratum 2: \**Cenchrus ciliaris*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	3	3
<i>Acacia tumida</i> var. <i>pilbarensis</i>	5	7
* <i>Aerva javanica</i>	0.2	0.1
<i>Amaranthus undulatus</i>	0.2	0.1
<i>Atalaya hemiglauc</i>	4	0.1
<i>Boerhavia coccinea</i>		0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cajanus cinereus</i>	0.2	0.1
* <i>Cenchrus ciliaris</i>	0.6	4
<i>Cleome viscosa</i>	0.5	0.1
<i>Corchorus parviflorus</i>	0.4	0.1
<i>Corchorus tridens</i>	0.1	0.1
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	0.5	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Enneapogon lindleyanus</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.2	0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>		0.1
<i>Euphorbia careyi</i>		0.1
<i>Euphorbia trigonosperma</i>	0.2	0.1
<i>Gomphrena cunninghamii</i>	0.2	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Gossypium australe</i>	1.3	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.7	0.1
<i>Hybanthus aurantiacus</i>	0.1	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Ipomoea muelleri</i>		0.1
<i>Melhania oblongifolia</i>	0.2	0.1
<i>Nicotiana ?rosulata</i>	0.3	0.1
<i>Notoleptopus decaisnei</i>	0.2	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1



<i>Phyllanthus maderaspatensis</i>	0.5	0.1
<i>Polycarpaea corymbosa</i>	0.2	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polycarpaea longiflora</i>	0.2	0.1
<i>Portulaca oleracea</i>		0.1
<i>Pterocaulon sphacelatum</i>	0.2	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus auriculifolius</i>	0.4	0.1
<i>Ptilotus fusiformis</i>	0.3	0.1
<i>Salsola australis</i>	0.5	0.1
<i>Scaevola spinescens</i>	1.1	0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>hemslsii</i>	1.2	0.1
<i>Sesbania cannabina</i>	0.5	0.1
<i>Solanum diversiflorum</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Sporobolus australasicus</i>	0.2	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.6	0.1
<i>Trianthema pilosum</i>	0.1	0.1
<i>Trianthema triquetrum</i>	0.1	0.1
<i>Tribulus suberosus</i>	0.4	0.1
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	0.2	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.6	3
<i>Triumfetta propinqua</i>	0.1	0.1

**PHOTO**



Site Name: HER014  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 11/06/2011  
 GPS Location: WGS84 Zone 50 673056E 7659923N  
 Landform Type: Simple Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: E  
 Soil Type: Sandy Loam  
 Soil Colour: Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Acacia inaequilatera*  
 Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Triodia brizoides*, *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	0.8
<i>Acacia inaequilatera</i>	3.5	0.4
<i>Bonamia pilbarensis</i>		0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.6	0.1
<i>Dampiera candidans</i>	0.7	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.2	0.1
<i>Goodenia stobbsiana</i>	0.4	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>	0.1	0.1
<i>Tephrosia clementii</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia brizoides</i>	20	0.3
<i>Triodia epactia</i>	0.4	10



**PHOTO**





Site Name: HER015  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 11/06/2011  
 GPS Location: WGS84 Zone 50 672845E 7660022N  
 Landform Type: Lower Slope  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: N  
 Soil Type: Sandy Loam  
 Soil Colour: Brown  
 Rock Outcrop: Decayed Granite, Quartz, Calcrete (other), 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite, Quartz, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Acacia inaequilatera*  
 Lower Stratum 1: *Triodia scintillans*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1	0.1
<i>Acacia inaequilatera</i>	3	0.2
<i>Boerhavia gardneri</i>		0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Dysphania plantaginella</i>	0.1	0.1
<i>Enneapogon lindleyanus</i>	0.3	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.4	0.1
<i>Heliotropium cunninghamii</i>	0.1	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.6	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Triodia scintillans</i>	0.3	95
<i>Triodia wiseana</i>	0.4	0.1



**PHOTO**





Site Name: HER016  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 11/06/2011  
 GPS Location: WGS84 Zone 50 672745E 7659704N  
 Landform Type: Upper Slope  
 Slope Class: Precipitous (60 degrees)  
 Aspect: S  
 Soil Type: Sandy Loam  
 Soil Colour: Brown  
 Rock Outcrop: Granite, >50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Grevillea pyramidalis* subsp. *leucadendron*  
 Lower Stratum 1: *Triodia wiseana*  
 Lower Stratum 2: *Gomphrena cunninghamii*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	0.5	0.1
<i>Amaranthus undulatus</i>	0.6	0.1
<i>Aristida burbridgeae</i>	0.5	0.1
<i>Boerhavia gardneri</i>		0.1
<i>Bulbostylis barbata</i>	0.2	0.1
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.1	0.1
<i>Cleome viscosa</i>	0.5	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	1	0.1
<i>Cyperus hesperius</i>	0.2	0.1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.2	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.2	0.5
<i>Gossypium australe</i>	1.1	0.1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	3	0.4
<i>Indigofera monophylla</i>	0.6	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1.2	0.1
<i>Nicotiana benthamiana</i>	0.2	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Peripleura virgata</i>	0.3	0.1
<i>Polycarpaea longiflora</i>	0.2	0.1
<i>Ptilotus auriculifolius</i>	0.4	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.6	0.1
<i>Terminalia supranitifolia</i> (P3)	2	0.2
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.1	0.1
<i>Triodia wiseana</i>	0.7	30
<i>Triumfetta propinqua</i>	0.2	0.1



**PHOTO**





Site Name: HER017  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 11/06/2011  
 GPS Location: WGS84 Zone 50 672573E 7659518N  
 Landform Type: Mid Slope  
 Slope Class: Steep (23 degrees)  
 Aspect: N  
 Soil Type: Sandy Loam  
 Soil Colour: Brown  
 Rock Outcrop: Granite, >50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*, *Acacia inaequilatera*  
 Lower Stratum 1: *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	0.5
<i>Acacia ancistrocarpa</i>	1.6	0.1
<i>Acacia inaequilatera</i>	2	0.1
<i>Boerhavia gardneri</i>		0.2
<i>Bonamia pilbarensis</i>		0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.4	0.1
<i>Indigofera monophylla</i>	0.5	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.2	0.1
<i>Triodia epactia</i>	0.7	0.2
<i>Triodia wiseana</i>	0.7	25



**PHOTO**





Site Name: HER018  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 11/06/2011  
 GPS Location: WGS84 Zone 50 673277E 7659461N  
 Landform Type: Upper Slope  
 Slope Class: Precipitous (60 degrees)  
 Aspect: S  
 Soil Type: Sandy Loam  
 Soil Colour: Brown (other)  
 Rock Outcrop: Granite, >50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Hakea lorea* subsp. *lorea*  
 Lower Stratum 1: *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> sp. <i>Dioicum</i> (A.A. Mitchell PRP 1618)	0.3	0.1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	1.7	0.1
<i>Amaranthus undulatus</i>	0.6	0.1
<i>Boerhavia gardneri</i>		0.1
<i>Bulbostylis barbata</i>	0.2	0.1
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.1	0.1
<i>Cleome viscosa</i>	0.5	0.1
<i>Corchorus parviflorus</i>	0.2	0.1
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	0.8	0.1
<i>Enneapogon lindleyanus</i>	0.2	0.1
<i>Eriachne mucronata</i>	0.4	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Euphorbia trigonosperma</i>	0.2	0.1
<i>Gomphrena cunninghamii</i>	0.2	0.1
<i>Gossypium australe</i>	1	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	1.8	0.1
<i>Hibiscus coatesii</i>	0.4	0.1
<i>Indigofera monophylla</i>	0.5	0.1
<i>Indigofera trita</i>	0.2	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1.5	0.1
<i>Nicotiana benthamiana</i>	0.3	0.1
<i>Notoleptopus decaisnei</i>	0.3	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Paspalidium tabulatum</i>	0.2	0.1
<i>Phyllanthus maderaspatensis</i>	0.2	0.1
<i>Ptilotus auriculifolius</i>	0.5	0.1
<i>Rhynchosia minima</i>		0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.5	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Stemodia grossa</i>	0.3	0.1
<i>Terminalia supranitifolia</i> (P3)		
<i>Tinospora smilacina</i>		0.1
<i>Tribulus suberosus</i>	0.6	0.1
<i>Triodia wiseana</i>	0.7	25



<i>Triumfetta propinqua</i>	0.3	0.1
<i>Vigna triodiophila</i> (P3)		0.1

**PHOTO**



Site Name: HER019  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 10/06/2011  
 GPS Location: WGS84 Zone 50 673765E 7660486N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: NE  
 Soil Type: Sand  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 0%  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 3+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia tumida* var. *pilbarensis*  
 Mid Stratum 2: *Corchorus parviflorus*  
 Lower Stratum 1: *Bonamia erecta*  
 Lower Stratum 2: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	0.7	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3	10
<i>Amaranthus undulatus</i>	0.9	0.1
<i>Aristida holathera</i> var. <i>holathera</i>	0.5	0.1
<i>Boerhavia coccinea</i>		0.1
<i>Bonamia erecta</i>	0.6	1
<i>Chrysopogon fallax</i>	1	0.2
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.4	0.1
<i>Cleome viscosa</i>	0.6	0.1
<i>Corchorus parviflorus</i>	1.2	2
<i>Corymbia hamersleyana</i>	4	0.4
<i>Eragrostis eriopoda</i>	0.3	0.1
<i>Euphorbia clementii</i> (P3)	0.3	0.1
<i>Euphorbia trigonosperma</i>	0.4	0.1
<i>Fimbristylis simulans</i>	0.2	0.1
<i>Gossypium australe</i>	1.2	0.1
<i>Heliotropium skeleton</i>	0.5	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.5	0.1
<i>Hybanthus aurantiacus</i>	0.4	0.1
<i>Indigofera monophylla</i>	0.6	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1.2	0.1
<i>Paraneurachne muelleri</i>	0.5	0.2
<i>Ptilotus astrolasius</i>	0.6	0.1
<i>Ptilotus axillaris</i>		0.1
<i>Ptilotus fusiformis</i>	0.4	0.1
<i>Senna notabilis</i>	0.2	0.1
<i>Senna symonii</i>	0.2	0.1
<i>Sida arenicola</i>	2	0.5
<i>Solanum phlomoides</i>	0.3	0.1
<i>Sporobolus australasicus</i>	0.2	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.3	0.1
<i>Tinospora smilacina</i>		0.1
<i>Trianthema pilosum</i>	0.3	0.1



<i>Triodia epactia</i>	0.5	1
<i>Yakirra australiensis</i>	0.2	0.1

**PHOTO**



Site Name: HER020  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 12/06/2011  
 GPS Location: WGS84 Zone 50 674153E 7660278N  
 Landform Type: Drainage Line  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: N  
 Soil Type: Sandy Loam  
 Soil Colour: Brown (other)  
 Rock Outcrop: Calcrete (other), 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Riverstones (other)  
 Vegetation Condition: Northern Vegetation Condition - G - Good  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia tumida* var. *pilbarensis*  
 Mid Stratum 2: *Acacia pyrifolia* var. *pyrifolia*, *Acacia trachycarpa*  
 Lower Stratum 1: \**Cenchrus ciliaris*  
 Lower Stratum 2: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	0.1
<i>Acacia ancistrocarpa</i>	1.3	0.1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	2.5	2
<i>Acacia trachycarpa</i>	3	1
<i>Acacia trachycarpa</i> x <i>tumida</i> var. <i>pilbarensis</i>	4	0.2
<i>Acacia tumida</i> var. <i>pilbarensis</i>	4	15
<i>Amaranthus undulatus</i>	0.1	0.1
<i>Cajanus cinereus</i>	0.5	0.1
* <i>Cenchrus ciliaris</i>	0.7	8
<i>Chrysopogon fallax</i>	1	0.1
<i>Cleome viscosa</i>	0.5	0.1
<i>Corchorus parviflorus</i>	0.4	0.1
<i>Corymbia hamersleyana</i>	5	2
<i>Cymbopogon ambiguus</i>	0.7	0.1
<i>Eriachne benthamii</i>	0.5	0.1
<i>Eucalyptus victrix</i>	4	0.1
<i>Euphorbia clementii</i> (P3)	0.3	
<i>Gossypium australe</i>	0.4	0.1
<i>Hybanthus aurantiacus</i>	0.3	0.1
<i>Indigofera monophylla</i>	1	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1.2	0.1
<i>Melaleuca linophylla</i>	1.3	0.1
<i>Notoleptopus decaisnei</i>	0.2	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Paraneurachne muelleri</i>	0.6	0.2
<i>Phyllanthus maderaspatensis</i>	0.3	0.1
<i>Ptilotus axillaris</i>	0.1	0.1
<i>Rhynchosia minima</i>	0.1	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.8	0.1
<i>Sida clementii</i>	0.9	0.1
<i>Solanum phlomoides</i>	0.4	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	1	0.1



<i>Themeda triandra</i>	0.7	0.1
<i>Triodia epactia</i>	0.9	12
<i>Triodia wiseana</i>	0.2	0.1
<i>Triumfetta propinqua</i>	0.7	0.1
<i>Waltheria indica</i>	0.4	0.1

**PHOTO**



Site Name: HER021  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 14/06/2011  
 GPS Location: WGS84 Zone 50 674798E 7660480N  
 Landform Type: Drainage Line  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: NE  
 Soil Type: Sandy Loam  
 Soil Colour: Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: <2%  
 CF Sizes: 2-6mm, 6-20mm  
 CF Types: Granite, Stone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia tumida* var. *pilbarensis*  
 Mid Stratum 2: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> sp. Pilbara (W.R. Barker 2025)	0.9	0.1
<i>Acacia acradenia</i>	1.8	15
<i>Acacia ancistrocarpa</i>	2.5	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3	30
<i>Bonamia alatisemina</i>	0.1	0.1
<i>Bonamia erecta</i>	0.3	0.1
<i>Cassytha filiformis</i>	0.1	0.1
<i>Chrysopogon fallax</i>	1	0.2
<i>Cleome viscosa</i>	0.6	0.1
<i>Corchorus parviflorus</i>	0.4	0.1
<i>Corymbia hamersleyana</i>	4	0.5
<i>Cucumis variabilis</i>	0.1	0.1
<i>Dampiera candicans</i>	0.2	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.4	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia clementii</i> (P3)	0.3	0.1
<i>Euphorbia trigonosperma</i>	0.4	0.1
<i>Fimbristylis simulans</i>	0.2	0.1
<i>Goodenia forrestii</i>	0.3	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	0.2
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.4	0.1
<i>Hybanthus aurantiacus</i>	0.4	0.1
<i>Indigofera monophylla</i>	0.5	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1.5	0.1
<i>Polymeria ambigua</i>	0.1	0.1
? <i>Polymeria ambigua</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.2	0.1
<i>Ptilotus axillaris</i>	0.1	0.1
<i>Ptilotus fusiformis</i>	0.4	0.1
<i>Rhynchosia minima</i>	0.1	0.1



<i>Senna notabilis</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.3	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.2	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Tinospora smilacina</i>	0.1	0.1
<i>Triodia epactia</i>	0.5	30
<i>Triumfetta johnstonii</i>	0.3	0.1
<i>Yakirra australiensis</i>	0.1	0.1

**PHOTO**



Site Name: HER022  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 14/06/2011  
 GPS Location: WGS84 Zone 50 674964E 7660409N  
 Landform Type: Simple Slope  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: N  
 Soil Type: Sandy Loam  
 Soil Colour: Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*, *Triodia lanigera*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.7	2
<i>Acacia inaequilatera</i>	1.5	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2.8	0.2
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.2	0.1
<i>Ptilotus fusiformis</i>	0.4	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Triodia epactia</i>	0.5	0.2
<i>Triodia lanigera</i>	0.4	70
<i>Triodia wiseana</i>	0.6	10



**PHOTO**





Site Name: HER023  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 11/05/2011  
 GPS Location: GDA94 Zone 50 675364E 7660635N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: W  
 Soil Type: Sandy Loam  
 Soil Colour: Red  
 Rock Outcrop: Calcrete (other), <2% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - G - Good  
 Disturbance: Exotic Weeds  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Eucalyptus victrix*  
 Mid Stratum 1: *Acacia tumida* var. *pilbarensis*  
 Mid Stratum 2: *Acacia pyrifolia* var. *pyrifolia*  
 Lower Stratum 1: *\*Cenchrus ciliaris*, *Cymbopogon ambiguus*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	3	1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	2	3
<i>Acacia tumida</i> var. <i>pilbarensis</i>	4	3
<i>*Aerva javanica</i>	0.5	0.1
<i>Boerhavia coccinea</i>		0.1
<i>Cajanus cinereus</i>	0.6	0.1
<i>*Cenchrus ciliaris</i>	0.3	1
<i>Cleome viscosa</i>	0.5	0.1
<i>Corchorus parviflorus</i>	0.2	0.1
<i>Corchorus tridens</i>		0.1
<i>Cymbopogon ambiguus</i>	1	1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.2	0.1
<i>Eriachne obtusa</i>	0.4	0.1
<i>Eriachne tenuiculmis</i>	0.4	0.1
<i>Eucalyptus victrix</i>	8	5
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia clementii</i> (P3)	0.1	0.1
<i>Euphorbia trigonosperma</i>	0.2	0.1
<i>Euphorbia vaccaria</i> var. <i>vaccaria</i>	0.1	0.1
<i>Hybanthus aurantiacus</i>	0.4	0.1
<i>Indigofera monophylla</i>	1	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>		0.1
<i>Notoleptopus decaisnei</i>	0.2	0.1
<i>Paraneurachne muelleri</i>	0.4	0.1
<i>Phyllanthus maderaspatensis</i>	0.2	0.1
<i>Ptilotus axillaris</i>		0.1
<i>Rhynchosia minima</i>		0.1
<i>Salsola australis</i>	0.3	0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	2	0.1
<i>Sida clementii</i>	0.5	0.1
<i>Sida fibulifera</i>	0.2	0.1



<i>Solanum phlomoides</i>	0.3	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.3	0.1
<i>Triodia epactia</i>	0.5	5
<i>Triumfetta clementii</i>	0.1	0.1

**PHOTO**



Site Name: HER024  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 07/06/2011  
 GPS Location: WGS84 Zone 50 674998E 7659865N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: NW  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 2-10%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Cows (other)

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Upper Stratum 2: *Acacia tumida* var. *pilbarensis*  
 Lower Stratum 1: *Isotropis atropurpurea*  
 Lower Stratum 2: \**Cenchrus ciliaris*, *Corchorus parviflorus*, *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	0.2	0.1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	1.4	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	4.5	0.2
* <i>Aerva javanica</i>	0.7	0.1
<i>Amaranthus undulatus</i>	0.2	0.1
<i>Aristida holathera</i> var. <i>holathera</i>	0.8	0.1
<i>Boerhavia coccinea</i>		0.1
<i>Bonamia alatisemina</i>		0.1
<i>Bonamia pannosa</i>		0.1
<i>Bonamia pilbarensis</i>		0.1
<i>Bulbostylis barbata</i>	0.2	0.1
* <i>Cenchrus ciliaris</i>	1	0.2
<i>Chrysopogon fallax</i>	1.2	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.4	0.1
<i>Cleome viscosa</i>	1	0.1
<i>Codonocarpus cotinifolius</i>	0.5	0.1
<i>Corchorus parviflorus</i>	1	3
<i>Corymbia hamersleyana</i>	5	0.5
<i>Dampiera candidans</i>	0.5	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.4	0.2
* <i>Eragrostis minor</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.3	0.1
<i>Eriachne tenuiculmis</i>	0.5	0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>		0.1
<i>Euphorbia careyi</i>	0.2	0.1
<i>Euphorbia clementii</i> (P3)	0.3	0.1
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	1.2	0.1
<i>Fimbristylis simulans</i>	0.2	0.1
<i>Gomphrena cunninghamii</i>	0.2	0.1
<i>Goodenia microptera</i>	0.3	0.1
<i>Goodenia stobbsiana</i>	0.6	0.1
<i>Gossypium australe</i>	0.8	0.1



<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	0.1
<i>Heliotropium cunninghamii</i>	0.1	0.1
<i>Heliotropium skeleton</i>	0.5	0.1
<i>Hibiscus leptocladus</i>	0.7	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.5	0.1
<i>Hybanthus aurantiacus</i>	0.4	0.1
<i>Indigofera monophylla</i>	0.5	1
<i>Isotropis atropurpurea</i>	1	1
<i>Notoleptopus decaisnei</i>	0.5	0.1
<i>Oldenlandia crouchiana</i>	0.2	0.1
<i>Polycarpaea corymbosa</i>	0.2	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polycarpaea longiflora</i>	0.2	0.1
<i>Polymeria ambigua</i>		0.1
<i>Ptilotus astrolasius</i>	0.6	0.2
<i>Ptilotus auriculifolius</i>	0.6	0.1
<i>Ptilotus axillaris</i>		0.2
<i>Ptilotus calostachyus</i>	1.3	0.3
<i>Ptilotus fusiformis</i>	0.4	0.1
<i>Senna notabilis</i>	0.4	0.1
<i>Solanum diversiflorum</i>	0.5	0.1
<i>Solanum phlomoides</i>	0.8	0.2
<i>Sporobolus australasicus</i>	0.4	0.1
<i>Swainsona formosa</i>	0.5	0.1
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>	0.1	0.1
<i>Tephrosia clementii</i>	0.1	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.9	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.3	0.1
<i>Trianthema pilosum</i>		0.1
<i>Trianthema triquetrum</i>	0.1	0.1
<i>Tribulus hirsutus</i>		0.1
<i>Tribulus suberosus</i>	1.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.4	0.3
<i>Triodia lanigera</i>	0.4	0.1
<i>Triumfetta johnstonii</i>	0.8	0.1
<i>Velleia connata</i>	1	0.1
<i>Yakirra australiensis</i>	0.1	0.1



**PHOTO**





Site Name: HER025  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 08/06/2011  
 GPS Location: WGS84 Zone 50 674777E 7659649N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: N  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - G - Good  
 Disturbance: Grazing, Cattle tracks (other)  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Eucalyptus victrix*  
 Mid Stratum 1: *Acacia pyrifolia* var. *pyrifolia*, *Acacia tumida* var. *pilbarensis*  
 Lower Stratum 1: \**Cenchrus ciliaris*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> aff. <i>hannii</i>	0.1	0.1
<i>Acacia acradenia</i>	0.9	0.1
<i>Acacia ancistrocarpa</i>	2.5	0.1
<i>Acacia coriacea</i> subsp. <i>pendens</i>	1.5	0.1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	2	1
<i>Acacia trachycarpa</i>	2.5	0.1
<i>Acacia trachycarpa</i> x <i>tumida</i> var. <i>pilbarensis</i>	3	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3.5	0.2
* <i>Aerva javanica</i>	0.1	0.1
<i>Amaranthus undulatus</i>	0.1	0.1
<i>Boerhavia coccinea</i>		0.1
<i>Cajanus cinereus</i>	1	0.1
* <i>Cenchrus ciliaris</i>	0.7	90
<i>Cleome viscosa</i>	0.2	0.1
<i>Corchorus parviflorus</i>	1	0.1
<i>Corchorus tridens</i>	0.1	0.1
<i>Cymbopogon ambiguus</i>	1	0.2
<i>Cyperus vaginatus</i>	0.9	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eriachne tenuiculmis</i>	0.4	0.1
<i>Eucalyptus victrix</i>	9	5
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia trigonosperma</i>	0.3	0.1
<i>Goodenia forrestii</i>	0.3	0.1
<i>Indigofera colutea</i>	0.2	0.1
<i>Indigofera monophylla</i>	1	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1	0.1
<i>Melaleuca linophylla</i>	1.4	0.4
<i>Notoleptopus decaisnei</i>	0.2	0.1
<i>Phyllanthus maderaspatensis</i>	0.1	0.1
<i>Polymeria ambigua</i>		0.1
<i>Portulaca oleracea</i>		0.1



<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Rhynchosia minima</i>		0.1
<i>Salsola australis</i>	0.3	0.1
<i>Solanum diversiflorum</i>	0.1	0.1
<i>Solanum horridum</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.1	0.1
<i>Sporobolus australasicus</i>	0.2	0.1
<i>Stemodia grossa</i>	0.6	0.4
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.6	0.1
<i>Trianthema triquetrum</i>	0.1	0.1
<i>Triodia epactia</i>	0.6	0.2
<i>Triodia longiceps</i>	0.5	0.1

**PHOTO**



Site Name: HER026  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 08/06/2011  
 GPS Location: WGS84 Zone 50 674623E 7659273N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: N  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Calcrete (other), <2% bedrock exposed  
 CF Abundance: 2-10%  
 CF Sizes: 2-6mm, 6-20mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - G - Good  
 Disturbance: Cattle tracks (other)  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Eucalyptus victrix*  
 Upper Stratum 2: *Corymbia hamersleyana*  
 Mid Stratum 1: *Melaleuca linophylla*  
 Lower Stratum 1: *Cyperus vaginatus*, *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia colei</i> var. <i>colei</i>	2	0.1
<i>Acacia coriacea</i> subsp. <i>pendens</i>	1.6	0.1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	1.7	0.1
<i>Acacia trachycarpa</i>	2	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2	0.1
<i>Ammannia baccifera</i>	0.1	0.1
<i>Cajanus cinereus</i>	0.2	0.1
* <i>Cenchrus ciliaris</i>	0.6	2
<i>Chrysopogon fallax</i>	1.2	0.1
<i>Cleome viscosa</i>	0.4	0.1
<i>Corchorus parviflorus</i>	0.7	0.1
<i>Corymbia hamersleyana</i>	5	1
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	0.4	0.1
<i>Cymbopogon ambiguus</i>	0.7	0.1
<i>Cyperus vaginatus</i>	1	2
<i>Eragrostis tenellula</i>	0.1	0.1
<i>Eucalyptus victrix</i>	10	5
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia trigonosperma</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1	0.1
<i>Melaleuca linophylla</i>	4	3
<i>Notoleptopus decaisnei</i>	0.1	0.1
<i>Phyllanthus maderaspatensis</i>	0.4	0.1
<i>Pluchea rubelliflora</i>	0.1	0.1
<i>Pluchea tetranthera</i>	0.4	0.1
<i>Rhynchosia minima</i>		0.1
<i>Salsola australis</i>	0.6	0.1
? <i>Schenkia australis</i>	0.1	0.1
<i>Sesbania cannabina</i>	0.6	0.1
<i>Stemodia grossa</i>	0.4	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.9	0.1



<i>Triodia epactia</i>	0.6	40
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**PHOTO**



Site Name: HER027  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 08/06/2011  
 GPS Location: WGS84 Zone 50 674416E 7658984N  
 Landform Type: Simple Slope, Drainage line (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: NW  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - G - Good  
 Disturbance: Borrow pit (other)  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Eucalyptus victrix*  
 Mid Stratum 1: *Acacia pyrifolia* var. *pyrifolia*, *Acacia tumida* var. *pilbarensis*  
 Lower Stratum 1: \**Cenchrus ciliaris*, *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia colei</i> var. <i>colei</i>	3	0.1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	2.2	2
<i>Acacia tumida</i> var. <i>pilbarensis</i>	4	0.5
* <i>Aerva javanica</i>	0.6	0.1
<i>Boerhavia burbidgeana</i>		0.1
<i>Cajanus cinereus</i>	1.7	0.1
* <i>Cenchrus ciliaris</i>	0.9	30
<i>Cleome viscosa</i>	0.3	0.1
<i>Corchorus parviflorus</i>	1.2	0.1
<i>Corymbia hamersleyana</i>	4	0.3
<i>Cymbopogon ambiguus</i>	1	0.1
* <i>Cynodon dactylon</i>	0.2	0.1
<i>Cyperus vaginatus</i>	1	0.1
<i>Dactyloctenium radulans</i>	0.1	0.1
<i>Eragrostis tenellula</i>	0.2	0.1
<i>Eucalyptus victrix</i>	6	1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Euphorbia trigonosperma</i>	0.4	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Melaleuca glomerata</i>	4	0.2
<i>Melaleuca linophylla</i>	2	0.2
<i>Notoleptopus decaisnei</i>	0.1	0.1
<i>Phyllanthus maderaspatensis</i>	0.5	0.1
<i>Ptilotus auriculifolius</i>	0.4	0.1
<i>Ptilotus incanus</i>	0.1	0.1
<i>Rhynchosia minima</i>		0.1
<i>Salsola australis</i>	0.5	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Sesbania cannabina</i>	0.4	0.1
<i>Sida clementii</i>	0.5	0.1
<i>Sida fibulifera</i>		0.1
<i>Solanum phlomoides</i>	0.3	0.1
<i>Sporobolus australasicus</i>	0.1	0.1



<i>Stemodia grossa</i>	0.5	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.5	0.1
<i>Trianthema triquetrum</i>	0.1	0.1
<i>Triodia epactia</i>	0.6	0.5
<i>Triodia longiceps</i>	0.5	0.1

**PHOTO**



Site Name: HER028  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 08/06/2011  
 GPS Location: WGS84 Zone 50 674145E 7658899N  
 Landform Type: Upper Slope  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: ESE  
 Soil Type: Sandy Loam  
 Soil Colour: Brown (other)  
 Rock Outcrop: Granite, 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

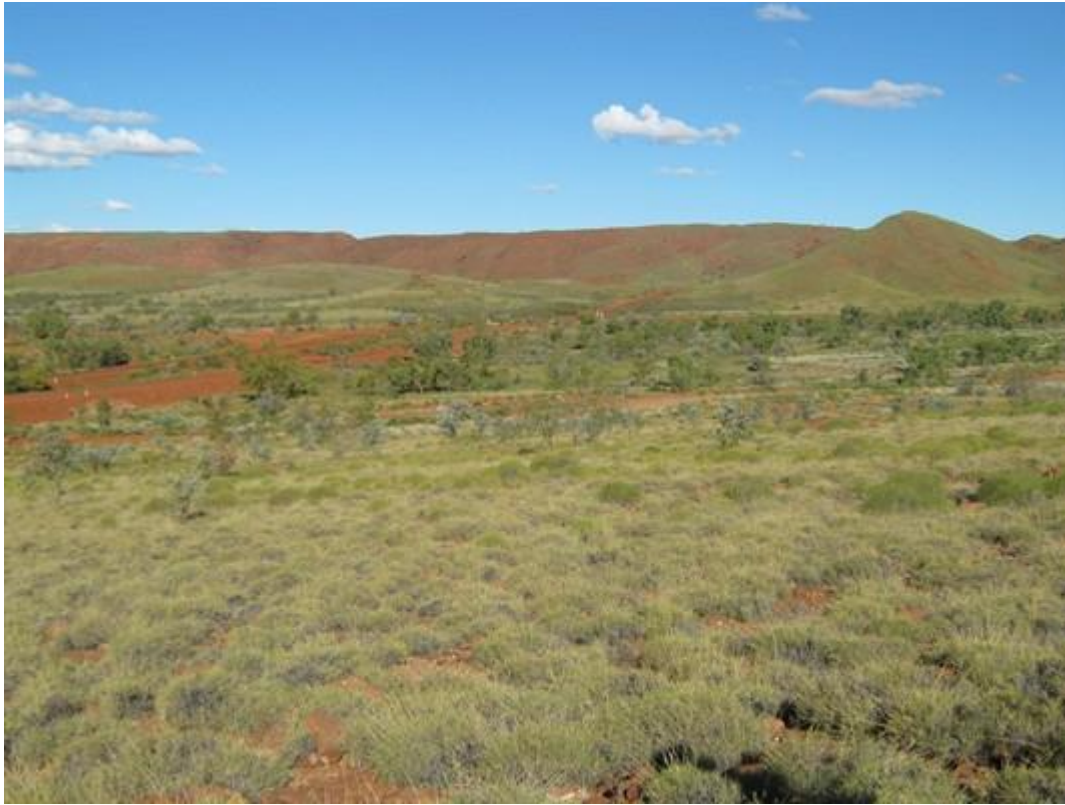
Mid Stratum 1: *Acacia inaequilatera*, *Grevillea wickhamii* subsp. *hispidula*  
 Lower Stratum 1: *Triodia scintillans*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	1.8	0.1
<i>Acacia orthocarpa</i>	4	0.1
<i>Boerhavia gardneri</i>		0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Dampiera candidans</i>	0.4	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.4	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Triodia scintillans</i>	0.3	80
<i>Triodia wiseana</i>	0.6	2



**PHOTO**





Site Name: HER029  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 08/06/2011  
 GPS Location: WGS84 Zone 50 674099E 7659375N  
 Landform Type: Simple Slope  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: N  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Calcrete (other), 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 2: *Acacia acradenia*  
 Lower Stratum 1: *Triodia chichesterensis*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	4
<i>Acacia inaequilatera</i>	0.6	0.1
<i>Bonamia pilbarensis</i>		0.1
<i>Cassytha capillaris</i>		0.1
<i>Corchorus parviflorus</i>	0.2	0.1
<i>Corymbia hamersleyana</i>	4	1
<i>Dysphania plantaginella</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.4	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	0.2
<i>Hakea lorea</i> subsp. <i>lorea</i>	1.7	0.1
<i>Haloragis gossei</i> var. <i>gossei</i>	0.1	0.1
<i>Hybanthus aurantiacus</i>	0.3	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Phyllanthus maderaspatensis</i>	0.3	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Sporobolus australasicus</i>	0.2	0.1
<i>Triodia chichesterensis</i> (P3)	0.3	40
<i>Triodia wiseana</i>	0.5	3



**PHOTO**





Site Name: HER030  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 10/06/2011  
 GPS Location: WGS84 Zone 50 673847E 7659558N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: NNE  
 Soil Type: Sandy Loam  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: <2%  
 CF Sizes: 2-6mm, 6-20mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Cattle tracks (other)  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia pyrifolia* var. *pyrifolia*, *Acacia tumida* var. *pilbarensis*  
 Lower Stratum 1: *Chrysopogon fallax*  
 Lower Stratum 2: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.3	0.1
<i>Acacia ancistrocarpa</i>	1.4	0.1
<i>Acacia inaequilatera</i>	1.4	0.1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	2.5	2
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3	0.5
* <i>Aerva javanica</i>	0.6	0.1
<i>Amaranthus undulatus</i>	0.3	0.1
<i>Boerhavia burbridgeana</i>		0.1
<i>Boerhavia coccinea</i>		0.1
<i>Bonamia alatisemina</i>		0.1
<i>Bonamia erecta</i>	0.4	0.1
<i>Cajanus cinereus</i>	0.5	0.1
* <i>Cenchrus ciliaris</i>	0.6	0.3
<i>Chrysopogon fallax</i>	1.2	20
<i>Cleome viscosa</i>	0.4	0.1
<i>Corchorus parviflorus</i>	0.4	0.2
<i>Corchorus tridens</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	5	1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.2	0.1
<i>Enneapogon lindleyanus</i>	0.4	0.1
<i>Eragrostis cumingii</i>	0.2	0.1
<i>Eragrostis tenellula</i>	0.2	0.1
<i>Eulalia aurea</i>	0.5	0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>		0.1
<i>Euphorbia clementii</i> (P3)	0.3	0.1
<i>Euphorbia trigonosperma</i>	0.3	0.1
<i>Goodenia forrestii</i>		0.1
<i>Goodenia triodiophila</i>	0.3	0.1
<i>Gossypium australe</i>	1	0.1
<i>Hybanthus aurantiacus</i>	0.3	0.1
<i>Indigofera colutea</i>	0.3	0.1



<i>Indigofera monophylla</i>	0.6	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1.2	0.1
<i>Melhania oblongifolia</i>	0.1	0.1
<i>Notoleptopus decaisnei</i>	0.3	0.1
<i>Paraneurachne muelleri</i>	0.3	0.1
<i>Perotis rara</i>	0.2	0.1
<i>Phyllanthus maderaspatensis</i>	0.2	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Polymeria ambigua</i>		0.1
<i>Portulaca oleracea</i>		0.1
<i>Pterocaulon sphacelatum</i>	0.1	0.1
<i>Ptilotus axillaris</i>		0.1
<i>Rhynchosia minima</i>		0.1
<i>Salsola australis</i>	0.6	0.1
<i>Senna notabilis</i>	0.2	0.1
<i>Sida clementii</i>	0.5	0.1
<i>Solanum phlomoides</i>	0.1	0.1
<i>Sporobolus australasicus</i>	0.4	0.1
<i>Stemodia grossa</i>	0.4	0.1
<i>Streptoglossa decurrens</i>	0.3	0.1
<i>Striga curviflora</i>	0.2	0.1
<i>Swainsona formosa</i>	0.1	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.4	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.3	0.1
<i>Themeda triandra</i>	1.2	0.1
<i>Trianthema pilosum</i>	0.1	0.1
<i>Triodia epactia</i>	0.7	5
<i>Triumfetta clementii</i>	0.2	0.1
<i>Yakirra australiensis</i>	0.1	0.1



**PHOTO**





Site Name: HER031  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 10/06/2011  
 GPS Location: WGS84 Zone 50 673706E 7659224N  
 Landform Type: Simple Slope  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: NE  
 Soil Type: Sandy clay (other)  
 Soil Colour: Brown  
 Rock Outcrop: Calcrete (other), 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Test pits (other)  
 Fire: 1-2 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Acacia inaequilatera*  
 Mid Stratum 1: *Ptilotus auriculifolius*  
 Lower Stratum 1: *Triodia chichesterensis*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.6	0.1
<i>Acacia inaequilatera</i>	2.5	0.2
* <i>Aerva javanica</i>	0.1	0.1
<i>Boerhavia coccinea</i>		0.1
<i>Bonamia pilbarensis</i>		0.1
<i>Cassytha filiformis</i>		0.1
<i>Cleome viscosa</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Corymbia hamersleyana</i>	0.5	0.1
<i>Dysphania plantaginella</i>	0.1	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.4	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>		0.1
<i>Euphorbia clementii</i> (P3)	0.3	
<i>Goodenia microptera</i>	0.3	0.1
<i>Goodenia muelleriana</i>	0.4	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	0.5	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1	0.1
<i>Heliotropium cunninghamii</i>	0.1	0.1
<i>Indigofera monophylla</i>	0.2	0.1
<i>Notoleptopus decaisnei</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Portulaca oleracea</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus auriculifolius</i>	0.7	0.2
<i>Ptilotus axillaris</i>		0.1
<i>Ptilotus clementii</i>	0.6	0.1
<i>Salsola australis</i>	0.6	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.5	0.1



<i>Tephrosia clementii</i>	0.1	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Tinospora smilacina</i>		0.1
<i>Tribulus hirsutus</i>		0.1
<i>Tribulus suberosus</i>	0.8	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia chichesterensis</i> (P3)	0.3	3
<i>Triodia wiseana</i>	0.4	2
<i>Yakirra australiensis</i>	0.1	0.1

**PHOTO**



Site Name: HER032  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 12/06/2011  
 GPS Location: WGS84 Zone 50 674379E 7660320N  
 Landform Type: Drainage Line  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: N  
 Soil Type: Sandy Loam  
 Soil Colour: Brown (other)  
 Rock Outcrop: Calcrete (other), <2% bedrock exposed  
 CF Abundance: <2%  
 CF Sizes: 2-6mm, 6-20mm  
 CF Types: Ironstone, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> sp. Pilbara (W.R. Barker 2025)	0.3	0.1
<i>Acacia acradenia</i>	2.5	50
<i>Acacia ancistrocarpa</i>	2	0.1
<i>Acacia inaequilatera</i>	2	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2.2	0.1
<i>Bonamia erecta</i>	0.3	0.1
<i>Cassytha filiformis</i>	0.1	0.1
<i>Cleome viscosa</i>	0.4	0.1
<i>Corchorus parviflorus</i>	0.6	0.1
<i>Corymbia hamersleyana</i>	5	1
<i>Euphorbia clementii</i> (P3)	0.2	0.1
<i>Euphorbia trigonosperma</i>	0.5	0.1
<i>Goodenia forrestii</i>	0.3	0.1
<i>Goodenia stobbsiana</i>	0.4	0.1
<i>Gossypium australe</i>	0.4	0.1
<i>Hibiscus leptocladus</i>	0.7	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.5	0.1
<i>Hybanthus aurantiacus</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Notoleptopus decaisnei</i>	0.3	0.1
<i>Paspalidium clementii</i>	0.2	0.1
<i>Pluchea dentex</i>	0.4	0.1
<i>Polycarpaea longiflora</i>	0.4	0.1
<i>Polymeria ambigua</i>	0.1	0.1
<i>Pterocaulon sphacelatum</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Senna notabilis</i>	0.3	0.1
<i>Solanum phlomoides</i>	0.3	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.3	0.1
<i>Triodia epactia</i>	0.4	20
<i>Triodia wiseana</i>	0.4	0.1
<i>Yakirra australiensis</i>	0.2	0.1



**PHOTO**





Site Name: HER033  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 12/06/2011  
 GPS Location: WGS84 Zone 50 674411E 7660056N  
 Landform Type: Simple Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Soil Type: Sandy Loam  
 Soil Colour: Brown (other)  
 Rock Outcrop: Calcrete (other), 10-20% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Ironstone, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Triodia chichesterensis*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.8	0.2
<i>Cassytha filiformis</i>	0.1	0.1
<i>Cleome viscosa</i>	0.3	0.1
<i>Corymbia hamersleyana</i>	1.8	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.2	0.1
<i>Euphorbia clementii</i> (P3)	0.3	
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	0.3
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Ptilotus clementii</i>	0.3	0.1
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Triodia chichesterensis</i> (P3)	0.3	70
<i>Triodia epactia</i>	0.4	0.1
<i>Triodia wiseana</i>	0.5	2



**PHOTO**





Site Name: HER034  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 10/06/2011  
 GPS Location: WGS84 Zone 50 673706E 7658679N  
 Landform Type: Drainage Line  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: NE  
 Soil Type: Sandy Loam  
 Soil Colour: Brown  
 Rock Outcrop: Calcrete (other), <2% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Shale, Riverstones (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana, Eucalyptus victrix*  
 Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Cymbopogon ambiguus, Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> aff. <i>hannii</i>	0.6	0.1
<i>Acacia acradenia</i>	3	2
<i>Acacia colei</i> var. <i>colei</i>	2	0.1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	1.8	0.1
* <i>Aerva javanica</i>	0.9	0.1
<i>Amaranthus undulatus</i>	0.8	0.1
<i>Boerhavia burbridgeana</i>		0.1
<i>Boerhavia coccinea</i>		0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cajanus cinereus</i>	1.2	0.1
<i>Cassytha filiformis</i>		0.1
* <i>Cenchrus ciliaris</i>	0.6	0.1
<i>Chrysopogon fallax</i>	1	0.2
<i>Cleome viscosa</i>	0.7	0.1
<i>Corchorus parviflorus</i>	0.5	0.1
<i>Corchorus tridens</i>		0.1
<i>Corymbia hamersleyana</i>	6	1
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	0.7	0.1
<i>Crotalaria novae-hollandiae</i> subsp. <i>novae-hollandiae</i>	0.2	0.1
<i>Cucumis variabilis</i>		0.1
<i>Cullen leucochaetes</i>	0.4	0.1
<i>Cymbopogon ambiguus</i>	1.1	1
<i>Cyperus vaginatus</i>	1	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.2	0.1
<i>Enneapogon caerulescens</i>	0.2	0.1
<i>Eragrostis tenellula</i>	0.2	0.1
<i>Eriachne benthamii</i>	0.4	0.1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Eucalyptus victrix</i>	10	2
<i>Euphorbia careyi</i>	0.1	0.1
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	0.3	0.1
<i>Euphorbia trigonosperma</i>	0.2	0.1



<i>*Flaveria trinervia</i>	0.3	0.1
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	1.7	0.1
<i>Gossypium australe</i>	1.3	0.1
<i>Hibiscus coatesii</i>	0.3	0.1
<i>Hybanthus aurantiacus</i>	0.1	0.1
<i>Indigofera linifolia</i>	0.1	0.1
<i>Indigofera monophylla</i>	0.6	0.1
<i>Lepidium ?pholidogynum</i>		0.1
<i>Melaleuca linophylla</i>	2	0.1
<i>Nicotiana benthamiana</i>	0.3	0.1
<i>Notoleptopus decaisnei</i>	0.2	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Paspalidium clementii</i>	0.1	0.1
<i>Phyllanthus maderaspatensis</i>	0.3	0.1
<i>Pluchea rubelliflora</i>	0.2	0.1
<i>Polymeria ambigua</i>		0.1
<i>Pterocaulon sphacelatum</i>	0.2	0.1
<i>Ptilotus auriculifolius</i>	0.2	0.1
<i>Rhynchosia minima</i>		0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	2	0.1
<i>Solanum horridum</i>	0.2	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Stemodia grossa</i>	0.2	0.1
<i>Swainsona formosa</i>	0.3	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.5	0.1
<i>Themeda triandra</i>	1	0.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.4	0.1
<i>*Trianthema portulacastrum</i>		0.1
<i>Triodia epactia</i>	0.7	70
<i>Triodia longiceps</i>	0.7	0.1
<i>Triodia wiseana</i>	0.4	1
<i>Triumfetta clementii</i>	0.1	0.1
<i>Triumfetta propinqua</i>	0.2	0.1



**PHOTO**





Site Name: HER035  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 10/06/2011  
 GPS Location: WGS84 Zone 50 673625E 7658250N  
 Landform Type: Upper Slope  
 Slope Class: Very Steep (37 degrees)  
 Aspect: NW  
 Soil Type: Sandy Loam  
 Soil Colour: Brown  
 Rock Outcrop: Granite, 20-50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Old ripped track (regenerating) (other)  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Grevillea pyramidalis* subsp. *leucadendron*  
 Mid Stratum 2: *Indigofera monophylla*  
 Lower Stratum 1: *Triodia epactia*, *Triodia scintillans*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Boerhavia gardneri</i>		0.1
<i>Bonamia pilbarensis</i>		0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cajanus cinereus</i>	0.3	0.1
<i>Cleome viscosa</i>	0.2	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Euphorbia careyi</i>		0.1
<i>Gomphrena cunninghamii</i>	0.3	0.1
<i>Gossypium robinsonii</i>	0.2	0.1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	0.1	0.1
<i>Indigofera monophylla</i>	0.8	0.2
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Rhynchosia minima</i>		0.1
<i>Solanum horridum</i>	0.1	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	1	
<i>Tribulus suberosus</i>	0.5	0.1
<i>Triodia epactia</i>	0.4	0.5
<i>Triodia scintillans</i>	0.4	60
<i>Triodia wiseana</i>	0.6	1



**PHOTO**





Site Name: HER036  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 09/06/2011  
 GPS Location: WGS84 Zone 50 673588E 7657557N  
 Landform Type: Hillock  
 Slope Class: Steep (23 degrees)  
 Aspect: S  
 Soil Type: Sandy Loam  
 Soil Colour: Brown (other)  
 Rock Outcrop: Granite, 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	0.3	0.1
<i>Boerhavia gardneri</i>		0.1
<i>Bonamia pilbarensis</i>		0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	2.3	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	0.4	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.3	0.1
<i>Enneapogon caeruleus</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>		0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.2	0.1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	1.3	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Paspalidium clementii</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Solanum horridum</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.3	0.1
<i>Sporobolus australasicus</i>	0.2	0.1
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>	0.1	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.2	0.1
<i>Triodia epactia</i>	0.4	50
<i>Triodia scintillans</i>	0.3	0.1
<i>Triodia wiseana</i>	0.3	0.1



**PHOTO**





Site Name: HER037  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 09/06/2011  
 GPS Location: WGS84 Zone 50 672777E 7658153N  
 Landform Type: Drainage Line  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: NE  
 Soil Type: Sandy clay (other)  
 Soil Colour: Brown  
 Rock Outcrop: Granite, 20-50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*, *Melaleuca linophylla*  
 Mid Stratum 2: *Cajanus cinereus*  
 Lower Stratum 1: *Triodia wiseana*  
 Lower Stratum 2: *Stemodia grossa*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2.5	2
<i>Acacia coriacea</i> subsp. <i>pendens</i>	3	0.1
* <i>Aerva javanica</i>	0.2	0.1
<i>Amaranthus undulatus</i>	0.7	0.1
<i>Ammannia baccifera</i>	0.2	0.1
<i>Aristida burbridgeae</i>	0.6	0.1
<i>Boerhavia gardneri</i>		0.1
<i>Bulbostylis barbata</i>	0.2	0.1
<i>Cajanus cinereus</i>	1.5	0.2
<i>Cassytha filiformis</i>		0.1
<i>Cleome viscosa</i>	0.4	0.1
<i>Corchorus parviflorus</i>	0.4	0.1
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	0.4	0.1
<i>Cucumis variabilis</i>		0.1
<i>Cullen leucochaetes</i>	1	0.1
<i>Cymbopogon ambiguus</i>	1.1	0.1
<i>Cyperus hesperius</i>	0.2	0.1
<i>Cyperus squarrosus</i>	0.1	0.1
<i>Eragrostis cumingii</i>	0.2	0.1
<i>Eragrostis tenellula</i>	0.2	0.1
<i>Eriachne benthamii</i>	0.6	0.5
<i>Eriachne mucronata</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.2	0.1
<i>Euphorbia careyi</i>	0.2	0.1
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	1	0.1
<i>Fimbristylis elegans</i>	0.1	0.1
<i>Fimbristylis rara</i>	0.1	0.1
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	2.5	0.1
<i>Gomphrena cunninghamii</i>	0.2	0.1
<i>Gossypium australe</i>	0.7	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	1.8	0.1
<i>Hybanthus aurantiacus</i>	0.2	0.1
<i>Indigofera linifolia</i>	0.2	0.1



<i>Indigofera monophylla</i>	0.4	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.4	0.1
<i>Melaleuca linophylla</i>	3	2
<i>Nicotiana benthamiana</i>	0.2	0.1
<i>Notoleptopus decaisnei</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.2	0.1
<i>Paspalidium tabulatum</i>	0.3	0.1
<i>Phyllanthus maderaspatensis</i>	0.3	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polycarpaea longiflora</i>	0.3	0.1
<i>Portulaca oleracea</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Rhynchosia minima</i>		0.1
<i>Solanum horridum</i>	0.2	0.1
<i>Solanum phlomoides</i>	0.4	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Stemodia grossa</i>	0.6	1
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.4	0.1
<i>Tephrosia densa</i>	0.4	0.1
<i>Terminalia supranitifolia</i> (P3)	3	1
<i>Tinospora smilacina</i>		0.1
<i>Tribulus suberosus</i>	0.3	0.1
<i>Trichosanthes cucumerina</i> var. <i>cucumerina</i>		0.1
<i>Triodia epactia</i>	0.3	0.1
<i>Triodia wiseana</i>	1	20
<i>Triumfetta clementii</i>	0.3	0.1
<i>Triumfetta propinqua</i>	0.4	0.1
<i>Vigna triodiophila</i> (P3)	0.1	0.1
<i>Yakirra australiensis</i>	0.1	0.1



**PHOTO**





Site Name: HER038  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 09/06/2011  
 GPS Location: WGS84 Zone 50 672479E 7657214N  
 Landform Type: Drainage Line  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: WNW  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Calcrete (other), 20-50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Calcrete, Shale (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 2: *Acacia acradenia*  
 Lower Stratum 1: *Triodia wiseana*  
 Lower Stratum 2: *Cyperus vaginatus*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> aff. <i>hannii</i>	0.1	0.1
<i>Acacia acradenia</i>	2.5	50
<i>Acacia coriacea</i> subsp. <i>pendens</i>	3	0.1
<i>Acacia inaequilatera</i>	2	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3	0.2
* <i>Aerva javanica</i>	0.1	0.1
<i>Amaranthus undulatus</i>	0.2	0.1
<i>Aristida holathera</i> var. <i>holathera</i>	0.3	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cajanus cinereus</i>	0.1	0.1
<i>Cassytha capillaris</i>		0.2
<i>Cleome viscosa</i>	0.2	0.1
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Corymbia hamersleyana</i>	5	1
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	0.3	0.1
<i>Crotalaria novae-hollandiae</i> subsp. <i>novae-hollandiae</i>	0.1	0.1
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	1.1	0.1
<i>Cyperus vaginatus</i>	0.8	2
<i>Dactyloctenium radulans</i>	0.1	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.2	0.1
<i>Eragrostis cumingii</i>	0.2	0.1
<i>Eragrostis speciosa</i>	0.9	0.1
<i>Eragrostis tenellula</i>	0.3	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Euphorbia trigonosperma</i>	0.2	0.1
* <i>Flaveria trinervia</i>	0.1	0.1
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	1.6	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3.5	0.2



<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.4	0.1
<i>Hybanthus aurantiacus</i>	0.2	0.1
<i>Indigofera linifolia</i>	0.1	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1.5	0.1
<i>Notoleptopus decaisnei</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
* <i>Passiflora foetida</i> var. <i>hispida</i>		0.1
<i>Pluchea rubelliflora</i>	0.4	0.1
<i>Polymeria ambigua</i>		0.1
<i>Pterocaulon sphacelatum</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Rhynchosia minima</i>		0.1
<i>Salsola australis</i>	0.2	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Solanum horridum</i>	0.1	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Stemodia grossa</i>	0.6	0.1
<i>Tinospora smilacina</i>		0.1
* <i>Trianthema portulacastrum</i>	0.1	0.1
<i>Trianthema triquetrum</i>	0.1	0.1
<i>Triodia epactia</i>	0.2	0.1
<i>Triodia scintillans</i>	0.3	3
<i>Triodia wiseana</i>	0.7	5
<i>Yakirra australiensis</i>	0.1	0.1

**PHOTO**



Site Name: HER039  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 12/05/2011  
 GPS Location: GDA94 Zone 50 671761E 7658577N  
 Landform Type: Crest, Upper slope (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: E  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: Granite, >50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, >2000mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Mining exploration (other)  
 Fire: 3 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Hakea lorea* subsp. *lorea*  
 Mid Stratum 1: *Grevillea wickhamii* subsp. *hispidula*  
 Lower Stratum 1: *Dampiera candidans*, *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.5	0.1
<i>Acacia inaequilatera</i>	0.3	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Cymbopogon ambiguus</i>	0.1	0.1
<i>Cyperus hesperius</i>	0.2	0.1
<i>Dampiera candidans</i>	0.3	5
<i>Dodonaea coriacea</i>	0.3	0.1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.2	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.2	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1	1
<i>Hakea lorea</i> subsp. <i>lorea</i>	3	0.1
<i>Indigofera monophylla</i>	0.3	0.2
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.4	0.1
<i>Ptilotus incanus</i>	0.2	0.1
<i>Solanum phlomoides</i>	0.1	0.1
<i>Tephrosia virens</i>	0.5	0.1
<i>Tinospora smilacina</i>	0.1	0.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.1	0.1
<i>Tribulus hirsutus</i>		0.1
<i>Tribulus suberosus</i>	0.4	0.1
<i>Triodia epactia</i>	0.3	45
<i>Triodia wiseana</i>	0.1	0.1
<i>Triumfetta maconochieana</i>	0.4	0.2



**PHOTO**





Site Name: HER040  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 13/05/2011  
 GPS Location: GDA94 Zone 50 671489E 7658600N  
 Landform Type: Mid Slope  
 Slope Class: Very Steep (37 degrees)  
 Aspect: NNW  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: Ironstone, 10-20% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, >2000mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 3 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Triumfetta propinqua*  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	0.2	0.1
<i>Amaranthus undulatus</i>	0.1	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.3	0.2
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Cymbopogon ambiguus</i>	0.5	0.1
<i>Cyperus hesperius</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.2	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Ptilotus incanus</i>	0.1	0.1
<i>Tribulus suberosus</i>	0.2	0.1
<i>Triodia epactia</i>	0.3	40
<i>Triodia wiseana</i>	0.3	20
<i>Triumfetta maconochieana</i>	0.3	0.1
<i>Triumfetta propinqua</i>	0.5	0.2



**PHOTO**





Site Name: HER041  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 13/05/2011  
 GPS Location: GDA94 Zone 50 671476E 7658151N  
 Landform Type: Simple Slope  
 Slope Class: Steep (23 degrees)  
 Aspect: W  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: Ironstone, >50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, >2000mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Eucalyptus leucophloia* subsp. *leucophloia*  
 Mid Stratum 1: *Acacia acradenia*, *Terminalia supranitifolia*  
 Lower Stratum 1: *Cleome viscosa*, *Trachymene oleracea* subsp. *oleracea*, *Triumfetta propinqua*  
 Lower Stratum 2: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	0.5
<i>Amaranthus undulatus</i>	0.2	0.1
<i>Aristida burbridgeae</i>	0.2	0.2
<i>Boerhavia coccinea</i>	0.1	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.5	0.5
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.2	0.1
<i>Corymbia hamersleyana</i>	1	0.1
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	0.3	0.1
<i>Cyperus hesperius</i>	0.1	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.2	0.3
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	8	1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	0.1
<i>Hibiscus goldsworthii</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.5	0.5
<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.1	0.1
<i>Nicotiana benthamiana</i>	0.2	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Pluchea dentex</i>	0.4	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Ptilotus incanus</i>	0.1	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Solanum horridum</i>	0.2	0.1



<i>Solanum phlomoides</i>	0.2	0.1
<i>Streptoglossa decurrens</i>	0.1	0.1
<i>Terminalia supranitifolia</i> (P3)	2	0.1
<i>Tinospora smilacina</i>		0.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.5	1
<i>Tribulus suberosus</i>	0.2	0.1
<i>Trichosanthes cucumerina</i> var. <i>cucumerina</i>	0.1	0.1
<i>Triodia epactia</i>	0.3	1
<i>Triodia wiseana</i>	0.3	60
<i>Triumfetta maconochieana</i>	0.2	0.1
<i>Triumfetta propinqua</i>	0.5	0.5

**PHOTO**



Site Name: HER042  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 13/05/2011  
 GPS Location: GDA94 Zone 50 671551E 7657784N  
 Landform Type: Upper Slope  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: W  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: Ironstone, 20-50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, >2000mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Extensive Clearing  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	10
<i>Boerhavia coccinea</i>		0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cassytha capillaris</i>		0.1
<i>Cleome viscosa</i>	0.4	0.1
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Cymbopogon ambiguus</i>	0.5	0.2
<i>Cyperus hesperius</i>	0.1	0.1
<i>Dampiera candicans</i>	0.4	0.1
<i>Dodonaea coriacea</i>	0.4	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eriachne ciliata</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.3	0.2
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.2	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.2	0.1
<i>Goodenia cusackiana</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	4	10
<i>Indigofera monophylla</i>	0.3	0.5
<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	1	0.1
<i>Ptilotus incanus</i>	0.2	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.3	0.1
<i>Solanum phlomoides</i>	0.3	0.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.1	0.1
<i>Tribulus suberosus</i>	0.3	0.1



<i>Triodia epactia</i>	0.4	25
<i>Triodia wiseana</i>	0.4	25
<i>Triumfetta maconochieana</i>	0.5	0.2
<i>Triumfetta propinqua</i>	0.1	0.1

**PHOTO**



Site Name: HER043  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 13/05/2011  
 GPS Location: GDA94 Zone 50 671727E 7657649N  
 Landform Type: Upper Slope  
 Slope Class: Very Steep (37 degrees)  
 Aspect: E  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: Ironstone, 20-50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, >2000mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 3 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1	20
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.2	0.1
<i>Corymbia hamersleyana</i>	3.5	0.5
<i>Cyperus hesperius</i>	0.1	0.1
<i>Dampiera candidans</i>	0.3	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.3	0.4
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.2	0.2
<i>Fimbristylis simulans</i>	0.3	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Goodenia cusackiana</i>	0.1	0.2
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	5
<i>Indigofera monophylla</i>	0.2	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Ptilotus incanus</i>	0.1	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	0.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.1	0.1
<i>Tribulus suberosus</i>	0.3	0.1
<i>Trigastrotheca molluginea</i>		
<i>Triodia epactia</i>	0.3	10
<i>Triodia wiseana</i>	0.3	10
<i>Triumfetta maconochieana</i>	1	0.1
<i>Triumfetta propinqua</i>	0.1	0.1



**PHOTO**





Site Name: HER044  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 14/05/2011  
 GPS Location: GDA94 Zone 50 671732E 7657014N  
 Landform Type: Upper Slope  
 Slope Class: Steep (23 degrees)  
 Aspect: SE  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: Ironstone, 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, >2000mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Eucalyptus leucophloia* subsp. *leucophloia*  
 Mid Stratum 1: *Acacia acradenia*, *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 2: *Acacia acradenia* 1m 15%  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1	15
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2	0.2
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cassytha capillaris</i>		0.1
<i>Dampiera candidans</i>	0.3	0.1
<i>Eriachne mucronata</i>	0.2	0.2
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	8	1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	20
<i>Indigofera monophylla</i>	0.3	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.3	0.1
<i>Triodia epactia</i>	0.3	40
<i>Triodia wiseana</i>	0.3	10



**PHOTO**





Site Name: HER045  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 15/05/2011  
 GPS Location: GDA94 Zone 50 671473E 7656615N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: W  
 Soil Type: Clay Loam (other)  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, >2000mm  
 CF Types: Granite, Ironstone, Alluvial material (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 3 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia tumida* var. *pilbarensis*, *Grevillea wickhamii* subsp. *hispidula*  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> sp. <i>Dioicum</i> (A.A. Mitchell PRP 1618)	1	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3	2
* <i>Aerva javanica</i>	0.3	0.1
<i>Amaranthus undulatus</i>	0.3	0.1
<i>Boerhavia coccinea</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.2	0.1
<i>Cajanus cinereus</i>	1	0.2
<i>Cleome viscosa</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.3	0.5
<i>Corymbia hamersleyana</i>	10	2
<i>Cucumis variabilis</i>	0.1	0.1
<i>Cymbopogon ambiguus</i>	1	0.1
<i>Cyperus hesperius</i>	0.2	0.1
<i>Dampiera candidans</i>	0.3	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.3	0.2
<i>Eragrostis cumingii</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.3	0.1
<i>Goodenia stobbsiana</i>	0.1	0.1
<i>Gossypium australe</i>	1	0.2
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	3
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.3	0.1
<i>Hybanthus aurantiacus</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.5	2
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1	0.3
<i>Notoleptopus decaisnei</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Paspalidium clementii</i>	0.1	0.1
<i>Paspalidium tabulatum</i>	0.3	0.1
<i>Phyllanthus maderaspatensis</i>	0.3	0.1
<i>Polycarpaea longiflora</i>	0.1	0.1
<i>Polymeria ambigua</i>	0.1	0.1
<i>Pterocaulon sphacelatum</i>	0.2	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1



<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Ptilotus nobilis</i>	0.3	0.1
<i>Salsola australis</i>	1	0.2
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	0.1
<i>Solanum phlomoides</i>	0.3	0.1
<i>Swainsona formosa</i>	0.2	0.1
<i>Tinospora smilacina</i>	0.1	0.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.2	0.1
* <i>Trianthema portulacastrum</i>	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.3	20
<i>Triodia wiseana</i>	0.3	10
<i>Triumfetta propinqua</i>	0.3	0.1

**PHOTO**



Site Name: HER046  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 14/05/2011  
 GPS Location: GDA94 Zone 50 671451E 7656987N  
 Landform Type: Lower Slope, Gully in range (other)  
 Slope Class: Steep (23 degrees)  
 Aspect: SW  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: Ironstone, 20-50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, >2000mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Extensive Clearing  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Eucalyptus leucophloia* subsp. *leucophloia*  
 Mid Stratum 1: *Acacia tumida* var. *pilbarensis*, *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 2: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	3	2
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3	10
<i>Boerhavia coccinea</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.8	0.15
<i>Cassytha capillaris</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.2	0.1
<i>Cymbopogon ambiguus</i>	0.1	0.1
<i>Cyperus hesperius</i>	0.2	0.1
<i>Dampiera candidans</i>	0.3	0.1
<i>Eriachne mucronata</i>	0.2	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	8	1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	20
<i>Indigofera monophylla</i>	0.5	0.5
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Ptilotus fusiformis</i>	0.2	0.1
<i>Ptilotus incanus</i>	0.3	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.3	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Tephrosia virens</i>	0.1	0.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.2	0.1
<i>Trianthema pilosum</i>	0.1	0.1
<i>Triodia epactia</i>	0.3	30
<i>Triodia wiseana</i>	0.3	30
<i>Triumfetta maconochieana</i>	1	0.1



**PHOTO**





Site Name: HER047  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 13/05/2011  
 GPS Location: GDA94 Zone 50 671328E 7657730N  
 Landform Type: Upper Slope, Mid slope (other)  
 Slope Class: Precipitous (60 degrees)  
 Aspect: N  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: Ironstone, 20-50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, >2000mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Ficus brachypoda*, *Terminalia supranitifolia*  
 Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	20
<i>Acacia coriacea</i> subsp. <i>pendens</i>	5	0.2
<i>Amaranthus undulatus</i>	0.3	0.1
<i>Aristida burbridgeae</i>	0.3	0.1
<i>Boerhavia coccinea</i>	0.1	0.1
<i>Bonamia pilbarensis</i>		0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cassytha capillaris</i>		0.1
<i>Cleome viscosa</i>	0.3	0.2
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	1.5	0.3
<i>Cucumis variabilis</i>	0.1	0.1
<i>Cymbopogon ambiguus</i>	0.6	0.1
<i>Cyperus hesperius</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.2	0.5
<i>Euphorbia careyi</i>	0.1	0.1
<i>Ficus brachypoda</i>	4	1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Goodenia microptera</i>	0.2	0.1
<i>Goodenia muelleriana</i>	0.2	0.1
<i>Goodenia stobbsiana</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1	0.1
<i>Hibiscus goldsworthii</i>	0.6	0.1
<i>Indigofera monophylla</i>	0.3	0.3
<i>Jasminum didymum</i> subsp. <i>lineare</i>		0.1
<i>Mallotus nesophilus</i>	1	0.1
<i>Nicotiana benthamiana</i>	0.3	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Paspalidium clementii</i>	0.1	0.1
<i>Paspalidium tabulatum</i>	0.2	0.2
<i>Polycarpaea longiflora</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.2	0.1
<i>Ptilotus axillaris</i>	0.1	0.1
<i>Ptilotus incanus</i>	0.2	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.5	0.1



<i>Solanum horridum</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.1	0.1
<i>Streptoglossa decurrens</i>	0.1	0.1
<i>Striga curviflora</i>	0.2	0.1
<i>Tephrosia virens</i>	0.2	0.1
<i>Terminalia supranitifolia</i> (P3)	3	0.5
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.1	0.1
<i>Trichosanthes cucumerina</i> var. <i>cucumerina</i>		0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.3	10
<i>Triodia wiseana</i>	0.3	60
<i>Triumfetta maconochieana</i>	0.5	0.2
<i>Triumfetta propinqua</i>	0.2	0.1

**PHOTO**



Site Name: HER049  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 14/05/2011  
 GPS Location: GDA94 Zone 50 671353E 7657619N  
 Landform Type: Crest, Upper slope (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: W  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: Ironstone, 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, >2000mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Extensive Clearing  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	2
<i>Acacia tumida</i> var. <i>pilbarensis</i>	0.1	0.1
<i>Bonamia pilbarensis</i>		0.1
<i>Cleome viscosa</i>	0.3	0.1
<i>Cyperus hesperius</i>	0.1	0.1
<i>Dampiera candidans</i>	0.1	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.2	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.4
<i>Euphorbia careyi</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3.5	0.1
<i>Indigofera monophylla</i>	0.2	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Ptilotus incanus</i>	0.3	0.2
<i>Senna notabilis</i>	0.3	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.3	0.2
<i>Solanum horridum</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.3	65
<i>Triodia wiseana</i>	0.3	0.1
<i>Triumfetta maconochieana</i>	1	0.1



**PHOTO**





Site Name: HER050  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 16/05/2011  
 GPS Location: GDA94 Zone 50 670978E 7658454N  
 Landform Type: Plain, Undulating (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: W  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Acacia inaequilatera*, *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 1: *Acacia acradenia*, *Acacia inaequilatera*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1	1
<i>Acacia inaequilatera</i>	2	1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.2	1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.1	0.1
<i>Tribulus suberosus</i>	0.1	0.1
<i>Triodia epactia</i>	0.3	50
<i>Triodia wiseana</i>	0.3	0.1



**PHOTO**





Site Name: HER051  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 17/05/2011  
 GPS Location: GDA94 Zone 50 670982E 7659485N  
 Landform Type: Upper Slope, Mild slope (other)  
 Slope Class: Very Steep (37 degrees)  
 Aspect: W  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: Granite, 20-50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 3 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia inaequilatera*, *Grevillea wickhamii* subsp. *hispidula*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	2.5	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Dampiera candidans</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.2
<i>Gossypium australe</i>	0.5	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	0.4
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.1	0.1
<i>Triodia epactia</i>	0.3	70
<i>Triodia wiseana</i>	0.3	0.2
<i>Triumfetta propinqua</i>	0.3	0.1



**PHOTO**





Site Name: HER052  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 14/05/2011  
 GPS Location: GDA94 Zone 50 671177E 7657246N  
 Landform Type: Upper Slope, Mid slope, scree slope (other)  
 Slope Class: Precipitous (60 degrees)  
 Aspect: N  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: Ironstone  
 CF Abundance: 2-10%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, >2000mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Acacia acradenia*, *Terminalia supranitifolia*  
 Lower Stratum 1: *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	3	0.2
<i>Boerhavia coccinea</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Cucumis variabilis</i>	0.1	0.1
<i>Cyperus hesperius</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.2	0.1
<i>Gomphrena cunninghamii</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.3	0.2
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polycarpaea longiflora</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	0.1
<i>Solanum horridum</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.1	0.1
<i>Streptoglossa decurrens</i>	0.1	0.1
<i>Terminalia supranitifolia</i> (P3)	3	0.1
<i>Triodia wiseana</i>	0.3	74
<i>Triumfetta propinqua</i>	0.2	0.1



**PHOTO**





Site Name: HER053  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 15/05/2011  
 GPS Location: GDA94 Zone 50 670935E 7657053N  
 Landform Type: Crest, Upper slope (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: W  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 10-20%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, >2000mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Acacia acradenia*, *Grevillea wickhamii* subsp. *hispidula*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.4	20
<i>Amaranthus interruptus</i>	0.1	0.1
<i>Bonamia pilbarensis</i>		0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.2	0.1
<i>Codonocarpus cotinifolius</i>	1.5	0.1
<i>Corchorus parviflorus</i>	0.2	0.1
<i>Cyperus hesperius</i>	0.2	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.3	0.1
<i>Eriachne mucronata</i>	0.2	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.2
<i>Euphorbia careyi</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	0.4	10
<i>Indigofera monophylla</i>	0.3	0.2
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Ptilotus fusiformis</i>	0.3	0.1
<i>Ptilotus incanus</i>	0.2	0.1
<i>Schizachyrium fragile</i>	0.1	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.3	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.1	0.1
<i>Triodia epactia</i>	0.3	30
<i>Triodia wiseana</i>	0.3	2



**PHOTO**





Site Name: HER054  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 14/05/2011  
 GPS Location: GDA94 Zone 50 670992E 7656961N  
 Landform Type: Other, Cliff (other)  
 Slope Class: Clifted (80 degrees)  
 Aspect: SSW  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: Ironstone, >50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 200-600mm, 600-2000mm, >2000mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Eucalyptus leucophloia* subsp. *leucophloia*, *Ficus brachypoda*  
 Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1	2
* <i>Aerva javanica</i>	0.4	0.1
<i>Amaranthus interruptus</i>	0.1	0.1
<i>Amaranthus undulatus</i>	0.4	0.1
<i>Aristida burbridgeae</i>	0.4	0.1
<i>Boerhavia coccinea</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.3	0.1
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	0.3	0.1
<i>Cymbopogon ambiguus</i>	0.5	0.2
<i>Cyperus hesperius</i>	0.5	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.2	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	8	3
<i>Euphorbia careyi</i>	0.1	0.1
<i>Ficus brachypoda</i>	6	30
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	2	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Indigofera monophylla</i>	0.3	0.2
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1	0.1
<i>Mallotus nesophilus</i>	2	0.1
<i>Nicotiana benthamiana</i>	0.2	0.1
<i>Paspalidium tabulatum</i>	0.3	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.2	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.2	0.1
<i>Solanum horridum</i>	0.2	0.1
<i>Streptoglossa decurrens</i>	0.1	0.1
<i>Terminalia supranitifolia</i> (P3)	1	0.2
<i>Tinospora smilacina</i>	0.1	0.1
<i>Trichosanthes cucumerina</i> var. <i>cucumerina</i>		0.1



<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.3	20
<i>Triodia wiseana</i>	0.3	20

**PHOTO**



Site Name: HER055  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 15/05/2011  
 GPS Location: GDA94 Zone 50 670833E 7656933N  
 Landform Type: Mid Slope, Lower slope, scree slope (other)  
 Slope Class: Precipitous (60 degrees)  
 Aspect: S  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: Granite, 20-50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, >2000mm  
 CF Types: Granite, Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 3 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Grevillea wickhamii* subsp. *hispidula*  
 Lower Stratum 1: *Cleome viscosa*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	0.3	0.1
<i>Amaranthus undulatus</i>	0.3	0.1
<i>Boerhavia coccinea</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.1	0.1
<i>Cleome viscosa</i>	0.3	0.3
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.2	0.1
<i>Cyperus hesperius</i>	0.3	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Enneapogon caeruleus</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1	0.1
<i>Goodenia microptera</i>	0.2	0.1
<i>Gossypium australe</i>	0.5	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	0.5	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Nicotiana benthamiana</i>	0.3	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Paspalidium clementii</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polycarpaea longiflora</i>	0.1	0.1
<i>Pterocaulon sphacelatum</i>	0.2	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Ptilotus fusiformis</i>	0.2	0.1
<i>Ptilotus incanus</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia wiseana</i>	0.3	40
<i>Triumfetta propinqua</i>	0.1	0.1



**PHOTO**





Site Name: HER056  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 15/05/2011  
 GPS Location: GDA94 Zone 50 670564E 7657000N  
 Landform Type: Drainage Line, Broad flat (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: W  
 Soil Type: Loam  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 10-20%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Ironstone, Quartz, Alluvial material (other)  
 Vegetation Condition: Northern Vegetation Condition - G - Good  
 Disturbance: Exotic Weeds  
 Fire: 3/5 > mixed

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia pyrifolia* var. *pyrifolia*, *Acacia tumida* var. *pilbarensis*  
 Lower Stratum 1: *Indigofera monophylla*, *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> sp. <i>Dioicum</i> (A.A. Mitchell PRP 1618)	0.5	0.1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	4	5
<i>Acacia tumida</i> var. <i>pilbarensis</i>	4	5
* <i>Aerva javanica</i>	0.5	1
<i>Amaranthus undulatus</i>	1	0.5
<i>Boerhavia coccinea</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
* <i>Cenchrus ciliaris</i>	0.3	0.1
<i>Cleome viscosa</i>	0.3	0.2
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	0.5	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Corchorus tridens</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	8	2
<i>Cucumis variabilis</i>	0.1	0.2
<i>Cyperus hesperius</i>	0.1	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.3	0.2
<i>Eriachne mucronata</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.2	0.1
<i>Euphorbia careyi</i>	0.1	0.2
<i>Gomphrena cunninghamii</i>	0.3	0.1
<i>Gossypium australe</i>	0.5	0.2
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	0.1
<i>Hybanthus aurantiacus</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.3	10
<i>Jasminum didymum</i> subsp. <i>lineare</i>	2	0.1
<i>Notoleptopus decaisnei</i>	0.3	0.3
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Operculina aequisejala</i>	0.1	0.1
<i>Paspalidium clementii</i>	0.2	0.1
<i>Paspalidium tabulatum</i>	0.3	1
<i>Phyllanthus maderaspatensis</i>	0.4	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1



<i>Polycarpaea longiflora</i>	0.1	0.1
<i>Pterocaulon sphacelatum</i>	0.3	0.1
<i>Ptilotus auriculifolius</i>	0.2	0.1
<i>Ptilotus axillaris</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Salsola australis</i>	1	0.3
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.4	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	2	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.1	0.1
<i>Sporobolus australasicus</i>	0.2	0.1
<i>Striga curviflora</i>	0.1	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.4	0.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.2	0.1
<i>Trianthema pilosum</i>	0.1	0.1
* <i>Trianthema portulacastrum</i>	0.2	0.4
<i>Tribulus suberosus</i>	0.4	0.1
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	0.2	0.1
<i>Triodia epactia</i>	0.3	20
<i>Triodia wiseana</i>	0.3	10
<i>Triumfetta propinqua</i>	0.2	0.1

**PHOTO**



Site Name: HER057  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 16/05/2011  
 GPS Location: GDA94 Zone 50 670404E 7656854N  
 Landform Type: Hillock  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: W  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: Granite, 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Acacia inaequilatera*, *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Triodia brizoides*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.5	0.5
<i>Acacia ancistrocarpa</i>	0.3	0.1
<i>Acacia inaequilatera</i>	3	0.3
<i>Boerhavia coccinea</i>	0.1	0.1
<i>Cleome viscosa</i>	0.2	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.3
<i>Goodenia stobbsiana</i>	0.3	0.2
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	1.5	0.2
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	0.5
<i>Indigofera monophylla</i>	0.3	0.3
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.4	0.1
<i>Tribulus suberosus</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia brizoides</i>	0.3	70
<i>Triodia wiseana</i>	0.3	0.1



**PHOTO**





Site Name: HER058  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 16/05/2011  
 GPS Location: GDA94 Zone 50 670502E 7657398N  
 Landform Type: Lower Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: NW  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: Granite, 10-20% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Acacia acradenia*, *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	3	2
<i>Boerhavia coccinea</i>	0.3	0.2
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.2	0.1
<i>Eriachne ciliata</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	0.2
<i>Indigofera monophylla</i>	0.3	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Paspalidium clementii</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.2	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Triodia epactia</i>	0.3	30
<i>Triodia wiseana</i>	0.4	40



**PHOTO**





Site Name: HER059  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 16/05/2011  
 GPS Location: GDA94 Zone 50 670639E 7657394N  
 Landform Type: Crest, Ridge (other)  
 Slope Class: Clifted (80 degrees)  
 Aspect: E  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: Granite, >50% bedrock exposed  
 CF Abundance: >90%  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 1: *Acacia acradenia*, *Grevillea wickhamii* subsp. *hispidula*  
 Lower Stratum 1: *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1	2
<i>Amaranthus undulatus</i>	0.3	0.2
<i>Boerhavia coccinea</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.3	0.3
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Cucumis variabilis</i>	0.1	0.1
<i>Cymbopogon ambiguus</i>	0.3	0.1
<i>Cyperus hesperius</i>	0.1	0.1
<i>Eriachne ciliata</i>	0.2	0.1
<i>Eriachne mucronata</i>	0.3	0.2
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.3	0.1
<i>Euphorbia careyi</i>	0.1	0.2
<i>Gomphrena cunninghamii</i>	0.2	0.5
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	2
<i>Hibiscus coatesii</i>	0.3	0.1
<i>Hybanthus aurantiacus</i>	0.3	0.1
<i>Nicotiana benthamiana</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Paspalidium clementii</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polycarpaea longiflora</i>	0.2	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Solanum horridum</i>	0.1	0.1
<i>Tribulus suberosus</i>	0.3	0.1
<i>Triodia wiseana</i>	0.3	45
<i>Triumfetta propinqua</i>	0.2	0.2



**PHOTO**





Site Name: HER060  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 16/05/2011  
 GPS Location: GDA94 Zone 50 670743E 7658192N  
 Landform Type: Hillock  
 Slope Class: Very Steep (37 degrees)  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: Granite, >50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 20-60mm, 60-200mm, 200-600mm, 600-2000mm, >2000mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Old gold shaft (other)  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	2
<i>Amaranthus undulatus</i>	0.3	0.1
<i>Boerhavia coccinea</i>	0.2	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
* <i>Cenchrus ciliaris</i>	0.3	0.1
<i>Cleome viscosa</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Cucumis variabilis</i>	0.1	0.2
<i>Cymbopogon ambiguus</i>	1	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.2
<i>Fimbristylis dichotoma</i>	0.2	0.1
<i>Fimbristylis simulans</i>	0.2	0.1
<i>Gomphrena cunninghamii</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Notoleptopus decaisnei</i>	0.2	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polycarpaea longiflora</i>	0.3	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.2	0.1
<i>Rhynchosia minima</i>	0.1	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Triodia epactia</i>	0.3	5
<i>Triodia wiseana</i>	0.3	55
<i>Triumfetta propinqua</i>	0.3	0.2



**PHOTO**





Site Name: HER061  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 16/05/2011  
 GPS Location: GDA94 Zone 50 670845E 7658298N  
 Landform Type: Lower Slope, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: W  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 60-200mm  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Acacia acradenia*, *Acacia inaequilatera*  
 Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2.5	2
<i>Acacia inaequilatera</i>	3	0.5
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia vaccaria</i> var. <i>vaccaria</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.3
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Stemodia grossa</i>	0.5	0.1
<i>Triodia epactia</i>	0.3	70



**PHOTO**





Site Name: HER062  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 16/05/2011  
 GPS Location: GDA94 Zone 50 670529E 7658273N  
 Landform Type: Plain, Undulating (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: S  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 200-600mm  
 CF Types: Granite, Dolerite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Limited Clearing  
 Fire: 3 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*

Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	2
<i>Acacia inaequilatera</i>	0.3	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2	0.2
<i>Amaranthus undulatus</i>	0.1	0.1
<i>Bonamia</i> aff. <i>pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cassytha capillaris</i>	0.1	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.3	0.1
<i>Cleome viscosa</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.2	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.3
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia clementii</i> (P3)	0.3	0.1
<i>Fimbristylis simulans</i>	0.2	0.3
<i>Indigofera monophylla</i>	0.3	0.2
<i>Paspalidium clementii</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polycarpaea longiflora</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Tribulus suberosus</i>	0.2	0.1
<i>Triodia epactia</i>	0.3	70



**PHOTO**





Site Name: HER063  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 15/05/2011  
 GPS Location: GDA94 Zone 50 671025E 7656689N  
 Landform Type: Mid Slope, Lower slope, scree slope (other)  
 Slope Class: Very Steep (37 degrees)  
 Aspect: N  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: Ironstone, 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, >2000mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 3 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Acacia inaequilatera*  
 Mid Stratum 1: *Cleome viscosa*, *Ptilotus auriculifolius*  
 Lower Stratum 1: *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	3	0.1
<i>Amaranthus undulatus</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.4	10
<i>Corchorus parviflorus</i>	0.3	0.2
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.2	0.1
<i>Gomphrena cunninghamii</i>	0.3	0.1
<i>Goodenia muelleriana</i>	0.2	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Paspalidium clementii</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.5	20
<i>Ptilotus axillaris</i>	0.1	0.1
<i>Ptilotus fusiformis</i>	0.3	0.1
<i>Ptilotus incanus</i>	0.2	0.1
<i>Salsola australis</i>	0.5	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.5	0.1
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	0.5	0.1
<i>Solanum horridum</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.3	0.1
<i>Tribulus hirsutus</i>	0.1	0.2
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia wiseana</i>	0.3	30



**PHOTO**





Site Name: HER064  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 17/05/2011  
 GPS Location: GDA94 Zone 50 670859E 7659946N  
 Landform Type: Crest, Hillock, Upper slope (other)  
 Slope Class: Precipitous (60 degrees)  
 Soil Type: Loam  
 Soil Colour: Red  
 Rock Outcrop: Granite, >50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, >2000mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia ancistrocarpa*, *Grevillea wickhamii* subsp. *hispidula*

Lower Stratum 1: *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.5	0.5
<i>Acacia ancistrocarpa</i>	2	1
<i>Acacia inaequilatera</i>	0.5	0.1
<i>Amaranthus undulatus</i>	0.4	0.2
<i>Boerhavia coccinea</i>	0.2	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.4	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.3	0.1
<i>Enneapogon caeruleus</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.3	0.2
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Gossypium australe</i>	0.4	1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Nicotiana benthamiana</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polycarpaea longiflora</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.4	0.1
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	0.3	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Tribulus suberosus</i>	0.1	0.1
<i>Triodia epactia</i>	0.3	0.2
<i>Triodia wiseana</i>	0.4	50



**PHOTO**





Site Name: HER066  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 12/06/2011  
 GPS Location: WGS84 Zone 50 672334E 7660044N  
 Landform Type: Simple Slope  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: NE  
 Soil Type: Sandy Loam  
 Soil Colour: Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Test pit (other)  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana* 4m 0.1%  
 Mid Stratum 1: *Acacia acradenia* 1.6m 25%  
 Lower Stratum 1: *Triodia epactia* 0.4m 70%

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.6	25
<i>Acacia ancistrocarpa</i>	1.4	0.1
<i>Acacia inaequilatera</i>	1.8	0.1
<i>Corymbia hamersleyana</i>	4	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.2	0.1
<i>Fimbristylis simulans</i>	0.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.8	0.1
<i>Indigofera monophylla</i>	0.2	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.2	0.1
<i>Ptilotus calostachyus</i>	0.2	0.1
<i>Triodia epactia</i>	0.4	70



**PHOTO**





Site Name: HER067  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 09/06/2011  
 GPS Location: WGS84 Zone 50 672736E 7657385N  
 Landform Type: Upper Slope  
 Slope Class: Very Steep (37 degrees)  
 Aspect: S  
 Soil Type: Sandy Loam  
 Soil Colour: Brown (other)  
 Rock Outcrop: Granite, 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

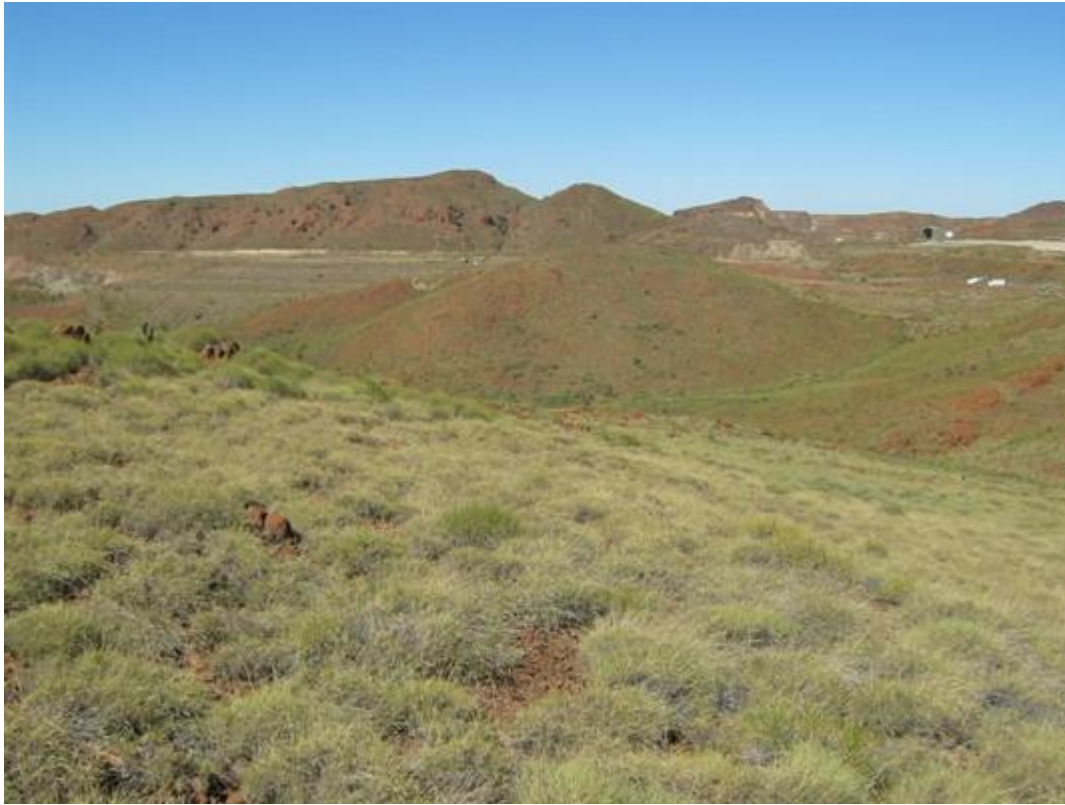
Lower Stratum 1: *Triodia scintillans*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	0.8	0.1
<i>Boerhavia gardneri</i>		0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.2	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Cullen leucochaetes</i>	0.5	0.1
<i>Cymbopogon ambiguus</i>	0.4	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Enneapogon caeruleus</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Gossypium australe</i>	0.6	0.1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	1.8	0.1
<i>Indigofera linifolia</i>	0.1	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.2	0.1
<i>Rhynchosia minima</i>		0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Triodia scintillans</i>	0.3	90
<i>Triodia wiseana</i>	0.5	1.5



**PHOTO**





Site Name: HER068  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 14/06/2011  
 GPS Location: WGS84 Zone 50 674034E 7660363N  
 Landform Type: Hillock  
 Slope Class: Steep (23 degrees)  
 Aspect: S  
 Soil Type: Sandy Loam  
 Soil Colour: Brown (other)  
 Rock Outcrop: Calcrete (other), >50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 2 to 3 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Gomphrena cunninghamii*  
 Lower Stratum 1: *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> sp. Dioicum (A.A. Mitchell PRP 1618)	0.2	0.1
<i>Acacia inaequilatera</i>	1.7	0.1
<i>Amaranthus undulatus</i>	0.1	0.1
<i>Boerhavia gardneri</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cassytha filiformis</i>	0.1	0.1
<i>Cleome viscosa</i>	0.5	0.1
<i>Corchorus parviflorus</i>	0.7	0.1
<i>Cymbopogon ambiguus</i>	0.6	0.1
<i>Cyperus hesperius</i>	0.3	0.1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Euphorbia clementii</i> (P3)	0.3	
<i>Gomphrena cunninghamii</i>	0.2	0.2
<i>Gossypium australe</i>	0.3	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.5	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	2	0.1
<i>Hybanthus aurantiacus</i>	0.3	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
* <i>Passiflora foetida</i> var. <i>hispida</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.4	0.1
<i>Rhynchosia minima</i>	0.1	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.4	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Tinospora smilacina</i>	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Tribulus suberosus</i>	0.7	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.3	0.2
<i>Triodia wiseana</i>	0.6	30



**PHOTO**





Site Name: HER069  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 14/06/2011  
 GPS Location: WGS84 Zone 50 673689E 7659945N  
 Landform Type: Plain  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: E  
 Soil Type: Sandy Loam  
 Soil Colour: Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 2-10%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia inaequilatera*  
 Lower Stratum 1: *Triodia epactia*, *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	2.5	0.1
<i>Acacia inaequilatera</i>	2.5	10
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	2.7	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	0.5	0.1
<i>Aristida holathera</i> var. <i>holathera</i>	0.5	0.1
<i>Boerhavia coccinea</i>	0.1	0.1
<i>Bonamia alatisemina</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cassytha filiformis</i>	0.1	0.1
<i>Chrysopogon fallax</i>	0.9	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.1	0.1
<i>Cleome viscosa</i>	0.4	0.1
<i>Corchorus parviflorus</i>	0.7	0.1
<i>Corymbia hamersleyana</i>	4	0.2
<i>Cucumis variabilis</i>	0.1	0.1
<i>Cullen martinii</i>	0.3	0.1
<i>Eragrostis eriopoda</i>	0.3	0.1
<i>Eriachne aristidea</i>	0.3	0.1
<i>Eriachne obtusa</i>	0.4	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia clementii</i> (P3)	0.4	0.1
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	0.7	0.1
<i>Goodenia forrestii</i>	0.3	0.1
<i>Gossypium australe</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.8	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	1.2	0.1
<i>Indigofera colutea</i>	0.1	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1	0.1
<i>Mitrasacme connata</i>	0.1	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1



<i>Ptilotus auriculifolius</i>	0.4	0.1
<i>Ptilotus axillaris</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Schizachyrium fragile</i>	0.4	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.3	0.1
<i>Trianthema pilosum</i>	0.2	0.2
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Triodia epactia</i>	0.4	5
<i>Triodia lanigera</i>	0.7	60
<i>Yakirra australiensis</i>	0.1	0.1

**PHOTO**



Site Name: HER070  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 14/06/2011  
 GPS Location: WGS84 Zone 50 674301E 7660500N  
 Landform Type: Plain  
 Slope Class: Level (0 degrees)  
 Aspect: N  
 Soil Type: Sandy Loam  
 Soil Colour: Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: 5+ years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Acacia ancistrocarpa*  
 Lower Stratum 1: *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.3	0.1
<i>Acacia ancistrocarpa</i>	3	40
<i>Acacia inaequilatera</i>	2	0.1
<i>Bonamia alatisemina</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.2	0.1
<i>Euphorbia clementii</i> (P3)	0.3	0.1
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	0.2	0.1
<i>Gossypium australe</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus auriculifolius</i>	0.2	0.1
<i>Ptilotus axillaris</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Ptilotus fusiformis</i>	0.5	0.1
<i>Senna notabilis</i>	0.2	0.1
<i>Solanum phlomoides</i>	0.3	0.1
<i>Trianthema pilosum</i>	0.2	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Triodia epactia</i>	0.4	0.1
<i>Triodia lanigera</i>	0.4	50
<i>Yakirra australiensis</i>	0.2	0.1



**PHOTO**





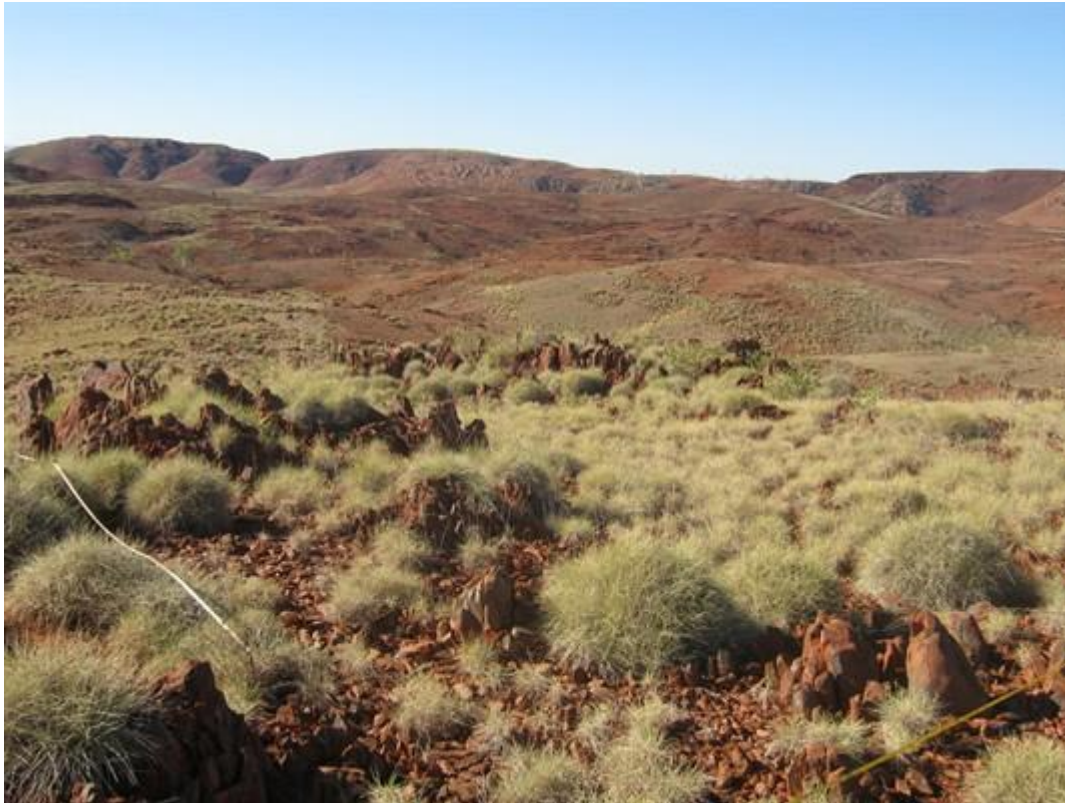
Site Name: TRH052  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 28/06/2018  
 GPS Location: GDA94 Zone 50 671815E 7653405N  
 Landform Type: Crest  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: SE  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Soil Depth: Skeletal  
 Rock Outcrop: Ironstone, >50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 600-2000mm, 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.5	3
<i>Acacia spondylophylla</i>	0.4	6
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.8	0.5
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	0.4	0.1
<i>Dampiera candicans</i>	0.2	0.2
<i>Eriachne mucronata</i>	0.3	2
<i>Euphorbia careyi</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	0.6	0.4
<i>Indigofera monophylla</i>	0.1	0.3
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	2	0.2
<i>Solanum phlomoides</i>	0.5	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.3	0.1
<i>Tribulus suberosus</i>	0.4	0.1
<i>Triodia brizoides</i>	0.2	20
<i>Triodia wiseana</i>	0.3	64
<i>Triumfetta propinqua</i>	0.1	0.1



**PHOTO**





Site Name: TRH056  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 28/06/2018  
 GPS Location: GDA94 Zone 50 673280E 7653422N  
 Landform Type: Crest  
 Slope Class: Steep (23 degrees)  
 Aspect: ENE  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Soil Depth: Skeletal  
 Rock Outcrop: Ironstone, 20-50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, 2-6mm  
 CF Types: Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1	1
<i>Acacia inaequilatera</i>	0.5	0.5
<i>Boerhavia gardneri</i>	0.2	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.3	0.3
<i>Cullen leucochaetes</i>	1.5	0.5
<i>Cymbopogon ambiguus</i>	0.3	2
<i>Dampiera candidans</i>	0.1	0.3
<i>Euphorbia careyi</i>	0.1	0.2
<i>Gossypium australe</i>	0.5	1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	0.5
<i>Indigofera monophylla</i>	0.5	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.7	0.3
<i>Tephrosia densa</i>	0.4	0.1
<i>Tribulus suberosus</i>	0.4	0.3
<i>Triodia brizoides</i>	0.3	20
<i>Triodia scintillans</i>	0.2	3
<i>Triodia wiseana</i>	0.3	20



**PHOTO**





Site Name: TRH057  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 28/06/2018  
 GPS Location: GDA94 Zone 50 673553E 7653900N  
 Landform Type: Crest  
 Slope Class: Very Steep (37 degrees)  
 Aspect: NNW  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Soil Depth: Skeletal  
 Rock Outcrop: Granite, >50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, 2-6mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Cymbopogon ambiguus</i>	0.2	0.1
<i>Cyperus hesperius</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.1	1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	6	2
<i>Euphorbia careyi</i>	0.1	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	0.3	0.3
<i>Terminalia supranitifolia</i> (P3)	0.5	0.5
<i>Triodia brizoides</i>	0.1	5
<i>Triodia wiseana</i>	0.1	7



**PHOTO**





Site Name: TRH058  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 28/06/2018  
 GPS Location: GDA94 Zone 50 673796E 7653684N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: ENE  
 Soil Type: Sandy Loam  
 Soil Colour: Red  
 Soil Depth: Shallow  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: River stones (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> sp. Dioicum (A.A. Mitchell PRP 1618)	0.6	0.1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	2	35
<i>Amaranthus undulatus</i>	1	0.5
<i>Boerhavia coccinea</i>	0.1	0.1
<i>Boerhavia gardneri</i>	0.3	0.2
<i>Cajanus cinereus</i>	0.4	0.2
* <i>Cenchrus ciliaris</i>	0.1	0.4
<i>Chrysopogon fallax</i>	0.2	3
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.4	0.1
<i>Corymbia hamersleyana</i>	1.8	15
<i>Cymbopogon ambiguus</i>	0.3	3
<i>Cyperus hesperius</i>	0.2	0.1
<i>Enneapogon caeruleus</i>	0.2	0.1
<i>Eriachne mucronata</i>	0.1	2
<i>Eriachne tenuiculmis</i>	0.2	5
<i>Eucalyptus victrix</i>	1.6	10
<i>Euphorbia careyi</i>	0.1	0.1
<i>Euphorbia clementii</i> (P3)	0.1	0.1
<i>Gossypium australe</i>	0.3	3
<i>Heliotropium tenuifolium</i>	0.1	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.3	0.1
<i>Hybanthus aurantiacus</i>	0.1	0.5
<i>Indigofera monophylla</i>	0.4	5
<i>Jasminum didymum</i> subsp. <i>lineare</i>		0.5
<i>Melaleuca linophylla</i>	2	3
<i>Phyllanthus maderaspatensis</i>	0.3	0.1
<i>Polymeria ambigua</i>	0.1	1
<i>Pterocaulon sphacelatum</i>	0.6	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.2
<i>Rhynchosia minima</i>		0.3
<i>Senna notabilis</i>	0.1	0.3
<i>Solanum phlomoides</i>	0.2	0.1
<i>Swainsona formosa</i>	0.2	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.2	0.1
<i>Tribulus suberosus</i>	0.1	0.1
<i>Triodia epactia</i>	0.4	1



<i>Triodia wiseana</i>	0.1	0.5
<i>Triumfetta propinqua</i>	0.4	0.3

**PHOTO**



Site Name: TRH059  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 28/06/2018  
 GPS Location: GDA94 Zone 50 673905E 7654186N  
 Landform Type: Upper Slope  
 Slope Class: Very Steep (37 degrees)  
 Aspect: E  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Soil Depth: Skeletal  
 Rock Outcrop: Ironstone, 20-50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, 2-6mm  
 CF Types: Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.5	0.5
<i>Acacia inaequilatera</i>	2	2.5
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.3	0.2
<i>Corymbia hamersleyana</i>	4	3
<i>Cymbopogon ambiguus</i>	0.5	0.5
<i>Cyperus hesperius</i>	0.2	0.1
<i>Dampiera candidans</i>	0.3	0.2
<i>Eriachne mucronata</i>	0.2	0.3
<i>Euphorbia careyi</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	2
<i>Tribulus suberosus</i>	0.3	0.2
<i>Triodia wiseana</i>	0.4	60
<i>Triumfetta propinqua</i>	0.3	0.1



**PHOTO**





Site Name: TRH060  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 28/06/2018  
 GPS Location: GDA94 Zone 50 674326E 7654183N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: SE  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Soil Depth: Skeletal  
 Rock Outcrop: Granite, 10-20% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, 2-6mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	1	0.3
<i>Acacia maitlandii</i>	1.5	2
<i>Acacia orthocarpa</i>	1.5	25
<i>Acacia spondylophylla</i>	0.4	10
<i>Acacia stellaticeps</i>	0.8	4
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2	3
<i>Corymbia hamersleyana</i>	8	1.5
<i>Dampiera candidans</i>	0.5	0.2
<i>Fimbristylis dichotoma</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.3	0.2
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	3
<i>Pluchea tetranthera</i>	0.4	0.2
<i>Triodia brizoides</i>	0.3	65
<i>Triodia epactia</i>	0.4	25



**PHOTO**





Site Name: TRH061  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 28/06/2018  
 GPS Location: GDA94 Zone 50 674323E 7654539N  
 Landform Type: Lower Slope  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: NW  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Soil Depth: Skeletal  
 Rock Outcrop: Granite, 10-20% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, 2-6mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia spondylophylla</i>	0.5	25
<i>Acacia tumida</i> var. <i>pilbarensis</i>	4	17
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.4	0.5
<i>Dampiera candidans</i>	0.6	0.1
<i>Eriachne mucronata</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.3	0.2
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2.5	3
<i>Indigofera monophylla</i>	0.3	0.1
<i>Triodia epactia</i>	0.4	59
<i>Triodia wiseana</i>	0.4	1



**PHOTO**





Site Name: TRH062  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 674900E 7654560N  
 Landform Type: Plain  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: SE  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Soil Depth: Skeletal  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.5	1
<i>Acacia orthocarpa</i>	2	4
<i>Acacia spondylophylla</i>	0.4	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2	3
<i>Bonamia</i> aff. <i>pilbarensis</i>	0.1	0.1
<i>Codonocarpus cotinifolius</i>	1	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	0.1
<i>Indigofera monophylla</i>	0.2	0.1
<i>Ptilotus calostachyus</i>	0.6	0.1
<i>Triodia brizoides</i>	0.3	35
<i>Triodia epactia</i>	0.5	10
<i>Triodia lanigera</i>	0.4	35



**PHOTO**





Site Name: TRH063  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 02/07/2018  
 GPS Location: GDA94 Zone 50 674996E 7655241N  
 Landform Type: Plain  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: SE  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Soil Depth: Skeletal  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia bivenosa</i>	0.8	0.3
<i>Acacia inaequilatera</i>	2	0.5
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Cleome viscosa</i>	0.2	0.1
<i>Corymbia hamersleyana</i>	8	2
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.3	0.2
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Tribulopsis angustifolia</i>	0.3	10
<i>Tribulus hirsutus</i>	0.2	0.1
<i>Triodia scintillans</i>	0.1	25
<i>Triodia wiseana</i>	0.4	2



**PHOTO**





Site Name: TRH064  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 02/07/2018  
 GPS Location: GDA94 Zone 50 675294E 7655120N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: SSE  
 Soil Type: Sandy Loam  
 Soil Colour: Orange  
 Soil Depth: Moderate  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: River stones (other)  
 Vegetation Condition: Northern Vegetation Condition - P - Poor  
 Disturbance: Exotic Weeds - Moderate to high weed cover, Pig/Animal Disturbance - Cattle and kangaroo activity

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	0.5	18
<i>Acacia tumida</i> var. <i>pilbarensis</i>	1.2	0.2
<i>Adriana tomentosa</i> var. <i>tomentosa</i>	0.6	0.1
* <i>Aerva javanica</i>	0.4	4
<i>Boerhavia burbidgeana</i>	0.1	0.1
<i>Boerhavia coccinea</i>	0.2	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
* <i>Cenchrus ciliaris</i>	0.2	15
* <i>Cenchrus setiger</i>	0.3	15
<i>Cleome viscosa</i>	0.2	0.1
<i>Corchorus parviflorus</i>	0.3	0.5
<i>Corymbia hamersleyana</i>	8	2
<i>Cymbopogon ambiguus</i>	0.4	4
? <i>Dysphania</i> sp.	0.3	0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Fimbristylis rara</i>	0.1	0.1
<i>Gossypium australe</i>	0.3	0.4
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	0.5	2
<i>Heliotropium tenuifolium</i>	0.2	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.5	0.1
<i>Hybanthus aurantiacus</i>	0.1	0.3
<i>Indigofera monophylla</i>	0.3	10
<i>Petalostylis labicheoides</i>	1.2	0.8
<i>Phyllanthus maderaspatensis</i>	0.6	0.1
<i>Polymeria ambigua</i>	0.1	0.2
<i>Pterocaulon sphacelatum</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.5
<i>Rhynchosia minima</i>		0.1
<i>Santalum lanceolatum</i>		
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.5	0.1
<i>Senna glutinosa</i> x	1	0.1
<i>Solanum phlomoides</i>	0.1	0.2
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.3	0.4
<i>Tribulus hirsutus</i>	0.1	0.1



<i>Triodia epactia</i>	0.2	3
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**PHOTO**



Site Name: TRH065  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 02/07/2018  
 GPS Location: GDA94 Zone 50 675159E 7655527N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: SSE  
 Soil Type: Loam  
 Soil Colour: Orange  
 Soil Depth: Moderate  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: River stones (other)  
 Vegetation Condition: Northern Vegetation Condition - P - Poor  
 Disturbance: Exotic Weeds - High weed cover, Pig/Animal Disturbance - Cattle activity

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia orthocarpa</i>	3	0.5
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	2	20
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2.2	4
* <i>Aerva javanica</i>	0.6	8
<i>Boerhavia burbidgeana</i>	0.1	0.1
<i>Boerhavia gardneri</i>	0.2	0.1
* <i>Cenchrus ciliaris</i>	0.1	35
* <i>Cenchrus setiger</i>	0.2	10
<i>Cleome viscosa</i>	0.4	0.1
<i>Corchorus parviflorus</i>	0.2	0.1
<i>Corymbia hamersleyana</i>	4	0.5
<i>Gossypium australe</i>	0.4	0.8
<i>Hybanthus aurantiacus</i>	0.1	0.3
<i>Indigofera monophylla</i>	0.4	7
<i>Notoleptopus decaisnei</i>	0.2	0.1
<i>Phyllanthus maderaspatensis</i>	0.5	0.1
<i>Polymeria ambigua</i>	0.1	0.1
<i>Pterocaulon sphacelatum</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.2
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1	0.5
<i>Senna ?glaucofolia</i>	1	0.3
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.8	0.5
<i>Senna notabilis</i>	0.1	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.4	0.5
<i>Triodia epactia</i>	0.3	15



**PHOTO**





Site Name: TRH066  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 02/07/2018  
 GPS Location: GDA94 Zone 50 674911E 7655515N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: SE  
 Soil Type: Sandy Loam  
 Soil Colour: Orange  
 Soil Depth: Skeletal  
 Rock Outcrop: Ironstone, 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	1.5	4
<i>Acacia orthocarpa</i>	2.2	3
<i>Acacia spondylophylla</i>	0.5	2
<i>Boerhavia coccinea</i>	0.2	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.4	0.1
<i>Corymbia hamersleyana</i>	5	8
<i>Eriachne mucronata</i>	0.2	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.3
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.2
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.2	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.1	0.1
<i>Triodia epactia</i>	0.4	13
<i>Triodia scintillans</i>	0.3	4
<i>Triodia wiseana</i>	0.4	12



**PHOTO**





Site Name: TRH067  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 02/07/2018  
 GPS Location: GDA94 Zone 50 675351E 7655801N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: E  
 Soil Type: Sandy Loam  
 Soil Colour: Red  
 Soil Depth: Skeletal  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1	0.5
<i>Acacia orthocarpa</i>	2.2	4
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	4	1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	1.2	0.5
<i>Triodia epactia</i>	0.3	4
<i>Triodia lanigera</i>	0.3	88



**PHOTO**





Site Name: W01A  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 23/04/2018  
 GPS Location: GDA94 Zone 50 671921E 7655136N  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>		1
<i>Aristida holathera</i> var. <i>holathera</i>		1
<i>Corchorus parviflorus</i>		1
<i>Corymbia hamersleyana</i>		1
<i>Dampiera candicans</i>		1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>		1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		1
<i>Goodenia stobbsiana</i>		1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>		1
<i>Indigofera monophylla</i>		1
<i>Ptilotus calostachyus</i>		1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)		1
<i>Tephrosia virens</i>		1
<i>Triodia brizoides</i>		1
<i>Triodia epactia</i>		1
<i>Triumfetta maconochieana</i>		1

**PHOTO**



Site Name: W02A  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 25/04/2018  
 GPS Location: GDA94 Zone 50 671753E 7653638N  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>		1
<i>Acacia inaequilatera</i>		1
<i>Bonamia pilbarensis</i>		1
<i>Corchorus parviflorus</i>		1
<i>Cymbopogon ambiguus</i>		1
<i>Cyperus hesperius</i>		1
<i>Euphorbia careyi</i>		1
<i>Indigofera monophylla</i>		1
<i>Polygala glaucifolia</i>		1
<i>Triodia brizoides</i>		1
<i>Triodia wiseana</i>		1

**PHOTO**



Site Name: W03A  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 25/04/2018  
 GPS Location: GDA94 Zone 50 671651E 7654754N  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>		1
<i>Acacia tumida</i> var. <i>pilbarensis</i>		1
<i>Corymbia hamersleyana</i>		1
<i>Cymbopogon ambiguus</i>		1
<i>Cyperus hesperius</i>		1
<i>Dampiera candidans</i>		1
<i>Eriachne ciliata</i>		1
<i>Eriachne mucronata</i>		1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>		1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>		1
<i>Indigofera monophylla</i>		1
<i>Ptilotus astrolasius</i>		1
<i>Ptilotus fusiformis</i>		1
<i>Ptilotus incanus</i>		1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)		1
<i>Solanum phlomoides</i>		1
<i>Triodia brizoides</i>		1
<i>Triodia epactia</i>		1



**PHOTO**





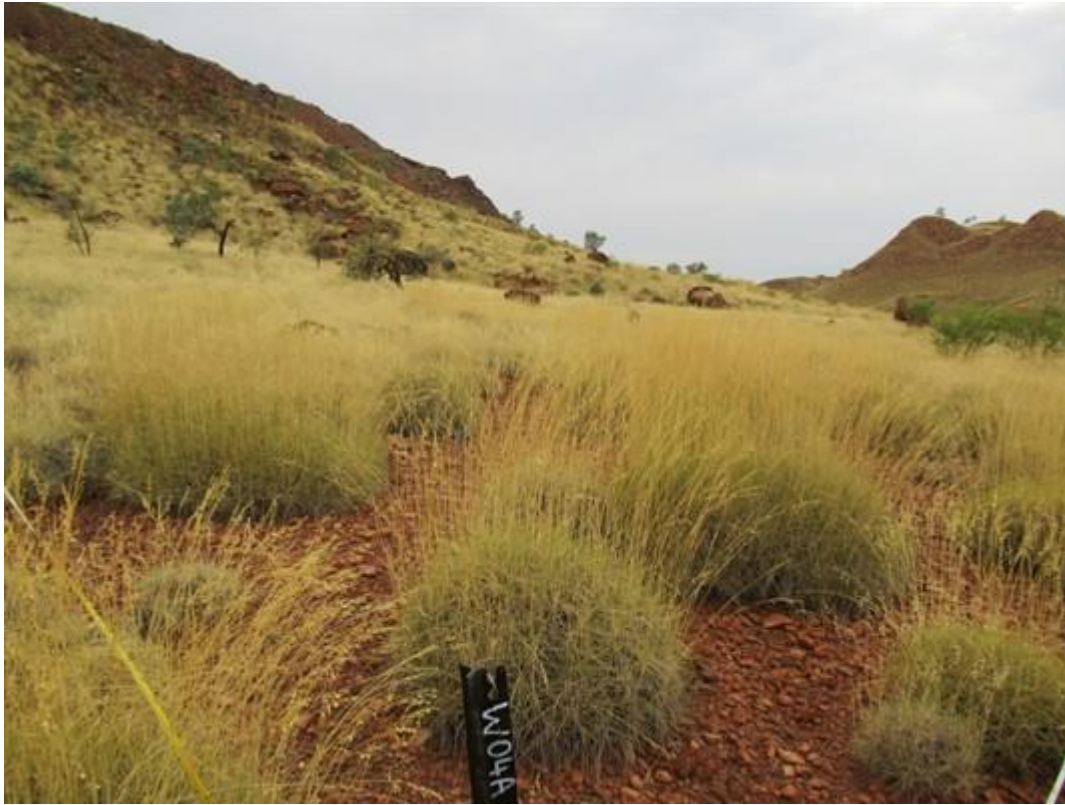
Site Name: W04A  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 26/04/2018  
 GPS Location: GDA94 Zone 50 673059E 7653962N  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>		1
<i>Acacia inaequilatera</i>		1
<i>Boerhavia gardneri</i>		1
<i>Bonamia pilbarensis</i>		1
<i>Cleome viscosa</i>		1
<i>Corchorus parviflorus</i>		1
<i>Cucumis variabilis</i>		1
<i>Cyperus hesperius</i>		1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>		1
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>		1
<i>Goodenia stobbsiana</i>		1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>		1
<i>Hakea lorea</i> subsp. <i>lorea</i>		1
<i>Indigofera monophylla</i>		1
<i>Rhynchosia minima</i>		1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>		1
<i>Solanum phlomoides</i>		1
<i>Swainsona formosa</i>		1
<i>Triodia brizoides</i>		1
<i>Triodia epactia</i>		1
<i>Triodia scintillans</i>		1
<i>Triodia wiseana</i>		1
<i>Triumfetta maconochieana</i>		1



**PHOTO**





Site Name: W05A  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 28/04/2018  
 GPS Location: GDA94 Zone 50 671387E 7657491N  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2 years / > 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>		1
<i>Acacia inaequilatera</i>		1
<i>Bonamia pilbarensis</i>		1
<i>Cassytha capillaris</i>		1
<i>Corchorus parviflorus</i>		1
<i>Corymbia hamersleyana</i>		1
<i>Cymbopogon ambiguus</i>		1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>		1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		1
<i>Euphorbia careyi</i>		1
<i>Goodenia stobbsiana</i>		1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>		1
<i>Indigofera monophylla</i>		1
<i>Ptilotus astrolasius</i>		1
<i>Ptilotus calostachyus</i>		1
<i>Ptilotus incanus</i>		1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>		1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)		1
<i>Solanum phlomoides</i>		1
<i>Triodia epactia</i>		1
<i>Triodia wiseana</i>		1



**PHOTO**





Site Name: W06A  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 29/04/2018  
 GPS Location: GDA94 Zone 50 672066E 7657228N  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2-3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>		1
<i>Acacia inaequilatera</i>		1
<i>Corchorus parviflorus</i>		1
<i>Dampiera candidans</i>		1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>		1
<i>Gomphrena cunninghamii</i>		1
<i>Gossypium australe</i>		1
<i>Hakea lorea</i> subsp. <i>lorea</i>		1
<i>Hibiscus coatesii</i>		1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>		1
<i>Indigofera monophylla</i>		1
<i>Ptilotus calostachyus</i>		1
<i>Ptilotus exaltatus</i>		1
<i>Ptilotus incanus</i>		1
<i>Salsola australis</i>		1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>		1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)		1
<i>Tribulus suberosus</i>		1
<i>Triodia epactia</i>		1
<i>Triodia wiseana</i>		1



**PHOTO**





Site Name: WD01  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 26/06/2018  
 GPS Location: GDA94 Zone 50 676365E 7663344N  
 Landform Type: Other, Stony plain (other)  
 Slope Class: Level (0 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Colluvium (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia synchronicia</i>	0.5	0.1
<i>Cynodon prostratus</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis dichotoma</i>	0.1	0.1
<i>Maireana</i> sp.	0.4	0.1
<i>Portulaca oleracea</i>	0.1	0.1
<i>Ptilotus exaltatus</i>	0.3	0.1
<i>Senna notabilis</i>		
<i>Sida fibulifera</i>	0.2	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Trianthema triquetrum</i>	0.1	0.1
<i>Triodia longiceps</i>	0.5	45



**PHOTO**





Site Name: WD02  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 26/06/2018  
 GPS Location: GDA94 Zone 50 677314E 7661282N  
 Landform Type: Plain  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: NW  
 Soil Type: Clayey Sand  
 Soil Colour: Red  
 Rock Outcrop: Granite, <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - VG - Very Good  
 Disturbance: Ground disturbance (other)  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia orthocarpa*  
 Lower Stratum 1: *Acacia stellaticeps*  
 Lower Stratum 2: *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia orthocarpa</i>	2	2
<i>Acacia stellaticeps</i>	0.6	4
<i>Aristida holathera</i> var. <i>holathera</i>	0.3	0.1
<i>Bonamia alatisemina</i>		0.1
<i>Bonamia erecta</i>	0.2	0.1
<i>Eragrostis eriopoda</i>	0.2	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Pluchea tetranthera</i>	0.4	0.1
<i>Ptilotus calostachyus</i>	0.2	0.1
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.2	0.1
<i>Triodia epactia</i>	0.2	0.1
<i>Triodia lanigera</i>	0.5	50
<i>Yakirra australiensis</i> var. <i>australiensis</i>	0.1	0.1



**PHOTO**





Site Name: WD03  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 26/06/2018  
 GPS Location: GDA94 Zone 50 675858E 7663069N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Level (0 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Calcrete, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	0.3	0.1
<i>Acacia bivenosa</i>	1	0.3
<i>Acacia inaequilatera</i>	2.5	3.5
<i>Bonamia erecta</i>	0.4	0.3
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Chrysopogon fallax</i>	0.5	0.2
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.2	0.1
<i>Codonocarpus cotinifolius</i>	1.5	0.2
<i>Corchorus parviflorus</i>	0.6	0.5
<i>Corymbia hamersleyana</i>	5.5	7
<i>Eragrostis eriopoda</i>	0.3	0.1
<i>Eriachne mucronata</i>	0.4	0.3
<i>Goodenia microptera</i>	0.3	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.5	0.1
<i>Heliotropium chrysocarpum</i>	0.4	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.3	0.1
<i>Hybanthus aurantiacus</i>	0.5	0.1
<i>Indigofera monophylla</i>	0.5	0.1
<i>Ptilotus astrolasius</i>	0.5	0.4
<i>Ptilotus calostachyus</i>	0.8	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.5	0.2
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.5	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia chichesterensis</i> (P3)	0.3	25
<i>Triodia epactia</i>	0.4	20



**PHOTO**





Site Name: WD04  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 27/06/2018  
 GPS Location: GDA94 Zone 50 676965E 7660809N  
 Landform Type: Lower Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: SW  
 Soil Type: Clayey Sand  
 Soil Colour: Orange  
 Rock Outcrop: Granite, 20-50% bedrock exposed  
 CF Abundance: <2%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia orthocarpa*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia orthocarpa</i>	2.5	3.5
<i>Acacia tumida</i> var. <i>pilbarensis</i>	1.2	0.5
<i>Aristida contorta</i>	0.1	0.1
<i>Aristida holathera</i> var. <i>holathera</i>	0.5	0.1
<i>Bonamia media</i>		
<i>Bonamia pannosa</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.7	0.1
<i>Desmodium filiforme</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	0.5	0.1
<i>Euphorbia vaccaria</i> var. <i>vaccaria</i>		0.1
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	0.2	0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.2	0.1
<i>Fimbristylis dichotoma</i>	0.3	0.1
<i>Goodenia stobbsiana</i>	0.4	0.1
<i>Hibiscus leptocladus</i>	0.2	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.5	0.1
<i>Hybanthus aurantiacus</i>	0.4	0.1
<i>Ipomoea muelleri</i>		0.1
<i>Isotropis atropurpurea</i>	0.7	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Pluchea ferdinandi-muelleri</i>	0.5	0.1
<i>Pluchea tetranthera</i>	0.6	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.8	0.1
<i>Rhynchosia minima</i>		0.1
<i>Schizachyrium fragile</i>	0.2	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Streptoglossa decurrens</i>	0.2	0.1
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>	0.1	0.1
<i>Tephrosia virens</i>	0.9	0.1



<i>Trachymene oleracea</i>	1.2	0.2
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.9	60
<i>Triodia lanigera</i>	0.8	1
<i>Tripogonella loliiformis</i>	0.1	0.1
<i>Triumfetta johnstonii</i>	0.6	0.1
<i>Yakirra australiensis</i> var. <i>australiensis</i>	0.1	0.1
<i>Zornia albiflora</i>	0.1	0.1

**PHOTO**



Site Name: WD05  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 27/06/2018  
 GPS Location: GDA94 Zone 50 671365E 7656316N  
 Landform Type: Mid Slope  
 Slope Class: Steep (23 degrees)  
 Aspect: NW  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Ironstone, 10-20% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 1 year

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Boerhavia gardneri</i>	0.2	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.2	0.1
<i>Corchorus parviflorus</i>	0.2	0.3
<i>Cymbopogon ambiguus</i>	0.2	0.1
<i>Cyperus hesperius</i>	0.2	0.1
<i>Eriachne aristidea</i>	0.1	0.1
<i>Eriachne ciliata</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.2
<i>Euphorbia careyi</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Heliotropium cunninghamii</i>	0.2	0.1
<i>Heliotropium pachyphyllum</i>	0.2	0.1
<i>Hibiscus ?leptocladus</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.2
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.1	0.1
<i>Rhynchosia minima</i>		0.1
<i>Solanum horridum</i>	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Tribulus suberosus</i>	0.2	0.1
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia wiseana</i>	0.3	25
<i>Triumfetta propinqua</i>	0.1	0.1



**PHOTO**





Site Name: WD06  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 27/06/2018  
 GPS Location: GDA94 Zone 50 676599E 7660402N  
 Landform Type: Hillock  
 Slope Class: Steep (23 degrees)  
 Aspect: NW  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Granite, Ironstone, Quartz (other), >50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia inaequilatera*  
 Mid Stratum 2: *Senna glutinosa* subsp. *glutinosa*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.4	0.2
<i>Acacia inaequilatera</i>	2	1
<i>Bonamia pilbarensis</i>		0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cassytha capillaris</i>		0.1
<i>Corchorus parviflorus</i>	0.2	0.1
<i>Dampiera candicans</i>		
<i>Eriachne mucronata</i>	0.2	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.2	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.6	0.1
<i>Pluchea tetranthera</i>	0.8	0.1
<i>Polygala glaucifolia</i>		
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.5	0.2
<i>Senna symonii</i>	1	0.1
<i>Solanum phlomoides</i>	0.4	0.1
<i>Tribulus suberosus</i>	0.4	0.1
<i>Triodia epactia</i>	0.6	85
<i>Triodia wiseana</i>	0.5	0.5
<i>Triumfetta maconochieana</i>	0.3	0.1



**PHOTO**





Site Name: WD07  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 27/06/2018  
 GPS Location: GDA94 Zone 50 671966E 7655873N  
 Landform Type: Upper Slope  
 Slope Class: Steep (23 degrees)  
 Aspect: NW  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Ironstone, 10-20% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.7	1
<i>Acacia inaequilatera</i>	1	0.2
<i>Boerhavia gardneri</i>	0.2	0.1
<i>Bonamia pilbarensis</i>		0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Cymbopogon ambiguus</i>	0.3	0.1
<i>Cyperus hesperius</i>	0.3	0.1
<i>Eriachne mucronata</i>	0.3	0.2
<i>Euphorbia careyi</i>	0.2	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.6	0.2
<i>Hakea lorea</i> subsp. <i>lorea</i>	0.5	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	0.1
<i>Terminalia supranitifolia</i> (P3)	0.8	0.1
<i>Tribulus suberosus</i>	1	0.1
<i>Triodia wiseana</i>	0.5	45
<i>Triumfetta propinqua</i>	0.4	0.1



**PHOTO**





Site Name: WD08  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 27/06/2018  
 GPS Location: GDA94 Zone 50 676641E 7660888N  
 Landform Type: Other, Low rise (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: NW  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Orange  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia ancistrocarpa*  
 Lower Stratum 1: *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	1.7	2
<i>Acacia ancistrocarpa x orthocarpa</i>	2	0.1
<i>Acacia inaequilatera</i>	1	0.1
<i>Bonamia aff. pilbarensis</i>		0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>		
<i>Codonocarpus cotinifolius</i>	0.8	0.1
<i>Dampiera candidans</i>	1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.4	0.1
<i>Tephrosia clementii</i>	0.2	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia lanigera</i>	0.4	70



**PHOTO**





Site Name: WD09  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 27/06/2018  
 GPS Location: GDA94 Zone 50 671875E 7656139N  
 Landform Type: Crest  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: W  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Ironstone, <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 1 year

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.1	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.2	0.1
<i>Corymbia hamersleyana</i>	3	0.5
<i>Dampiera candidans</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.2	0.1
<i>Euphorbia careyi</i>	0.2	0.1
<i>Fimbristylis simulans</i>	0.2	0.1
<i>Gomphrena cunninghamii</i>	0.2	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	0.6	5
<i>Heliotropium skeleton</i>		
<i>Indigofera monophylla</i>	0.1	0.2
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1.5	0.1
<i>Oldenlandia crouchiana</i>	0.2	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Ptilotus axillaris</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Senna notabilis</i>	0.2	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.1	0.1
<i>Solanum horridum</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Trigastrotheca molluginea</i>	0.2	0.1
<i>Triodia brizoides</i>	0.2	7
<i>Triodia epactia</i>	0.1	7
<i>Triodia wiseana</i>	0.3	0.1
<i>Yakirra australiensis</i> var. <i>australiensis</i>	0.1	0.1



**PHOTO**





Site Name: WD10  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 27/06/2018  
 GPS Location: GDA94 Zone 50 676986E 7661477N  
 Landform Type: Plain  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: N  
 Soil Type: Sandy Clay  
 Soil Colour: Orange  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: <2%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia ancistrocarpa*, *Acacia bivenosa*  
 Lower Stratum 1: *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	1.8	0.8
<i>Acacia bivenosa</i>	1.5	3
<i>Acacia inaequilatera</i>	1.4	0.1
<i>Acacia stellaticeps</i>	0.5	1
<i>Bonamia erecta</i>	0.2	0.2
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.4	0.1
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>		
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia lanigera</i>	0.6	60



**PHOTO**





Site Name: WD11  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 27/06/2018  
 GPS Location: GDA94 Zone 50 672173E 7656268N  
 Landform Type: Upper Slope  
 Slope Class: Steep (23 degrees)  
 Aspect: SE  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Metamorphic (other), 10-20% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Metamorphic, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 1 year / > 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.5	0.3
<i>Boerhavia gardneri</i>	0.4	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.1	0.1
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	0.5	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	2.5	0.3
<i>Cymbopogon ambiguus</i>	0.1	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.2	0.1
<i>Eriachne ciliata</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	4	1
<i>Euphorbia careyi</i>	0.1	0.1
* <i>Flaveria trinervia</i>	0.3	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1	0.2
<i>Hakea lorea</i> subsp. <i>lorea</i>	1.5	0.2
<i>Indigofera monophylla</i>	0.1	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Ptilotus axillaris</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.6	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.2	0.1
<i>Senna notabilis</i>	0.2	0.1
<i>Solanum horridum</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Tribulus suberosus</i>	0.6	0.1
<i>Triodia brizoides</i>	0.1	3
<i>Triodia wiseana</i>	0.5	35
<i>Triumfetta maconochieana</i>	0.1	0.1



**PHOTO**





Site Name: WD12  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 27/06/2018  
 GPS Location: GDA94 Zone 50 677015E 7661962N  
 Landform Type: Plain  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: NW  
 Soil Type: Sandy Clay  
 Soil Colour: Light brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia orthocarpa*  
 Lower Stratum 1: *Triodia angusta*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia bivenosa</i>	1.3	0.1
<i>Acacia inaequilatera</i>	1.3	0.1
<i>Acacia orthocarpa</i>	2	0.2
<i>Acacia stellaticeps</i>	0.8	0.1
<i>Bonamia</i> aff. <i>pilbarensis</i>	0.1	0.1
* <i>Cenchrus ciliaris</i>	0.4	0.1
<i>Chrysopogon fallax</i>	1	0.1
<i>Codonocarpus cotinifolius</i>	3	0.1
<i>Corchorus parviflorus</i>	0.2	0.1
<i>Corymbia hamersleyana</i>	4	0.3
<i>Euphorbia clementii</i> (P3)	0.2	0.1
<i>Euphorbia vaccaria</i> var. <i>vaccaria</i>	0.1	0.1
<i>Goodenia microptera</i>	0.3	0.1
<i>Heliotropium tenuifolium</i>	0.1	0.1
<i>Hybanthus aurantiacus</i>	0.4	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Phyllanthus maderaspatensis</i>		
<i>Pluchea ferdinandi-muelleri</i>	0.6	0.1
<i>Pluchea tetranthera</i>	0.5	0.1
<i>Polymeria ambigua</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.2	0.1
<i>Ptilotus axillaris</i>		0.1
<i>Rhynchosia minima</i>		0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Solanum diversiflorum</i>		
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.3	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Triodia angusta</i>	0.7	75
<i>Triodia epactia</i>	0.5	0.1
<i>Triodia wiseana</i>	0.7	0.2



<i>Yakirra australiensis</i> var. <i>australiensis</i>	0.1	0.1
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**PHOTO**



Site Name: WD13  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 27/06/2018  
 GPS Location: GDA94 Zone 50 672481E 7655580N  
 Landform Type: Crest  
 Slope Class: Moderately Inclined (10 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Ironstone, 2-10% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 1 year

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.4	0.4
<i>Acacia tumida</i> var. <i>pilbarensis</i>	0.1	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Dampiera candidans</i>	0.5	1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	4	0.5
<i>Euphorbia careyi</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	0.5	0.5
<i>Hakea lorea</i> subsp. <i>lorea</i>	0.3	0.1
<i>Heliotropium skeleton</i>	0.4	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Ptilotus axillaris</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Senna notabilis</i>	0.2	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.2	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Tephrosia virens</i>	0.3	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.2	20
<i>Triodia wiseana</i>	0.2	2
<i>Triumfetta maconochieana</i>	0.3	0.1
<i>Yakirra australiensis</i> var. <i>australiensis</i>	0.1	0.1



**PHOTO**





Site Name: WD14  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 27/06/2018  
 GPS Location: GDA94 Zone 50 676768E 7661888N  
 Landform Type: Plain  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: NE  
 Soil Type: Sandy Clay  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 2-10%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia bivenosa*  
 Lower Stratum 1: *Acacia stellaticeps*  
 Lower Stratum 2: *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia bivenosa</i>	1.5	2
<i>Acacia sphaerostachya</i>	1.3	0.1
<i>Acacia stellaticeps</i>	0.8	20
<i>Bonamia erecta</i>	0.4	0.2
<i>Pluchea tetranthera</i>	0.5	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.8	0.1
<i>Triodia epactia</i>	0.5	0.1
<i>Triodia lanigera</i>	0.8	65



**PHOTO**





Site Name: WD15  
 Site Type: QUADRAT  
 Dimensions: 20m x 125m  
 Survey Date: 27/06/2018  
 GPS Location: GDA94 Zone 50 672472E 7655360N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Ironstone, <2% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 1 year

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	4	0.3
<i>Acacia tumida</i> var. <i>pilbarensis</i>	0.8	10
<i>Cajanus cinereus</i>	0.4	0.1
<i>Cleome viscosa</i>	0.2	0.1
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	1	0.1
<i>Corchorus parviflorus</i>	0.3	8
<i>Cymbopogon ambiguus</i>	0.6	0.1
<i>Dampiera candidans</i>	0.4	0.2
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.3	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	1.5	0.3
<i>Euphorbia careyi</i>	0.2	0.3
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	0.5	0.2
<i>Heliotropium cunninghamii</i>	0.1	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.3	0.1
<i>Hybanthus aurantiacus</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.5	1
<i>Jasminum didymum</i> subsp. <i>lineare</i>		5
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.2	0.1
<i>Ptilotus calostachyus</i>	1	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.5	1.5
<i>Senna notabilis</i>	0.3	0.2
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.1	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Tinospora smilacina</i>	0.1	0.1
<i>Triodia epactia</i>	0.3	5
<i>Triodia wiseana</i>	0.4	0.2
<i>Triumfetta maconochieana</i>	0.3	0.1
<i>Triumfetta propinqua</i>	0.3	0.1



**PHOTO**





Site Name: WD16  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 27/06/2018  
 GPS Location: GDA94 Zone 50 676807E 7661526N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: N  
 Soil Type: Sandy Clay  
 Soil Colour: Orange  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 2-10%  
 CF Sizes: 2-6mm, 6-20mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia orthocarpa*, *Acacia tumida* var. *pilbarensis*  
 Lower Stratum 1: *Triodia epactia*  
 Lower Stratum 2: *Chrysopogon fallax*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia bivenosa</i>	1.8	0.2
<i>Acacia inaequilatera</i>	1.8	0.1
<i>Acacia orthocarpa</i>	3.5	45
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3.5	2
<i>Aristida contorta</i>	0.2	0.1
<i>Aristida holathera</i> var. <i>holathera</i>	0.4	0.1
<i>Boerhavia burbridgeana</i>		0.1
<i>Boerhavia coccinea</i>		0.1
<i>Bonamia erecta</i>	0.4	0.1
<i>Bonamia</i> aff. <i>pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cajanus cinereus</i>	0.4	0.2
<i>Cassylia capillaris</i>		0.1
* <i>Cenchrus ciliaris</i>	0.3	0.1
<i>Chrysopogon fallax</i>	0.7	15
<i>Corchorus parviflorus</i>	0.5	0.1
<i>Corymbia hamersleyana</i>	4	1
<i>Cucumis variabilis</i>		0.1
<i>Eragrostis eriopoda</i>	0.5	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	0.8	0.1
<i>Euphorbia trigonosperma</i>	0.4	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.4	0.1
<i>Gossypium australe</i>	1	0.1
<i>Heliotropium tenuifolium</i>	0.2	0.1
<i>Hybanthus aurantiacus</i>	0.4	0.1
<i>Indigofera monophylla</i>	0.6	0.1
<i>Isotropis atropurpurea</i>	0.5	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>		0.1
<i>Phyllanthus maderaspatensis</i>	0.8	0.1



<i>Pluchea tetranthera</i>	0.4	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polymeria ambigua</i>	0.2	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Rhynchosia minima</i>		0.5
<i>Senna notabilis</i>	0.2	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.3	0.1
<i>Solanum diversiflorum</i>	0.3	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Streptoglossa decurrens</i>	0.6	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.2	0.1
<i>Tephrosia supina</i>	0.4	0.1
<i>Tinospora smilacina</i>		0.1
<i>Trachymene oleracea</i>	1	0.1
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	0.2	0.1
<i>Trigastrotheca molluginea</i>	0.2	0.1
<i>Triodia epactia</i>	0.8	70
<i>Triodia lanigera</i>	0.7	0.2
<i>Yakirra australiensis</i> var. <i>australiensis</i>	0.1	0.1

**PHOTO**



Site Name: WD17  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 27/06/2018  
 GPS Location: GDA94 Zone 50 671704E 7654292N  
 Landform Type: Lower Slope  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: W  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: Dolerite, 10-20% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Dolerite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	1
<i>Acacia inaequilatera</i>	3	3
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.2	0.1
<i>Dampiera candidans</i>	0.5	0.1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	4	1
<i>Euphorbia careyi</i>	0.2	0.1
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	1	0.1
<i>Fimbristylis dichotoma</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Gossypium australe</i>	1	0.2
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	1
<i>Indigofera monophylla</i>	0.2	0.1
<i>Indigofera rugosa</i>		
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.5	0.5
<i>Solanum phlomoides</i>	0.5	0.1
<i>Tribulus platypterus</i>	0.5	0.1
<i>Tribulus suberosus</i>	0.8	0.1
<i>Triodia brizoides</i>	0.4	55
<i>Triumfetta maconochieana</i>	0.2	0.1



**PHOTO**





Site Name: WD18  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 27/06/2018  
 GPS Location: GDA94 Zone 50 676695E 7661197N  
 Landform Type: Plain  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: N  
 Soil Type: Loamy clay (other)  
 Soil Colour: Orange  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia orthocarpa*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia orthocarpa</i>	2.2	5
<i>Bonamia aff. pilbarensis</i>	0.1	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.1	0.1
<i>Codonocarpus cotinifolius</i>	1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Pluchea ferdinandi-muelleri</i>	0.7	0.1
<i>Pluchea tetranthera</i>	0.5	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.7	70
<i>Triodia lanigera</i>	0.6	0.2



**PHOTO**





Site Name: WD19  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 27/06/2018  
 GPS Location: GDA94 Zone 50 671622E 7654093N  
 Landform Type: Other, Low rise (other)  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: WSW  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Dolerite, 2-10% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Dolerite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	2.5
<i>Acacia inaequilatera</i>	2	0.3
<i>Cassytha capillaris</i>		0.1
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	1	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Cymbopogon ambiguus</i>	1.2	0.1
<i>Dampiera candidans</i>	0.2	0.1
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2.5	0.5
<i>Hibiscus coatesii</i>	0.2	0.1
<i>Ptilotus calostachyus</i>	0.2	0.1
<i>Triodia brizoides</i>	0.4	15
<i>Triodia scintillans</i>	0.3	15
<i>Triodia wiseana</i>	0.5	25
<i>Triumfetta maconochieana</i>	0.1	0.1



**PHOTO**





Site Name: WD20  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 28/06/2018  
 GPS Location: GDA94 Zone 50 675286E 7659513N  
 Landform Type: Crest  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: W  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Quartz (other), 20-50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 2: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.6	0.5
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.1	0.1
<i>Cleome viscosa</i>	0.3	0.1
<i>Corymbia hamersleyana</i>	3.5	0.5
<i>Cymbopogon ambiguus</i>	0.6	0.1
<i>Dampiera candidans</i>	0.6	0.1
<i>Eriachne ciliata</i>	0.2	0.1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Ficus brachypoda</i>	3	0.5
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	3
<i>Paspalidium tabulatum</i>	0.4	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.3	0.1
<i>Triodia epactia</i>	0.6	80
<i>Triumfetta maconochieana</i>	0.7	0.1
<i>Triumfetta propinqua</i>	0.4	0.1



**PHOTO**





Site Name: WD21  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 28/06/2018  
 GPS Location: GDA94 Zone 50 674174E 7653998N  
 Landform Type: Lower Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: ESE  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Ironstone, Metamorphic (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.5	0.5
<i>Acacia inaequilatera</i>	4.5	4
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Corymbia hamersleyana</i>	2.5	0.5
<i>Dampiera candicans</i>	0.5	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.4	0.1
<i>Heliotropium skeleton</i>	0.4	0.1
<i>Ptilotus astrolasius</i>	0.5	0.3
<i>Ptilotus calostachyus</i>	1	0.1
<i>Triodia epactia</i>	0.4	5
<i>Triodia lanigera</i>	0.4	40
<i>Triodia wiseana</i>	0.4	10



**PHOTO**





Site Name: WD22  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 28/06/2018  
 GPS Location: GDA94 Zone 50 675707E 7659723N  
 Landform Type: Upper Slope  
 Slope Class: Precipitous (60 degrees)  
 Aspect: NNW  
 Soil Type: Sandy Loam  
 Soil Colour: Brown  
 Rock Outcrop: Quartz (other), >50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 2: *Acacia acradenia*, *Gossypium australe*  
 Lower Stratum 1: *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.4	0.5
<i>Boerhavia gardneri</i>		
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.3	0.1
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	0.4	0.1
<i>Cyperus hesperius</i>	0.2	0.1
<i>Eriachne ciliata</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.2	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.1	0.1
<i>Gossypium australe</i>	1.2	1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.8	0.8
<i>Indigofera monophylla</i>	0.3	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polycarpaea longiflora</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Ptilotus incanus</i>	0.2	0.1
<i>Solanum horridum</i>	0.2	0.1
<i>Tephrosia virens</i>	1	0.2
<i>Tribulus suberosus</i>	0.9	0.2
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia wiseana</i>	0.8	80
<i>Triumfetta propinqua</i>	0.6	0.6



**PHOTO**





Site Name: WD23  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 28/06/2018  
 GPS Location: GDA94 Zone 50 672995E 7654086N  
 Landform Type: Upper Slope  
 Slope Class: Steep (23 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Ironstone, 10-20% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: (other)  
 Fire: > 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> sp. Dioicum (A.A. Mitchell PRP 1618)	2	0.5
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	1.5	0.1
* <i>Aerva javanica</i>	1	0.2
<i>Amaranthus undulatus</i>	0.3	0.1
<i>Cheilanthes brownii</i>	0.1	0.1
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.1	0.1
<i>Cleome viscosa</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.4	0.1
<i>Corymbia hamersleyana</i>	2	0.5
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	0.6	0.2
<i>Cyperus hesperius</i>	0.2	0.1
<i>Eriachne mucronata</i>	0.2	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	4.5	2
<i>Euphorbia careyi</i>	0.3	0.3
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	0.2
<i>Hakea lorea</i> subsp. <i>lorea</i>	1.5	0.2
<i>Indigofera monophylla</i>	0.4	0.2
<i>Paspalidium tabulatum</i>	0.4	0.1
<i>Salsola australis</i>	0.4	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.5	1
<i>Solanum horridum</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.3	0.1
<i>Terminalia circumalata</i>	3	1
<i>Tribulus suberosus</i>	0.2	0.1
<i>Triodia brizoides</i>	0.5	30
<i>Triodia epactia</i>	0.5	15
<i>Triodia wiseana</i>	0.5	15
<i>Triumfetta propinqua</i>	0.2	0.1



**PHOTO**





Site Name: WD24  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 28/06/2018  
 GPS Location: GDA94 Zone 50 675694E 7659827N  
 Landform Type: Lower Slope  
 Slope Class: Steep (23 degrees)  
 Aspect: NNW  
 Soil Type: Sandy Loam  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*, *Acacia ancistrocarpa*  
 Lower Stratum 1: *Triodia brizoides*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.2	0.6
<i>Acacia ancistrocarpa</i>	1.4	0.3
<i>Bonamia</i> aff. <i>pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Dampiera candidans</i>	0.5	0.1
<i>Gossypium australe</i>	0.4	0.1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>		
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	0.1
<i>Indigofera monophylla</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.5	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Senna symonii</i>	0.6	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.4	0.1
<i>Tribulus suberosus</i>	0.9	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia brizoides</i>	0.6	80
<i>Triodia epactia</i>	0.7	0.2
<i>Triodia wiseana</i>	0.6	0.1



**PHOTO**





Site Name: WD25  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 29/06/2018  
 GPS Location: GDA94 Zone 50 670696E 7653373N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Colluvium (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Exotic Weeds - Some weeds, Pig/Animal Disturbance - Cattle activity  
 Fire: ~ 2 years / > 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> aff. <i>hannii</i>	0.4	0.1
<i>Abutilon</i> sp. <i>Dioicum</i> (A.A. Mitchell PRP 1618)	2.5	0.2
<i>Acacia ancistrocarpa</i>	2.5	0.4
<i>Acacia bivenosa</i>	2.5	0.3
<i>Acacia coriacea</i> subsp. <i>pendens</i>	3.5	3
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	2.5	6
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3	3
* <i>Aerva javanica</i>	0.1	0.1
<i>Boerhavia burbridgeana</i>	0.1	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Cajanus cinereus</i>	0.8	0.3
<i>Cassytha capillaris</i>		0.3
<i>Cleome viscosa</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.5	3
<i>Cymbopogon ambiguus</i>	0.6	4
<i>Enneapogon lindleyanus</i>	0.5	0.2
<i>Eriachne tenuiculmis</i>	0.5	8
<i>Eucalyptus victrix</i>	10	15
<i>Euphorbia careyi</i>	0.2	0.2
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	1	0.1
<i>Euphorbia</i> ? <i>trigonosperma</i>	0.1	0.1
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	2.5	1
<i>Gossypium australe</i>	1	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	1.7	0.2
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.4	1
<i>Hybanthus aurantiacus</i>	0.6	0.1
<i>Indigofera monophylla</i>	0.4	1
<i>Melaleuca glomerata</i>	1	2
<i>Melaleuca linophylla</i>	2.5	3
<i>Notoleptopus decaisnei</i>	0.2	0.1
<i>Phyllanthus maderaspatensis</i>	0.5	0.3
<i>Polymeria ambigua</i>	0.2	0.1
<i>Ptilotus</i> ? <i>exaltatus</i>	0.1	0.1
<i>Rhynchosia minima</i>		0.1
<i>Senna notabilis</i>	0.2	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Swainsona formosa</i>	0.3	0.1



<i>Tephrosia rosea</i> var. <i>clementii</i>	0.5	0.2
<i>Themeda triandra</i>	0.5	0.1
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	0.2	0.1
<i>Triodia epactia</i>	0.5	5
<i>Triodia wiseana</i>	0.6	2
<i>Triumfetta clementii</i>	0.1	0.1
<i>Triumfetta maconochieana</i>	0.5	0.1

**PHOTO**



Site Name: WD26  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 28/06/2018  
 GPS Location: GDA94 Zone 50 675815E 7660146N  
 Landform Type: Simple Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: NE  
 Soil Type: Sandy Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia ancistrocarpa*  
 Lower Stratum 1: *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	2	20
<i>Bonamia aff. pilbarensis</i>	0.1	0.1
<i>Codonocarpus cotinifolius</i>	1.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.2	0.1
<i>Fimbristylis simulans</i>	0.2	0.1
<i>Goodenia stobbsiana</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.8	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Trigastrotheca molluginea</i>	0.2	0.1
<i>Triodia epactia</i>	0.6	0.1
<i>Triodia lanigera</i>	0.5	50



**PHOTO**





Site Name: WD27  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 29/06/2018  
 GPS Location: GDA94 Zone 50 670135E 7653609N  
 Landform Type: Upper Slope  
 Slope Class: Very Steep (37 degrees)  
 Aspect: E  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Banded Ironstone (other), 10-20% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm, >2000mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2 years / > 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.3	0.5
<i>Amaranthus undulatus</i>	0.2	0.1
<i>Aristida burbridgeae</i>	0.5	0.3
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.6	4
<i>Cucumis variabilis</i>		0.2
<i>Cymbopogon ambiguus</i>	0.6	2
<i>Cyperus hesperius</i>	0.3	0.1
<i>Dampiera candidans</i>	0.6	1
<i>Eriachne mucronata</i>	0.3	1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.3	0.3
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	2.5	0.5
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Gossypium australe</i>	1	0.2
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	0.3	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	2.5	0.2
<i>Hibiscus goldsworthii</i>	0.5	0.1
<i>Indigofera monophylla</i>	0.3	0.2
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Paspalidium tabulatum</i>	0.4	0.2
<i>Ptilotus astrolasius</i>		
<i>Ptilotus calostachyus</i>	1	0.1
<i>Ptilotus incanus</i>	0.3	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.3	0.4
<i>Senna notabilis</i>	0.2	0.1
<i>Solanum horridum</i>	0.2	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Terminalia circumalata</i>	4.5	4
<i>Tinospora smilacina</i>		0.1
<i>Tribulus platypterus</i>	0.5	0.1
<i>Triodia wiseana</i>	0.5	25
<i>Triumfetta propinqua</i>	0.3	3



**PHOTO**





Site Name: WD28  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 28/06/2018  
 GPS Location: GDA94 Zone 50 676522E 7661016N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: NE  
 Soil Type: Clayey Sand  
 Soil Colour: Orange  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: <2%  
 CF Sizes: 2-6mm, 6-20mm  
 CF Types: Granite, Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia orthocarpa*, *Acacia tumida* var. *pilbarensis*  
 Lower Stratum 1: *Triodia epactia*  
 Lower Stratum 2: *Chrysopogon fallax*, *Paraneurachne muelleri*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia orthocarpa</i>	2.5	2
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	3	0.2
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3.5	27
<i>Aristida holathera</i> var. <i>holathera</i>	0.2	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cajanus cinereus</i>	0.7	0.1
* <i>Cenchrus ciliaris</i>	0.9	0.4
* <i>Cenchrus setiger</i>	0.8	0.1
<i>Chrysopogon fallax</i>	0.6	3
<i>Corchorus parviflorus</i>	0.5	0.1
<i>Corymbia hamersleyana</i>	4.5	2
<i>Dampiera candidans</i>	0.5	0.1
<i>Eragrostis cumingii</i>	0.3	0.1
<i>Eragrostis eriopoda</i>	0.4	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Eriachne tenuiculmis</i>	0.5	0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia trigonosperma</i>	0.1	0.1
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	0.4	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.4	0.1
<i>Gossypium australe</i>	0.8	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	0.1
<i>Hibiscus leptocladus</i>	0.1	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.6	0.2
<i>Hybanthus aurantiacus</i>	0.4	0.2
<i>Indigofera monophylla</i>	0.6	0.1
<i>Paraneurachne muelleri</i>	1	1
<i>Paspalidium rarum</i>	0.2	0.1
<i>Phyllanthus maderaspatensis</i>	1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polymeria ambigua</i>		0.1



<i>Pterocaulon sphacelatum</i>		
<i>Ptilotus astrolasius</i>	0.6	0.1
<i>Ptilotus axillaris</i>		0.1
<i>Ptilotus calostachyus</i>	0.8	0.1
<i>Ptilotus exaltatus</i>	0.1	0.1
<i>Ptilotus fusiformis</i>	0.5	0.1
<i>Salsola australis</i>	0.5	0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1	0.1
<i>Senna notabilis</i>	0.2	0.1
<i>Sida clementii</i>	0.9	0.1
<i>Solanum diversiflorum</i>	0.5	0.1
<i>Solanum phlomoides</i>	0.4	0.1
<i>Swainsona formosa</i>	0.4	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.2	0.1
<i>Tinospora smilacina</i>		0.1
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	0.7	0.1
<i>Triodia epactia</i>	0.8	65
<i>Triodia lanigera</i>	0.5	0.1
<i>Waltheria indica</i>	0.2	0.1
<i>Yakirra australiensis</i> var. <i>australiensis</i>	0.1	0.1

**PHOTO**



Site Name: WD29  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 29/06/2018  
 GPS Location: GDA94 Zone 50 669865E 7653424N  
 Landform Type: Other, Outwash plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: W  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2 years / > 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.6	0.2
<i>Acacia inaequilatera</i>	2	3
<i>Boerhavia gardneri</i>	0.1	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.2	0.8
<i>Corymbia hamersleyana</i>	5	1
<i>Dampiera candicans</i>	0.4	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia microptera</i>	0.3	0.1
<i>Goodenia stobbsiana</i>	0.3	3
<i>Heliotropium pachyphyllum</i>	0.3	0.1
<i>Heliotropium skeleton</i>	0.4	0.1
<i>Indigofera monophylla</i>	0.2	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.5	15
<i>Ptilotus calostachyus</i>	1	0.1
<i>Solanum diversiflorum</i>	0.2	0.1
<i>Tephrosia clementii</i>	0.1	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.2	0.1
<i>Triodia brizoides</i>	0.4	20
<i>Triodia scintillans</i>	0.3	3
<i>Triodia wiseana</i>	0.3	0.2



**PHOTO**





Site Name: WD30  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 28/07/2018  
 GPS Location: GDA94 Zone 50 676413E 7660952N  
 Landform Type: Plain  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: N  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia orthocarpa*  
 Lower Stratum 1: *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia orthocarpa</i>	1.9	6
<i>Bonamia aff. pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.2	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Tephrosia clementii</i>	0.1	0.1
<i>Triodia epactia</i>	0.5	0.1
<i>Triodia lanigera</i>	0.5	85



**PHOTO**





Site Name: WD31  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 29/06/2018  
 GPS Location: GDA94 Zone 50 669634E 7653542N  
 Landform Type: Ridge  
 Slope Class: Steep (23 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Dolerite, Shale (other), 10-20% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Dolerite, Shale (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	2.5	0.3
* <i>Aerva javanica</i>	0.5	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.2	0.1
<i>Cleome viscosa</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.8	2
<i>Crotalaria novae-hollandiae</i> subsp. <i>novae-hollandiae</i>	0.2	0.1
<i>Cullen leucochaetes</i>	2	2
<i>Cymbopogon ambiguus</i>	0.6	8
<i>Cyperus hesperius</i>	0.3	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.2	0.1
<i>Enneapogon lindleyanus</i>	0.2	0.1
<i>Eriachne mucronata</i>	0.3	0.2
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.2	1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Goodenia microptera</i>	0.3	0.1
<i>Gossypium australe</i>	1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	0.3	0.1
<i>Hibiscus coatesii</i>	0.4	0.1
<i>Hybanthus aurantiacus</i>	0.2	0.1
<i>Indigofera rugosa</i>	0.6	0.3
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Paspalidium tabulatum</i>	0.4	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polycarpaea longiflora</i>	0.3	0.1
<i>Ptilotus auriculifolius</i>	0.2	0.1
<i>Ptilotus calostachyus</i>	0.4	0.1
<i>Ptilotus exaltatus</i>	0.3	0.1
<i>Ptilotus fusiformis</i>	0.3	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.7	0.1
<i>Solanum diversiflorum</i>	0.2	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Swainsona formosa</i>	0.4	0.1
<i>Tephrosia densa</i>	0.3	0.1



<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Tribulus suberosus</i>	0.5	0.2
<i>Triodia brizoides</i>	0.3	5
<i>Triodia scintillans</i>	0.3	0.1
<i>Triodia wiseana</i>	0.3	15
<i>Triumfetta maconochieana</i>	0.2	0.1
<i>Triumfetta propinqua</i>	0.3	0.2

**PHOTO**



Site Name: WD32  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 28/07/2018  
 GPS Location: GDA94 Zone 50 674894E 7659399N  
 Landform Type: Mid Slope  
 Slope Class: Very Steep (37 degrees)  
 Aspect: N  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Granite, Quartz (other), <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia inaequilatera*  
 Mid Stratum 2: *Acacia acradenia*, *Acacia ancistrocarpa*  
 Lower Stratum 1: *Triodia brizoides*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.3	0.5
<i>Acacia ancistrocarpa</i>	1.4	0.2
<i>Acacia inaequilatera</i>	3	0.5
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	1	0.1
<i>Tribulus suberosus</i>	0.3	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia brizoides</i>	0.5	75
<i>Triodia epactia</i>	0.3	0.1
<i>Triodia wiseana</i>	0.6	2



**PHOTO**





Site Name: WD33  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 29/06/2018  
 GPS Location: GDA94 Zone 50 669486E 7653745N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Granite, <2% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia orthocarpa</i>	1	8
<i>Aristida contorta</i>	0.2	0.2
<i>Aristida holathera</i> var. <i>holathera</i>	0.4	3
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.6	4
<i>Eriachne aristidea</i>	0.2	0.1
<i>Eriachne ciliata</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia clementii</i> (P3)	0.3	0.1
<i>Fimbristylis dichotoma</i>	0.2	0.1
<i>Fimbristylis simulans</i>	0.2	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Goodenia microptera</i>	0.2	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Heliotropium cunninghamii</i>	0.2	0.1
<i>Heliotropium tenuifolium</i>	0.2	0.1
<i>Hibiscus coatesii</i>	1	0.1
<i>Hibiscus leptocladus</i>	0.6	0.2
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.4	0.5
<i>Indigofera rugosa</i>	0.2	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.2	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus auriculifolius</i>	0.2	0.1
<i>Ptilotus axillaris</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	1	0.1
<i>Ptilotus ?exaltatus</i>	0.1	0.1
<i>Ptilotus incanus</i>	0.4	0.1
<i>Scaevola browniana</i> subsp. <i>browniana</i>	0.3	0.1
<i>Senna notabilis</i>	0.2	0.2
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.3	0.1
<i>Solanum phlomoides</i>	0.3	0.4
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>	0.1	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.4	0.1



<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.2	0.1
<i>Triodia brizoides</i>	0.3	15
<i>Triodia epactia</i>	0.3	0.2
<i>Triodia wiseana</i>	0.3	0.2
<i>Yakirra australiensis</i> var. <i>australiensis</i>	0.1	0.1

**PHOTO**



Site Name: WD34  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 29/06/2018  
 GPS Location: GDA94 Zone 50 674005E 7656557N  
 Landform Type: Mid Slope  
 Slope Class: Steep (23 degrees)  
 Aspect: N  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Granite, <2% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - VG - Very Good  
 Disturbance: Exotic Weeds - Some weeds, Dust (other) - Significant dust  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Indigofera monophylla*  
 Lower Stratum 2: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.6	0.8
* <i>Aerva javanica</i>	0.5	0.1
<i>Boerhavia gardneri</i>	0.3	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.6	0.1
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	0.3	0.1
<i>Cyperus hesperius</i>	0.3	0.1
<i>Enneapogon lindleyanus</i>	0.4	0.1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Euphorbia careyi</i>	0.2	0.1
<i>Gomphrena cunninghamii</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.3	1
<i>Paspalidium tabulatum</i>	0.3	0.1
<i>Pluchea ferdinandi-muelleri</i>	0.6	0.1
<i>Pterocaulon sphaeranthoides</i>	0.3	0.1
<i>Solanum horridum</i>	0.2	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Tinospora smilacina</i>		0.1
<i>Tribulus hirsutus</i>	0.2	0.1
<i>Triodia epactia</i>	0.5	45
<i>Triodia wiseana</i>	0.7	45
<i>Triumfetta propinqua</i>	0.4	0.1



**PHOTO**





Site Name: WD35  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 29/06/2018  
 GPS Location: GDA94 Zone 50 669878E 7654237N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Shale (other), <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Calcrete, Quartz, Shale (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> sp. <i>Dioicum</i> (A.A. Mitchell PRP 1618)	0.6	0.1
<i>Acacia acradenia</i>	0.2	0.2
<i>Acacia inaequilatera</i>	3	2
<i>Boerhavia gardneri</i>	0.4	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.2	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.3	0.1
<i>Cleome viscosa</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.5	25
<i>Corymbia hamersleyana</i>		
<i>Cymbopogon ambiguus</i>	0.5	0.1
<i>Dampiera candidans</i>	0.2	0.1
<i>Enneapogon caeruleus</i>	0.1	0.1
<i>Eriachne aristidea</i>	0.3	0.1
<i>Eriachne ciliata</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.2	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Heliotropium cunninghamii</i>	0.1	0.1
<i>Hibiscus coatesii</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Indigofera rugosa</i>	0.4	0.2
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>	0.1	0.1
<i>Tephrosia clementii</i>	0.1	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.3	0.2
<i>Triodia scintillans</i>	0.2	15
<i>Triodia wiseana</i>	0.3	10



**PHOTO**





Site Name: WD36  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 29/06/2018  
 GPS Location: GDA94 Zone 50 674162E 7656441N  
 Landform Type: Upper Slope  
 Slope Class: Precipitous (60 degrees)  
 Aspect: NW  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Ironstone, >50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Terminalia circumalata*  
 Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> sp. Dioicum (A.A. Mitchell PRP 1618)	0.6	0.1
<i>Acacia acradenia</i>	1.4	5
<i>Acacia coriacea</i> subsp. <i>pendens</i>	1	0.1
* <i>Aerva javanica</i>	0.1	0.1
<i>Boerhavia burbridgeana</i>		0.1
<i>Boerhavia gardneri</i>	0.2	0.1
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.1	0.1
<i>Cleome viscosa</i>	0.8	0.1
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	1.5	0.1
<i>Corymbia hamersleyana</i>	2	0.1
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	0.4	0.1
<i>Dampiera candidans</i>	0.3	0.1
<i>Enneapogon caeruleus</i>	0.2	0.1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Euphorbia careyi</i>	0.2	0.1
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>		
<i>Gossypium australe</i>	1.5	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.7	0.1
<i>Hibiscus coatesii</i>	0.3	0.1
<i>Hibiscus goldsworthii</i>	0.5	0.1
<i>Indigofera monophylla</i>	0.2	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.1	0.1
<i>Paspalidium tabulatum</i>	0.4	0.1
* <i>Passiflora foetida</i> var. <i>hispida</i>		0.1
<i>Ptilotus incanus</i>	0.2	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.8	0.1
<i>Senna notabilis</i>	0.2	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.2	0.1
<i>Solanum horridum</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Terminalia circumalata</i>	3.5	1.5
<i>Terminalia supranitifolia</i> (P3)	1.8	0.1
<i>Tinospora smilacina</i>		0.1



<i>Triodia epactia</i>	0.4	40
<i>Triodia wiseana</i>	0.5	30
<i>Triumfetta propinqua</i>	0.4	0.1

**PHOTO**



Site Name: WD37  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 29/06/2018  
 GPS Location: GDA94 Zone 50 669822E 7654602N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Granite, 10-20% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Dolerite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2 years / > 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.3	0.1
<i>Acacia orthocarpa</i>	1.5	7
<i>Aristida holathera</i> var. <i>holathera</i>	0.4	2
<i>Boerhavia gardneri</i>	0.5	0.1
<i>Bonamia alatisemina</i>	0.1	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.4	2
<i>Corchorus parviflorus</i>	0.6	30
<i>Corymbia hamersleyana</i>	0.2	0.1
<i>Cullen leucochaetes</i>	0.2	0.1
<i>Cymbopogon ambiguus</i>	0.7	0.1
<i>Cyperus hesperius</i>	0.2	0.1
<i>Dampiera candicans</i>	0.4	3
<i>Eriachne mucronata</i>	0.5	0.2
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	1.2	0.1
<i>Fimbristylis dichotoma</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Goodenia muelleriana</i>	0.2	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	0.4	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	0.5	0.1
<i>Heliotropium cunninghamii</i>	0.2	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.4	0.2
<i>Indigofera monophylla</i>	0.3	0.2
<i>Mitrasacme connata</i>	0.1	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polycarpaea longiflora</i>	0.1	0.1
<i>Polymeria ambigua</i>	0.1	0.1
<i>Portulaca oleracea</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.2	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Schizachyrium fragile</i>	0.2	0.1
<i>Senna notabilis</i>	0.2	0.1



<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.3	0.1
<i>Solanum phlomoides</i>	0.4	0.1
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>	0.1	0.1
<i>Tephrosia virens</i>	0.4	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia brizoides</i>	0.3	10
<i>Triodia epactia</i>	0.3	3
<i>Tripogonella loliiformis</i>	0.1	0.1
<i>Triumfetta clementii</i>	0.2	0.1
<i>Triumfetta propinqua</i>	0.5	0.1

**PHOTO**



Site Name: WD38  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 29/06/2018  
 GPS Location: GDA94 Zone 50 674402E 7657466N  
 Landform Type: Crest  
 Slope Class: Steep (23 degrees)  
 Aspect: E  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Granite, 20-50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 3 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Gossypium australe*, *Grevillea pyramidalis* subsp. *leucadendron*, *Grevillea wickhamii* subsp. *hispidula*, *Hakea lorea* subsp. *lorea*  
 Lower Stratum 1: *Corchorus parviflorus*, *Indigofera monophylla*  
 Lower Stratum 2: *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Amaranthus undulatus</i>	0.2	0.1
<i>Boerhavia gardneri</i>	0.2	0.1
<i>Cassytha capillaris</i>		0.1
<i>Corchorus parviflorus</i>	0.4	0.2
<i>Cucumis variabilis</i>		0.1
<i>Cullen leucochaetes</i>		
<i>Cymbopogon ambiguus</i>	0.3	0.1
<i>Cyperus hesperius</i>	0.3	0.1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Euphorbia careyi</i>	0.2	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Goodenia microptera</i>	0.3	0.1
<i>Goodenia stobbsiana</i>	0.1	0.1
<i>Gossypium australe</i>	1.2	0.2
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	1.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.5	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	1.6	0.1
<i>Hibiscus coatesii</i>	0.5	0.1
<i>Hybanthus aurantiacus</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.4	0.4
<i>Indigofera rugosa</i>		
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Ptilotus incanus</i>	0.2	0.1
<i>Rhynchosia minima</i>		0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Tribulus suberosus</i>	0.5	0.1
<i>Triodia wiseana</i>	0.3	30
<i>Triumfetta propinqua</i>	0.4	0.1



**PHOTO**





Site Name: WD39  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 30/06/2018  
 GPS Location: GDA94 Zone 50 670352E 7655576N  
 Landform Type: Other, Stony outwash plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: NW  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Ironstone, Metamorphic (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.6	0.3
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.4	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Corymbia hamersleyana</i>	2.5	0.2
<i>Dampiera candidans</i>	0.5	0.5
<i>Eriachne ciliata</i>	0.1	0.1
<i>Eriachne obtusa</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	0.5	0.2
<i>Hakea lorea</i> subsp. <i>lorea</i>	2	0.1
<i>Heliotropium cunninghamii</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	1.5	0.3
<i>Senna venusta</i>		
<i>Solanum phlomoides</i>	0.3	0.1
<i>Tephrosia clementii</i>	0.1	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.2	0.1
<i>Triodia brizoides</i>	0.3	15



**PHOTO**





Site Name: WD40  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 29/06/2018  
 GPS Location: GDA94 Zone 50 674945E 7657380N  
 Landform Type: Lower Slope  
 Slope Class: Steep (23 degrees)  
 Aspect: NW  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Granite, >50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 3-4 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia inaequilatera*  
 Mid Stratum 2: *Acacia acradenia*, *Grevillea wickhamii* subsp. *hispidula*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.5	0.5
<i>Acacia inaequilatera</i>	2.5	0.1
<i>Bonamia pilbarensis</i>		0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cyperus hesperius</i>	0.3	0.1
<i>Dampiera candidans</i>	0.4	0.5
<i>Eriachne ciliata</i>	0.2	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.6	0.3
<i>Indigofera monophylla</i>	0.2	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Tephrosia virens</i>	1.3	0.1
<i>Tribulus suberosus</i>	0.3	0.1
<i>Trigastrotheca molluginea</i>	0.2	0.1
<i>Triodia epactia</i>	0.4	60
<i>Triodia wiseana</i>	0.4	10
<i>Triumfetta propinqua</i>	0.7	0.1



**PHOTO**





Site Name: WD41  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 30/06/2018  
 GPS Location: GDA94 Zone 50 670396E 7655177N  
 Landform Type: Upper Slope  
 Slope Class: Very Steep (37 degrees)  
 Aspect: W  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Metamorphic (other), 10-20% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Dolerite, Metamorphic, Shale (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	0.5
<i>Cucumis variabilis</i>	0.1	0.1
<i>Cullen leucochaetes</i>	0.3	0.1
<i>Cymbopogon ambiguus</i>	0.6	0.2
<i>Cyperus hesperius</i>	0.3	0.1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	0.4
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Ptilotus ?auriculifolius</i>	0.1	0.1
<i>Solanum horridum</i>	0.1	0.1
<i>Terminalia circumalata</i>	3	1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia brizoides</i>	0.4	0.1
<i>Triodia wiseana</i>	0.6	45
<i>Triumfetta clementii</i>	0.3	0.3



**PHOTO**





Site Name: WD42  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 29/06/2018  
 GPS Location: GDA94 Zone 50 674928E 7657087N  
 Landform Type: Crest  
 Slope Class: Precipitous (60 degrees)  
 Aspect: N  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Granite, Ironstone, Quartz (other), 20-50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite, Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 3 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*, *Eucalyptus leucophloia* subsp. *leucophloia*  
 Mid Stratum 1: *Acacia acradenia*, *Grevillea wickhamii* subsp. *hispidula*  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1	1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	1	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.4	0.1
<i>Corymbia hamersleyana</i>	2	0.1
<i>Cymbopogon ambiguus</i>	0.3	0.1
<i>Cyperus hesperius</i>	0.2	0.1
<i>Dampiera candidans</i>	0.4	0.5
<i>Enneapogon lindleyanus</i>	0.1	0.1
<i>Eriachne ciliata</i>	0.2	0.1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	4	0.3
<i>Euphorbia careyi</i>	0.2	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.1	0.1
<i>Gossypium australe</i>	1.5	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.4	0.2
<i>Hakea lorea</i> subsp. <i>lorea</i>	1	0.1
<i>Heliotropium pachyphyllum</i>	0.4	0.1
<i>Hibiscus coatesii</i>	0.5	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>		0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Peripleura virgata</i>	0.3	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polycarpaea longiflora</i>	0.2	0.1
<i>Ptilotus astrolasius</i>	0.5	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Ptilotus exaltatus</i>	0.1	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.8	0.1
<i>Solanum phlomoides</i>	0.4	0.1
<i>Tinospora smilacina</i>		0.1



<i>Tribulus suberosus</i>	0.5	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.3	10
<i>Triodia wiseana</i>	0.3	40
<i>Triumfetta maconochieana</i>	0.2	0.1
<i>Triumfetta propinqua</i>	0.6	0.1

**PHOTO**



Site Name: WD43  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 30/06/2018  
 GPS Location: GDA94 Zone 50 670542E 7656348N  
 Landform Type: Crest  
 Slope Class: Very Steep (37 degrees)  
 Aspect: W  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Metamorphic (other), 20-50% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Metamorphic (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.4	0.5
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.4	0.1
<i>Cymbopogon ambiguus</i>	0.5	0.2
<i>Cyperus hesperius</i>	0.3	2
<i>Eriachne ciliata</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.3	0.3
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.3	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Gossypium australe</i>	0.7	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.6	1
<i>Oldenlandia crouchiana</i>	0.2	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	1.3	0.1
<i>Ptilotus exaltatus</i>	0.4	0.1
<i>Ptilotus incanus</i>	0.5	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.5	0.2
<i>Solanum horridum</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Tribulus suberosus</i>	1.3	3
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia wiseana</i>	0.5	20
<i>Triumfetta maconochieana</i>	0.5	0.1
<i>Triumfetta propinqua</i>	0.5	2



**PHOTO**





Site Name: WD44  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 29/06/2018  
 GPS Location: GDA94 Zone 50 674656E 7658575N  
 Landform Type: Other, Low rise (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: W  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Dolerite, <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Dolerite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia inaequilatera*  
 Lower Stratum 1: *Triodia scintillans*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> sp. Dioicum (A.A. Mitchell PRP 1618)	0.3	0.1
<i>Acacia inaequilatera</i>	2.5	2.5
<i>Boerhavia gardneri</i>	0.3	0.1
<i>Bonamia</i> aff. <i>pilbarensis</i>	0.2	0.1
<i>Cassytha capillaris</i>		0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Corymbia hamersleyana</i>	4	2
<i>Euphorbia vaccaria</i> var. <i>vaccaria</i>	0.1	0.1
<i>Hybanthus aurantiacus</i>	0.8	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Salsola australis</i>	0.4	0.1
<i>Senna notabilis</i>	0.3	0.1
<i>Swainsona formosa</i>	0.6	0.1
<i>Triodia scintillans</i>	0.3	90
<i>Triodia wiseana</i>	0.4	1



**PHOTO**





Site Name: WD45  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 30/06/2018  
 GPS Location: GDA94 Zone 50 670242E 7656332N  
 Landform Type: Lower Slope  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: SW  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Shale (other), 2-10% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Dolerite, Metamorphic, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.8	2
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.5	0.2
<i>Cullen leucochaetes</i>	1.3	0.1
<i>Dampiera candicans</i>	0.5	3
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.4	0.3
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.5	6
<i>Indigofera monophylla</i>	0.3	0.3
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polycarpaea longiflora</i>	0.2	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.8	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.3	0.1
<i>Solanum horridum</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.3	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Tephrosia virens</i>	1	0.1
<i>Tribulus suberosus</i>	0.6	0.1
<i>Triodia brizoides</i>	0.4	20
<i>Triodia wiseana</i>	0.5	0.2



**PHOTO**





Site Name: WD46  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 29/06/2018  
 GPS Location: GDA94 Zone 50 674947E 7658920N  
 Landform Type: Hillock  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: E  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Granite, <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia orthocarpa*  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia orthocarpa</i>	2	2
<i>Boerhavia gardneri</i>	0.2	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	1.4	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.4	0.1
<i>Solanum phlomoides</i>	0.4	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Triodia epactia</i>	0.4	2
<i>Triodia wiseana</i>	0.6	83



**PHOTO**





Site Name: WD47  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 30/06/2018  
 GPS Location: GDA94 Zone 50 670127E 7656414N  
 Landform Type: Ridge  
 Slope Class: Very Steep (37 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Dolerite, 20-50% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Dolerite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.2	0.1
* <i>Aerva javanica</i>	0.5	0.1
<i>Amaranthus undulatus</i>	0.3	0.1
<i>Boerhavia gardneri</i>	0.5	0.1
<i>Cassytha capillaris</i>		0.1
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	0.7	0.1
<i>Corchorus parviflorus</i>	0.5	0.2
<i>Cymbopogon ambiguus</i>	0.5	4
<i>Cyperus hesperius</i>	0.3	0.1
<i>Eriachne mucronata</i>	0.3	0.3
<i>Euphorbia careyi</i>	0.3	2
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.2	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Gossypium australe</i>	1.8	2
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	0.3	0.1
<i>Hibiscus leptocladus</i>	0.2	0.1
<i>Hybanthus aurantiacus</i>	0.2	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>		0.1
<i>Nicotiana benthamiana</i>	0.1	0.1
<i>Notoleptopus decaisnei</i>	0.1	0.1
<i>Polycarpaea longiflora</i>	0.2	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Rhynchosia minima</i>		0.2
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.5	0.1
<i>Solanum horridum</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.3	0.1
<i>Terminalia supranitifolia</i> (P3)	2.5	0.3
<i>Tinospora smilacina</i>		0.1
<i>Tribulus suberosus</i>	1	1
<i>Trichosanthes cucumerina</i>		0.1
<i>Triodia brizoides</i>	0.4	0.5
<i>Triodia wiseana</i>	0.5	20
<i>Triumfetta propinqua</i>	0.5	0.2



**PHOTO**





Site Name: WD48  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 30/06/2018  
 GPS Location: GDA94 Zone 50 675107E 7657788N  
 Landform Type: Other, Low rise (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: SW  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Granite, <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia inaequilatera*  
 Lower Stratum 1: *Triodia scintillans*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	2.5	1
<i>Corchorus parviflorus</i>	0.6	0.1
<i>Corymbia hamersleyana</i>	3	0.2
<i>Fimbristylis simulans</i>	0.2	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Triodia scintillans</i>	0.3	90
<i>Triodia wiseana</i>	0.4	2

**PHOTO**



Site Name: WD49  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 30/06/2018  
 GPS Location: GDA94 Zone 50 669919E 7656125N  
 Landform Type: Other, Stony plain (other)  
 Slope Class: Level (0 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Metamorphic, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 2 years / > 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.4	0.2
<i>Acacia inaequilatera</i>	3	4
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2	3
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.5	0.3
<i>Corchorus parviflorus</i>	0.5	0.5
<i>Dampiera candidans</i>	0.5	0.3
<i>Eriachne obtusa</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia forrestii</i>	0.3	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.5	0.3
<i>Paraneurachne muelleri</i>	0.4	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.5	0.2
<i>Ptilotus ?auriculifolius</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	1	0.2
<i>Senna notabilis</i>	0.1	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.5	0.1
<i>Solanum phlomoides</i>	0.4	0.1
<i>Tephrosia clementii</i>	0.1	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia brizoides</i>	0.5	30
<i>Triodia epactia</i>	0.5	5



**PHOTO**





Site Name: WD50  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 30/06/2018  
 GPS Location: GDA94 Zone 50 674916E 7658464N  
 Landform Type: Mid Slope  
 Slope Class: Steep (23 degrees)  
 Aspect: N  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Granite, 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia orthocarpa*  
 Lower Stratum 1: *Triodia epactia*, *Triodia scintillans*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia orthocarpa</i>	3.5	2.5
<i>Corchorus parviflorus</i>	0.6	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Triodia epactia</i>	0.5	70
<i>Triodia scintillans</i>	0.3	2
<i>Triodia wiseana</i>	0.6	20



**PHOTO**





Site Name: WD51  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 30/06/2018  
 GPS Location: GDA94 Zone 50 673695E 7661318N  
 Landform Type: Other, Stony plain (other)  
 Slope Class: Level (0 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Dolerite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	3	12
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3.5	3
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	1.8	0.2
<i>Corchorus parviflorus</i>	0.6	0.1
<i>Corymbia hamersleyana</i>	3.5	1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	0.3
<i>Indigofera monophylla</i>	0.6	0.2
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	1	0.1
<i>Senna notabilis</i>	0.2	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia brizoides</i>	0.4	40
<i>Triodia epactia</i>	0.4	20
<i>Triodia lanigera</i>	0.4	5



**PHOTO**





Site Name: WD52  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 30/06/2018  
 GPS Location: GDA94 Zone 50 674821E 7658360N  
 Landform Type: Upper Slope  
 Slope Class: Steep (23 degrees)  
 Aspect: N  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Dolerite, <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Dolerite, Calcrete, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia orthocarpa*  
 Lower Stratum 1: *Triodia brizoides*, *Triodia scintillans*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia orthocarpa</i>	3	2
<i>Boerhavia gardneri</i>	0.4	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.3	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Triodia brizoides</i>	0.3	1
<i>Triodia epactia</i>	0.4	0.2
<i>Triodia scintillans</i>	0.3	70
<i>Triodia wiseana</i>	0.4	20



**PHOTO**





Site Name: WD53  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 30/06/2018  
 GPS Location: GDA94 Zone 50 674145E 7661280N  
 Landform Type: Plain  
 Slope Class: Level (0 degrees)  
 Soil Type: Sandy Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: <2%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	3	8
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3	3
<i>Aristida holathera</i> var. <i>holathera</i>	0.5	0.1
<i>Bonamia erecta</i>	0.5	4
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.4	0.1
<i>Corchorus parviflorus</i>	0.8	0.1
<i>Eragrostis eriopoda</i>	0.3	0.2
<i>Eriachne mucronata</i>	0.4	0.2
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2.5	0.5
<i>Halgania solanacea</i> var. <i>solanacea</i> ms		
<i>Indigofera monophylla</i>	0.4	0.8
<i>Paraneurachne muelleri</i>	0.4	0.5
<i>Ptilotus astrolasius</i>	0.6	0.2
<i>Ptilotus calostachyus</i>	0.8	0.2
<i>Trigastrotheca molluginea</i>	0.2	0.1
<i>Triodia epactia</i>	0.5	2
<i>Triodia lanigera</i>	0.8	48



**PHOTO**





Site Name: WD54  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 30/06/2018  
 GPS Location: GDA94 Zone 50 675087E 7656669N  
 Landform Type: Upper Slope  
 Slope Class: Precipitous (60 degrees)  
 Aspect: NW  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Ironstone, 20-50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - G - Good  
 Disturbance: Exotic Weeds - Significant weed cover (*Aerva javanica*)  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: \**Aerva javanica*, *Corchorus parviflorus*, *Indigofera monophylla*  
 Lower Stratum 2: *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> sp. Dioicum (A.A. Mitchell PRP 1618)	0.4	0.1
<i>Acacia acradenia</i>	1.4	1
* <i>Aerva javanica</i>	0.6	20
<i>Boerhavia gardneri</i>	0.3	0.1
* <i>Cenchrus ciliaris</i>	0.3	0.1
<i>Cleome viscosa</i>	0.2	0.1
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	1.7	0.1
<i>Corchorus parviflorus</i>	0.6	10
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	0.5	0.1
<i>Cyperus hesperius</i>	0.2	0.1
<i>Enneapogon caeruleus</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Euphorbia careyi</i>	0.2	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Gossypium australe</i>	1.2	0.1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	1.5	0.1
<i>Indigofera monophylla</i>	0.5	1
<i>Jasminum didymum</i> subsp. <i>lineare</i>		0.1
<i>Notoleptopus decaisnei</i>	0.4	0.1
<i>Paspalidium tabulatum</i>	0.5	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.2	0.1
<i>Solanum horridum</i>	0.2	0.1
<i>Tinospora smilacina</i>		0.1
<i>Tribulus suberosus</i>	0.4	0.1
<i>Triodia epactia</i>	0.3	0.1
<i>Triodia wiseana</i>	0.7	40
<i>Triumfetta propinqua</i>	0.2	0.1



**PHOTO**





Site Name: WD55  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 30/06/2018  
 GPS Location: GDA94 Zone 50 674553E 7661325N  
 Landform Type: Other, Stony plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Metamorphic, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	5
<i>Cassytha capillaris</i>		0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.4	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.8	0.5
<i>Solanum phlomoides</i>	0.5	0.1
<i>Triodia chichesterensis</i> (P3)	0.3	2
<i>Triodia lanigera</i>	0.7	8
<i>Triodia wiseana</i>	0.7	40

**PHOTO**



Site Name: WD56  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 30/06/2018  
 GPS Location: GDA94 Zone 50 674821E 7656536N  
 Landform Type: Mid Slope  
 Slope Class: Very Steep (37 degrees)  
 Aspect: S  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Granite, 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*, *Senna glutinosa* subsp. *glutinosa*  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1	0.2
* <i>Aerva javanica</i>	0.5	0.1
<i>Boerhavia gardneri</i>	0.3	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.4	0.1
<i>Cymbopogon ambiguus</i>	0.3	0.1
<i>Eriachne mucronata</i>	0.4	0.2
<i>Euphorbia careyi</i>	0.2	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	1	0.1
<i>Indigofera monophylla</i>	0.2	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.2	0.1
<i>Solanum horridum</i>	0.1	0.1
<i>Tribulus suberosus</i>	0.4	0.1
<i>Triodia epactia</i>	0.4	0.5
<i>Triodia wiseana</i>	0.6	70
<i>Triumfetta propinqua</i>	0.4	0.1



**PHOTO**





Site Name: WD57  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 675036E 7662111N  
 Landform Type: Other, Stony plain (other)  
 Slope Class: Level (0 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	3	9
<i>Acacia inaequilatera</i>	3	1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	4	5
<i>Aristida holathera</i> var. <i>holathera</i>	0.5	0.5
<i>Bonamia erecta</i>	0.3	0.3
<i>Corchorus parviflorus</i>	0.6	0.2
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia</i> ? <i>trigonosperma</i>	0.4	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	0.5
<i>Hakea lorea</i> subsp. <i>lorea</i>	2	0.2
<i>Indigofera monophylla</i>	0.5	1
<i>Ptilotus calostachyus</i>	0.6	0.1
<i>Senna notabilis</i>	0.4	0.1
<i>Sida arenicola</i>	1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.5	35
<i>Triodia lanigera</i>	0.5	25



**PHOTO**





Site Name: WD58  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 30/06/2018  
 GPS Location: GDA94 Zone 50 674468E 7655689N  
 Landform Type: Crest  
 Slope Class: Precipitous (60 degrees)  
 Aspect: SE  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Ironstone, 20-50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Eucalyptus leucophloia* subsp. *leucophloia*  
 Mid Stratum 1: *Acacia acradenia*, *Hakea lorea* subsp. *lorea*  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.3	0.5
<i>Acacia inaequilatera</i>	1.2	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.2	0.1
<i>Eriachne mucronata</i>	0.2	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	2.5	0.5
<i>Euphorbia careyi</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	1.4	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Peripleura virgata</i>	0.1	0.1
<i>Pluchea tetranthera</i>	0.5	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Ptilotus polystachyus</i>	0.2	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	0.1
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	0.7	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.3	20
<i>Triodia wiseana</i>	0.4	40



**PHOTO**





Site Name: WD59  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 675360E 7662097N  
 Landform Type: Other, Stony plain (other)  
 Slope Class: Level (0 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Calcrete, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2.5	0.5
<i>Acacia inaequilatera</i>	3	3
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.6	0.1
<i>Corymbia hamersleyana</i>	4.5	1.5
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	0.3
<i>Hybanthus aurantiacus</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.5	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia chichesterensis</i> (P3)	0.3	40
<i>Triodia epactia</i>	0.5	10
<i>Triodia wiseana</i>	0.4	0.2



**PHOTO**





Site Name: WD60  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 30/06/2018  
 GPS Location: GDA94 Zone 50 674623E 7655046N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: SE  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Quartz (other), <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 3-4 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia inaequilatera*  
 Lower Stratum 1: *Acacia spondylophylla*  
 Lower Stratum 2: *Triodia epactia*, *Triodia scintillans*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.5	0.1
<i>Acacia inaequilatera</i>	1.4	0.2
<i>Acacia spondylophylla</i>	0.5	25
<i>Bonamia</i> aff. <i>pilbarensis</i>	0.1	0.1
<i>Cassytha capillaris</i>		0.1
<i>Codonocarpus cotinifolius</i>	1.5	0.1
<i>Corchorus parviflorus</i>	0.5	0.1
<i>Corymbia hamersleyana</i>	5	0.5
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	0.7	0.1
<i>Goodenia stobbsiana</i>	0.4	0.1
<i>Hibiscus coatesii</i>	0.7	0.1
<i>Ptilotus astrolasius</i>	0.5	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	0.1
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	1.2	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Tribulus platypterus</i>	0.5	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.3	3
<i>Triodia scintillans</i>	0.2	25
<i>Triodia wiseana</i>	0.4	25



**PHOTO**





Site Name: WD61  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 675825E 7662201N  
 Landform Type: Other, Stony plain (other)  
 Slope Class: Level (0 degrees)  
 Soil Type: Sandy Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	2	4
<i>Acacia bivenosa</i>	2	4
<i>Acacia inaequilatera</i>	3	2
<i>Acacia sphaerostachya</i>	1	0.3
<i>Acacia stellaticeps</i>	1	12
<i>Bonamia erecta</i>	0.4	0.2
<i>Cassytha capillaris</i>		0.1
<i>Triodia epactia</i>	0.5	0.5
<i>Triodia lanigera</i>	0.6	50

**PHOTO**



Site Name: WD62  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 674785E 7654254N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: SE  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 3-4 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia inaequilatera*, *Acacia orthocarpa*, *Grevillea wickhamii* subsp. *hispidula*  
 Lower Stratum 1: *Acacia spondylophylla*  
 Lower Stratum 2: *Triodia brizoides*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.3	0.1
<i>Acacia inaequilatera</i>	1	0.2
<i>Acacia orthocarpa</i>	1.4	2
<i>Acacia spondylophylla</i>	0.5	4
<i>Bonamia</i> aff. <i>pilbarensis</i>	0.1	0.1
<i>Codonocarpus cotinifolius</i>	0.5	0.1
<i>Corchorus parviflorus</i>	0.6	0.2
<i>Dodonaea coriacea</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.3	1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.2	0.2
<i>Indigofera monophylla</i>	0.2	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus calostachyus</i>	0.8	0.5
<i>Senna symonii</i>	0.4	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Tephrosia clementii</i>	0.1	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia brizoides</i>	0.2	30
<i>Triodia epactia</i>	0.3	0.1
<i>Triodia scintillans</i>	0.2	2
<i>Triodia wiseana</i>	0.3	3



**PHOTO**





Site Name: WD63  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 676034E 7662982N  
 Landform Type: Other, Flat/Minor drainage line (other)  
 Slope Class: Level (0 degrees)  
 Soil Type: Sandy Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 2-10%  
 CF Sizes: 2-6mm, 6-20mm  
 CF Types: Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	2.5	5
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	2	0.1
<i>Acacia stellaticeps</i>	0.4	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3	20
<i>Aristida holathera</i> var. <i>holathera</i>	0.4	0.1
<i>Bonamia alatisemina</i>		0.1
<i>Bonamia erecta</i>	0.4	0.5
<i>Cajanus cinereus</i>	1.8	0.2
<i>Cassytha capillaris</i>		0.2
<i>Chrysopogon fallax</i>	0.6	5
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.4	0.1
<i>Corchorus parviflorus</i>	1	1.5
<i>Corymbia hamersleyana</i>	5.5	6
<i>Dampiera candicans</i>	0.5	0.5
<i>Eriachne mucronata</i>	0.4	0.1
<i>Eulalia aurea</i>	0.5	0.1
<i>Goodenia microptera</i>	0.4	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	5
<i>Heliotropium pachyphyllum</i>	0.4	0.5
<i>Hybanthus aurantiacus</i>	0.6	0.5
<i>Indigofera monophylla</i>	0.4	0.1
<i>Isotropis atropurpurea</i>	0.6	0.1
<i>Paraneurachne muelleri</i>	0.3	0.1
<i>Polymeria ambigua</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.5	1
<i>Ptilotus axillaris</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.7	0.1
<i>Senna symonii</i>	1.5	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.4	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.6	30
<i>Triodia lanigera</i>	0.4	0.2



**PHOTO**





Site Name: WD64  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 674734E 7653978N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: NE  
 Soil Type: Clayey Sand  
 Soil Colour: Brown  
 Rock Outcrop: Granite, 2-10% bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - VG - Very Good  
 Disturbance: Exotic Weeds - Significant weed cover  
 Fire: > 5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Eucalyptus victrix*  
 Mid Stratum 1: *Acacia pyrifolia* var. *pyrifolia*, *Acacia tumida* var. *pilbarensis*, *Melaleuca linophylla*  
 Mid Stratum 2: *Corchorus parviflorus*, *Tephrosia rosea* var. *clementii*  
 Lower Stratum 1: \**Cenchrus ciliaris*, *Eriachne tenuiculmis*, *Themeda triandra*  
 Lower Stratum 2: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> aff. <i>hannii</i>	0.4	0.1
<i>Abutilon</i> sp. <i>Dioicum</i> (A.A. Mitchell PRP 1618)	0.1	0.1
<i>Acacia bivenosa</i>	1.3	0.1
<i>Acacia maitlandii</i>	0.3	0.1
<i>Acacia orthocarpa</i>	1.5	0.1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	1.5	2
<i>Acacia spondylophylla</i>	0.5	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	1.6	0.5
* <i>Aerva javanica</i>	0.1	0.2
<i>Boerhavia burbridgeana</i>		0.5
<i>Cajanus cinereus</i>	1.8	0.1
* <i>Cenchrus ciliaris</i>	0.6	7
<i>Chrysopogon fallax</i>	0.6	0.1
<i>Cleome viscosa</i>	0.2	0.1
<i>Corchorus parviflorus</i>	0.7	1
<i>Corymbia hamersleyana</i>	5	0.3
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	0.6	0.2
<i>Dampiera candidans</i>	0.4	0.1
<i>Enneapogon lindleyanus</i>	0.4	0.1
<i>Eriachne tenuiculmis</i>	0.5	1
<i>Eucalyptus victrix</i>	6	30
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.2	0.1
<i>Euphorbia careyi</i>	0.2	0.1
<i>Euphorbia trigonosperma</i>	0.3	0.1
<i>Goodenia microptera</i>	0.4	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Gossypium australe</i>	1.4	0.1
<i>Heliotropium pachyphyllum</i>	0.3	0.1
<i>Heliotropium tenuifolium</i>	0.4	0.1



<i>Hybanthus aurantiacus</i>	0.4	0.1
<i>Indigofera colutea</i>	0.1	0.1
<i>Indigofera monophylla</i>	1	0.1
<i>Isotropis atropurpurea</i>	0.8	0.1
<i>Melaleuca linophylla</i>	1.5	1
<i>Melhania oblongifolia</i>	0.3	0.1
<i>Paspalidium clementii</i>	0.1	0.1
<i>Paspalidium tabulatum</i>	0.4	0.1
<i>Phyllanthus maderaspatensis</i>	0.3	0.1
<i>Polymeria ambigua</i>	0.2	0.1
<i>Pterocaulon sphaeranthoides</i>	0.2	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus axillaris</i>		0.1
<i>Rhynchosia minima</i>		0.1
<i>Senna notabilis</i>	0.2	0.1
<i>Sida clementii</i>	0.2	0.1
<i>Solanum phlomoides</i>	0.7	0.1
<i>Swainsona formosa</i>	0.4	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.7	0.5
<i>Themeda triandra</i>	1	0.5
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Tribulus platypterus</i>	1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.5	25
<i>Triumfetta propinqua</i>	0.8	0.1

**PHOTO**



Site Name: WD65  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 676348E 7663040N  
 Landform Type: Other, Stony plain (other)  
 Slope Class: Level (0 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Dolerite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia synchronicia</i>	0.3	0.2
* <i>Cenchrus ciliaris</i>	0.4	0.2
<i>Cynodon prostratus</i>	0.1	0.1
<i>Fimbristylis dichotoma</i>		
<i>Maireana</i> sp.	0.7	0.2
<i>Portulaca oleracea</i>	0.1	0.1
<i>Ptilotus exaltatus</i>	0.1	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Triodia longiceps</i>	0.6	55

**PHOTO**



Site Name: WD66  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 674839E 7653710N  
 Landform Type: Mid Slope  
 Slope Class: Steep (23 degrees)  
 Aspect: NE  
 Soil Type: Clayey Sand  
 Soil Colour: Brown  
 Rock Outcrop: Granite, Quartz (other), 20-50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 3-4 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia inaequilatera*, *Gossypium australe*  
 Lower Stratum 1: *Acacia spondylophylla*  
 Lower Stratum 2: *Triodia brizoides*, *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	1.2	0.2
<i>Acacia spondylophylla</i>	0.6	2
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.8	0.1
<i>Cyperus hesperius</i>	0.3	0.1
<i>Dampiera candicans</i>	0.5	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Gossypium australe</i>	1.5	0.2
<i>Hibiscus coatesii</i>	0.5	0.1
<i>Hybanthus aurantiacus</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.6	0.1
<i>Ptilotus astrolasius</i>	0.5	0.1
<i>Ptilotus calostachyus</i>	0.7	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.3	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.5	0.1
<i>Solanum phlomoides</i>	0.5	0.1
<i>Tribulus suberosus</i>	0.7	0.2
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia brizoides</i>	0.2	30
<i>Triodia epactia</i>	0.3	30
<i>Triumfetta maconochieana</i>	0.3	0.1



**PHOTO**





Site Name: WD67  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 676481E 7662475N  
 Landform Type: Plain  
 Slope Class: Level (0 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 10-20%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	1.8	7
<i>Acacia inaequilatera</i>	3	1
<i>Acacia stellaticeps</i>	0.3	2
<i>Bonamia erecta</i>	0.2	0.1
<i>Chrysopogon fallax</i>	0.5	0.3
<i>Corymbia hamersleyana</i>	1	0.2
<i>Eragrostis eriopoda</i>	0.3	0.1
<i>Hybanthus aurantiacus</i>	0.4	0.1
<i>Indigofera monophylla</i>	0.2	0.1
<i>Pluchea tetranthera</i>	0.5	0.1
<i>Ptilotus astrolasius</i>	0.4	0.2
<i>Ptilotus calostachyus</i>	0.2	0.1
<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1.2	0.3
<i>Senna symonii</i>	1	0.4
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.4	35
<i>Triodia lanigera</i>	0.4	20



**PHOTO**





Site Name: WD68  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 675114E 7653723N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: S  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Granite, >50% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 3-4 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia orthocarpa*  
 Mid Stratum 2: *Acacia maitlandii*  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia maitlandii</i>	1.4	20
<i>Acacia orthocarpa</i>	2	1
<i>Acacia spondylophylla</i>	0.6	0.1
<i>Bonamia aff. pilbarensis</i>	0.1	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cassytha capillaris</i>		0.1
<i>Corchorus parviflorus</i>	0.6	0.1
<i>Dampiera candidans</i>	0.4	0.1
<i>Eriachne ciliata</i>	0.2	0.1
<i>Eriachne mucronata</i>	0.4	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis dichotoma</i>	0.2	0.1
<i>Goodenia microptera</i>	0.2	0.1
<i>Goodenia stobbsiana</i>	0.3	0.5
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2.2	0.1
<i>Heliotropium pachyphyllum</i>	0.3	0.1
<i>Heliotropium tenuifolium</i>	0.2	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.3	0.1
<i>Hybanthus aurantiacus</i>	0.2	0.1
<i>Isotropis atropurpurea</i>	0.8	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.2	0.1
<i>Ptilotus calostachyus</i>	0.6	0.1
<i>Scaevola browniana</i> subsp. <i>browniana</i>	0.3	0.1
<i>Seringia nephrosperma</i>	0.3	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.6	0.1
<i>Solanum phlomoides</i>	0.3	0.1
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.3	55
<i>Triodia wiseana</i>	0.5	1
<i>Tripogonella loliiformis</i>	0.2	0.1



**PHOTO**





Site Name: WD69  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 676958E 7663197N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia orthocarpa</i>	3	15
<i>Acacia stellaticeps</i>	0.6	0.3
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	2.5	0.3
<i>Goodenia microptera</i>	0.3	0.1
<i>Goodenia stobbsiana</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.6	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.5	0.2
<i>Triodia lanigera</i>	0.4	55

**PHOTO**



Site Name: WD70  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 675261E 7653742N  
 Landform Type: Open Depression  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: SE  
 Soil Type: Sandy Clay  
 Soil Colour: Grey-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 3-4 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia bivenosa*  
 Lower Stratum 1: *Triodia scintillans*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia bivenosa</i>	1.5	1.5
<i>Bonamia aff. pilbarensis</i>	0.1	0.1
<i>Cassytha capillaris</i>		0.1
<i>Codonocarpus cotinifolius</i>	0.4	0.1
<i>Corchorus parviflorus</i>	0.6	0.1
<i>Corymbia hamersleyana</i>	4	0.4
<i>Goodenia microptera</i>	0.2	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Heliotropium chrysocarpum</i>	0.2	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.2	0.1
<i>Hybanthus aurantiacus</i>	0.2	0.1
<i>Paraneurachne muelleri</i>	0.5	0.1
<i>Petalostylis labicheoides</i>	1.3	0.1
<i>Ptilotus exaltatus</i>	0.1	0.1
<i>Ptilotus polystachyus</i>	0.3	0.1
<i>Salsola australis</i>	0.2	0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.4	0.1
<i>Solanum phlomoides</i>	0.6	0.1
<i>Stackhousia ?muricata</i>	0.2	0.1
<i>Triodia scintillans</i>	0.2	75
<i>Triodia wiseana</i>	0.4	0.1



**PHOTO**





Site Name: WD71  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 676324E 7661692N  
 Landform Type: Plain  
 Slope Class: Level (0 degrees)  
 Soil Type: Sandy Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: <2%  
 CF Sizes: 2-6mm, 6-20mm  
 CF Types: Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	2	10
<i>Bonamia alatisemina</i>		0.1
<i>Bonamia erecta</i>	0.4	25
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.5	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.8	0.3
<i>Halgania solanacea</i> var. <i>solanacea</i> ms	0.3	0.3
<i>Hybanthus aurantiacus</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Ptilotus astrolasius</i>	0.5	2
<i>Ptilotus calostachyus</i>	0.8	0.2
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.3	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia lanigera</i>	0.5	55



**PHOTO**





Site Name: WD72  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 675062E 7653892N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: NW  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia orthocarpa*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia maitlandii</i>	1.6	0.1
<i>Acacia orthocarpa</i>	2.5	3
<i>Bonamia aff. pilbarensis</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.6	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis dichotoma</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.4	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	0.4	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.6	0.1
<i>Scaevola browniana</i> subsp. <i>browniana</i>	0.3	0.1
<i>Solanum phlomoides</i>	0.4	0.1
<i>Trigastrotheca molluginea</i>	0.2	0.1
<i>Triodia epactia</i>	0.4	50
<i>Triodia lanigera</i>	0.4	0.1



**PHOTO**





Site Name: WD73  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 675678E 7661814N  
 Landform Type: Drainage Line  
 Slope Class: Level (0 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 2-10%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: River stones (other)  
 Vegetation Condition: Northern Vegetation Condition - P - Poor  
 Disturbance: Exotic Weeds - *Cenchrus ciliaris*, Pig/Animal Disturbance - Cattle activity  
 Fire: > 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	3	1
<i>Acacia ancistrocarpa x tumida</i> var. <i>pilbarensis</i>	4	0.2
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	2	5
<i>Acacia trachycarpa</i>	3	10
<i>Acacia tumida</i> var. <i>pilbarensis</i>	6	8
<i>Amaranthus undulatus</i>	0.3	0.1
<i>Bonamia erecta</i>	0.3	0.2
<i>Cajanus cinereus</i>	1	0.5
* <i>Cenchrus ciliaris</i>	0.5	35
* <i>Cenchrus setiger</i>	0.5	0.5
<i>Chrysopogon fallax</i>	0.4	0.2
<i>Cleome viscosa</i>	0.4	0.1
<i>Corchorus parviflorus</i>	0.8	1
<i>Corymbia hamersleyana</i>	7	10
<i>Cullen leucanthum</i>	0.5	0.1
<i>Dampiera candidans</i>	0.5	0.1
<i>Eucalyptus victrix</i>	7	6
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia ?trigonosperma</i>	0.5	0.1
<i>Goodenia forrestii</i>	0.3	0.1
<i>Gossypium australe</i>	0.5	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	0.5
<i>Hybanthus aurantiacus</i>	0.8	1
<i>Indigofera monophylla</i>	0.8	1
<i>Paraneurachne muelleri</i>	0.4	0.2
<i>Phyllanthus maderaspatensis</i>	0.6	0.2
<i>Pluchea ferdinandi-muelleri</i>	0.4	0.1
<i>Pluchea rubelliflora</i>	0.3	0.1
<i>Polymeria ambigua</i>	0.2	0.1
<i>Rhynchosia minima</i>		0.1
<i>Solanum phlomoides</i>	0.3	0.1
<i>Stemodia grossa</i>	0.5	0.3
<i>Tephrosia rosea</i> var. <i>clementii</i>	1	1
<i>Themeda triandra</i>	0.8	0.4
<i>Trianthema pilosum</i>		
<i>Triodia epactia</i>	0.5	8
<i>Waltheria indica</i>	0.5	0.1



**PHOTO**





Site Name: WD74  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 674953E 7654289N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: S  
 Soil Type: Clayey Sand  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia tumida* var. *pilbarensis*, *Petalostylis labicheoides*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia orthocarpa</i>	1.4	0.1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	1.2	0.1
<i>Acacia spondylophylla</i>	0.7	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2.5	20
<i>Bonamia alatisemina</i>		0.1
<i>Bonamia</i> aff. <i>pilbarensis</i>	0.1	0.1
<i>Bonamia pilbarensis</i>		0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.3	0.1
<i>Codonocarpus cotinifolius</i>	0.6	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Dampiera candicans</i>	0.3	0.1
<i>Eriachne mucronata</i>	0.4	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Eriachne tenuiculmis</i>	0.5	0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Goodenia microptera</i>	0.3	0.1
<i>Goodenia stobbsiana</i>	0.6	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.4	0.1
<i>Hybanthus aurantiacus</i>	0.5	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Isotropis atropurpurea</i>	0.6	0.1
<i>Lepidium ?pholidogynum</i>	0.1	0.1
<i>Petalostylis labicheoides</i>	2	30
<i>Ptilotus astrolasius</i>	0.4	0.5
<i>Ptilotus axillaris</i>		0.1
<i>Ptilotus calostachyus</i>	0.4	0.1
<i>Ptilotus exaltatus</i>	0.1	0.1
<i>Salsola australis</i>	0.3	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.2	0.1
<i>Swainsona formosa</i>	0.3	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.8	0.1
<i>Trigastrotheca molluginea</i>	0.2	0.1
<i>Triodia epactia</i>	0.4	25



**PHOTO**





Site Name: WD75  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 675518E 7661795N  
 Landform Type: Other, Stony plain (other)  
 Slope Class: Level (0 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	2	1
<i>Acacia inaequilatera</i>	2.5	1
<i>Bonamia erecta</i>	0.4	0.2
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	0.5
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.4	50
<i>Triodia lanigera</i>	0.4	5



**PHOTO**





Site Name: WD76  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 675115E 7654237N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: SSE  
 Soil Type: Sandy Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 3-4 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia orthocarpa*  
 Lower Stratum 1: *Triodia lanigera*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia orthocarpa</i>	1.2	1.5
<i>Acacia spondylophylla</i>	0.5	0.5
<i>Bonamia aff. pilbarensis</i>	0.1	0.1
<i>Cassytha capillaris</i>		0.1
<i>Codonocarpus cotinifolius</i>	1.3	0.1
<i>Corchorus parviflorus</i>	0.7	0.5
<i>Eriachne mucronata</i>	0.4	0.2
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.4	0.5
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.7	0.4
<i>Indigofera monophylla</i>	0.3	0.1
<i>Ptilotus astrolasius</i>	0.6	0.1
<i>Ptilotus calostachyus</i>	0.9	0.1
<i>Ptilotus exaltatus</i>	0.2	0.1
<i>Senna symonii</i>	0.8	0.1
<i>Solanum phlomoides</i>	0.5	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia brizoides</i>	0.3	0.2
<i>Triodia epactia</i>	0.4	0.2
<i>Triodia lanigera</i>	0.3	25
<i>Triodia wiseana</i>	0.4	20



**PHOTO**





Site Name: WD77  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 02/07/2018  
 GPS Location: GDA94 Zone 50 674958E 7652144N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Calcrete, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Limited Clearing - Extremely old track running through quadrat  
 Fire: ~ 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia bivenosa</i>	2	2.5
<i>Acacia orthocarpa</i>	0.5	0.1
<i>Boerhavia gardneri</i>	0.4	0.3
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Codonocarpus cotinifolius</i>	0.5	0.1
<i>Corchorus parviflorus</i>	0.5	0.3
<i>Corymbia hamersleyana</i>	4	4
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	1	0.1
<i>Goodenia microptera</i>	0.2	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.4	0.2
<i>Indigofera rugosa</i>	0.6	0.5
<i>Ptilotus astrolasius</i>	0.2	0.1
<i>Ptilotus axillaris</i>	0.1	0.1
<i>Streptoglossa decurrens</i>	0.4	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.3	0.1
<i>Tribulus platypterus</i>	0.3	0.1
<i>Triodia scintillans</i>	0.2	40
<i>Triodia wiseana</i>	0.4	5



**PHOTO**





Site Name: WD78  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 675030E 7654362N  
 Landform Type: Open Depression  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: WSW  
 Soil Type: Sandy Clay  
 Soil Colour: Grey-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 3-4 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia acradenia*, *Acacia bivenosa*, *Acacia tumida* var. *pilbarensis*  
 Lower Stratum 1: *Triodia epactia*, *Triodia scintillans*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1	2
<i>Acacia bivenosa</i>	1.5	3
<i>Acacia tumida</i> var. <i>pilbarensis</i>	1.5	0.5
<i>Bonamia</i> aff. <i>pilbarensis</i>	0.1	0.1
<i>Cassytha capillaris</i>		0.1
<i>Codonocarpus cotinifolius</i>	1	0.1
<i>Corchorus parviflorus</i>	0.4	0.1
<i>Corymbia hamersleyana</i>	5	1
<i>Dodonaea coriacea</i>	0.6	0.1
<i>Goodenia stobbsiana</i>	0.4	0.1
<i>Heliotropium chrysocarpum</i>	0.3	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.2	0.1
<i>Hybanthus aurantiacus</i>	0.4	0.1
<i>Paraneurachne muelleri</i>	0.5	0.1
<i>Polymeria ambigua</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus axillaris</i>		0.1
<i>Ptilotus exaltatus</i>	0.2	0.1
<i>Sclerolaena densiflora</i>	0.1	0.1
<i>Senna symonii</i>	0.8	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia angusta</i>	0.3	1
<i>Triodia epactia</i>	0.4	2
<i>Triodia scintillans</i>	0.2	40



**PHOTO**





Site Name: WD79  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 02/07/2018  
 GPS Location: GDA94 Zone 50 674920E 7652361N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Granite, 2-10% bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia maitlandii</i>	0.5	0.4
<i>Acacia orthocarpa</i>	2	6
<i>Acacia spondylophylla</i>	0.3	0.1
<i>Bonamia alatisemina</i>		0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.4	0.1
<i>Corchorus parviflorus</i>	0.5	0.4
<i>Corymbia hamersleyana</i>	4.5	2.5
<i>Dampiera candidans</i>	0.4	0.1
<i>Fimbristylis dichotoma</i>	0.1	0.2
<i>Goodenia microptera</i>	0.2	0.1
<i>Goodenia muelleriana</i>	0.2	0.1
<i>Goodenia stobbsiana</i>	0.3	0.5
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1	0.1
<i>Heliotropium tenuifolium</i>	0.2	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.3	0.5
<i>Pluchea ferdinandi-muelleri</i>	0.4	0.1
<i>Pluchea tetranthera</i>	0.4	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.2	0.1
<i>Scaevola browniana</i> subsp. <i>browniana</i>	0.4	0.3
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.2	0.1
<i>Solanum phlomoides</i>	0.3	0.1
<i>Stemodia grossa</i>	0.2	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	1	0.2
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia brizoides</i>	0.3	0.3
<i>Triodia epactia</i>	0.3	20
<i>Triodia lanigera</i>	0.3	20



**PHOTO**





Site Name: WD80  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 675288E 7654729N  
 Landform Type: Lower Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: N  
 Soil Type: Sandy Clay  
 Soil Colour: Grey-brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Calcrete, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia orthocarpa*  
 Lower Stratum 1: *Acacia stellaticeps*  
 Lower Stratum 2: *Triodia angusta*, *Triodia scintillans*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	1.1	0.1
<i>Acacia orthocarpa</i>	2.5	0.2
<i>Acacia spondylophylla</i>	0.8	0.1
<i>Acacia stellaticeps</i>	1	1
<i>Cassytha capillaris</i>		0.1
<i>Corchorus parviflorus</i>	0.8	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.4	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Trianthema triquetrum</i>	0.1	0.1
<i>Triodia angusta</i>	0.7	40
<i>Triodia scintillans</i>	0.3	20
<i>Triodia wiseana</i>	0.5	3



**PHOTO**





Site Name: WD81  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 02/07/2018  
 GPS Location: GDA94 Zone 50 674608E 7651960N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: N  
 Soil Type: Sandy Loam  
 Soil Colour: Brown  
 Rock Outcrop: Granite, 20-50% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: ~ 3 years / > 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia maitlandii</i>	0.3	0.1
<i>Acacia orthocarpa</i>	3	2
<i>Acacia spondylophylla</i>	0.4	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3	2
<i>Bonamia alatisemina</i>		0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.6	0.5
<i>Corymbia hamersleyana</i>	4	0.5
<i>Dampiera candidans</i>	0.5	0.2
<i>Eriachne ciliata</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.3	0.2
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis dichotoma</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.3	0.2
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	3
<i>Heliotropium tenuifolium</i>	0.2	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.4	0.1
<i>Hybanthus aurantiacus</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.3	0.3
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Scaevola browniana</i> subsp. <i>browniana</i>	0.3	0.1
<i>Solanum phlomoides</i>	0.5	0.1
<i>Tephrosia virens</i>	1.2	0.2
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia brizoides</i>	0.4	12
<i>Triodia epactia</i>	0.4	20
<i>Triodia lanigera</i>	0.4	8



**PHOTO**





Site Name: WD82  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 01/07/2018  
 GPS Location: GDA94 Zone 50 675312E 7654780N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: E  
 Soil Type: Clayey Sand  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 2-10%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Calcrete, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia bivenosa*, *Acacia tumida* var. *pilbarensis*, *Grevillea wickhamii* subsp. *hispidula*, *Petalostylis labicheoides*

Lower Stratum 1: *Triodia angusta*, *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia bivenosa</i>	2.5	0.2
<i>Acacia spondylophylla</i>	0.6	0.1
<i>Acacia stellaticeps</i>	0.6	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3	10
<i>Aristida holathera</i> var. <i>holathera</i>	0.7	0.1
<i>Bonamia</i> aff. <i>pilbarensis</i>	0.1	0.1
<i>Cassytha capillaris</i>		0.1
* <i>Cenchrus ciliaris</i>	0.4	0.4
<i>Chrysopogon fallax</i>	0.7	0.1
<i>Cleome viscosa</i>	0.2	0.1
<i>Corchorus parviflorus</i>	1	0.1
<i>Corymbia hamersleyana</i>	4	0.2
<i>Dodonaea coriacea</i>	0.6	0.1
<i>Eriachne mucronata</i>	0.6	0.1
<i>Goodenia muelleriana</i>	0.3	0.1
<i>Goodenia stobbsiana</i>	0.6	0.1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	0.2
<i>Hakea lorea</i> subsp. <i>lorea</i>	1.8	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	1	0.1
<i>Hybanthus aurantiacus</i>	0.4	0.1
<i>Indigofera monophylla</i>	0.7	0.1
<i>Isotropis atropurpurea</i>	0.6	0.1
<i>Petalostylis labicheoides</i>	2	5
<i>Pluchea tetranthera</i>	0.6	0.1
<i>Polymeria ambigua</i>	0.1	0.1
<i>Pterocaulon sphaeranthoides</i>	0.8	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus calostachyus</i>	1.1	0.1
<i>Santalum lanceolatum</i>		
<i>Senna notabilis</i>	0.1	0.1
<i>Senna symonii</i>	0.4	0.1
<i>Solanum phlomoides</i>	0.6	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.8	0.1



<i>Trigastrotheca molluginea</i>	0.2	0.1
<i>Triodia angusta</i>	1.4	85
<i>Triodia epactia</i>	0.7	1
<i>Triodia scintillans</i>	0.2	0.1
<i>Triodia wiseana</i>	0.8	1

**PHOTO**



Site Name: WD83  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 02/07/2018  
 GPS Location: GDA94 Zone 50 674337E 7651847N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Shale (other), 2-10% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Dolerite, Calcrete, Quartz, Shale (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	3	1.5
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.6	0.1
<i>Cullen leucochaetes</i>	0.8	0.1
<i>Indigofera rugosa</i>	1	1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.5	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Triodia epactia</i>	0.5	0.5
<i>Triodia scintillans</i>	0.2	50
<i>Triodia wiseana</i>	0.4	5

**PHOTO**



Site Name: WD84  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 02/07/2018  
 GPS Location: GDA94 Zone 50 673946E 7653210N  
 Landform Type: Mid Slope  
 Slope Class: Precipitous (60 degrees)  
 Aspect: S  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Granite, 20-50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*, *Eucalyptus leucophloia* subsp. *leucophloia*  
 Mid Stratum 1: *Acacia inaequilatera*, *Hakea lorea* subsp. *lorea*  
 Mid Stratum 2: *Acacia acradenia*  
 Lower Stratum 1: *Triodia brizoides*, *Triodia epactia*, *Triodia wiseana*  
 Lower Stratum 2: *Eriachne mucronata*, *Themeda triandra*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> sp. Dioicum (A.A. Mitchell PRP 1618)	1	0.1
<i>Acacia acradenia</i>	1.5	0.2
<i>Acacia inaequilatera</i>	2.5	0.5
* <i>Aerva javanica</i>	0.3	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.1	0.1
<i>Cleome viscosa</i>	0.4	0.1
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	0.2	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	3	0.1
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	0.4	0.1
<i>Cyperus hesperius</i>	0.3	0.1
<i>Eriachne mucronata</i>	0.3	1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	4.5	2
<i>Euphorbia careyi</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	2	0.1
<i>Hibiscus goldsworthii</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.2	0.1
<i>Indigofera trita</i>	0.3	0.2
<i>Jasminum didymum</i> subsp. <i>lineare</i>		0.1
<i>Rhynchosia minima</i>		0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.8	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.2	0.1
<i>Solanum horridum</i>	0.2	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Themeda triandra</i>	0.4	0.2
<i>Tribulus suberosus</i>	0.4	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1



<i>Triodia brizoides</i>	0.4	78
<i>Triodia epactia</i>	0.4	0.5
<i>Triodia wiseana</i>	0.5	2
<i>Triumfetta propinqua</i>	0.3	0.1

**PHOTO**



Site Name: WD85  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 02/07/2018  
 GPS Location: GDA94 Zone 50 674086E 7651711N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Moderately Inclined (10 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Granite, 20-50% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.5	0.2
<i>Acacia maitlandii</i>	2	1
<i>Acacia orthocarpa</i>	2.5	3
<i>Bonamia alatisemina</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	0.6	0.2
<i>Cyperus hesperius</i>	0.2	0.1
<i>Dampiera candidans</i>	0.3	0.1
<i>Eriachne ciliata</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.3	0.2
<i>Euphorbia careyi</i>	0.2	0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1	0.1
<i>Fimbristylis dichotoma</i>	0.1	0.1
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	2.1	0.2
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	3
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.5	0.1
<i>Hybanthus aurantiacus</i>	0.4	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Nicotiana benthamiana</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Petalostylis labicheoides</i>	2	0.2
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.5	0.3
<i>Sida arenicola</i>	0.4	0.1
<i>Terminalia circumalata</i>	3	1
<i>Tinospora smilacina</i>		0.1
<i>Triodia brizoides</i>	0.4	20
<i>Triodia epactia</i>	0.4	45
<i>Tripogonella loliiformis</i>	0.1	0.1



**PHOTO**





Site Name: WD86  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 02/07/2018  
 GPS Location: GDA94 Zone 50 673941E 7653144N  
 Landform Type: Lower Slope  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: SSW  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Granite, <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia inaequilatera*  
 Lower Stratum 1: *Triodia epactia*, *Triodia scintillans*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.5	0.2
<i>Acacia inaequilatera</i>	2	2
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.6	0.1
<i>Ptilotus calostachyus</i>	0.8	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.2	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Triodia brizoides</i>	0.3	0.1
<i>Triodia epactia</i>	0.5	30
<i>Triodia scintillans</i>	0.3	2
<i>Triodia wiseana</i>	0.5	40



**PHOTO**





Site Name: WD87  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 02/07/2018  
 GPS Location: GDA94 Zone 50 673937E 7651888N  
 Landform Type: Upper Slope  
 Slope Class: Very Steep (37 degrees)  
 Aspect: S  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Ironstone, 10-20% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	0.2
<i>Acacia inaequilatera</i>	1.2	0.1
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.1	0.1
<i>Cucumis variabilis</i>		0.1
<i>Cullen leucochaetes</i>	1.8	0.2
<i>Cymbopogon ambiguus</i>	0.6	0.5
<i>Cyperus hesperius</i>	0.2	0.1
<i>Dampiera candicans</i>	0.3	0.1
<i>Eriachne mucronata</i>	0.3	0.5
<i>Euphorbia careyi</i>	0.1	0.1
<i>Gossypium australe</i>	1.8	0.4
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	2	0.2
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.5	0.1
<i>Hibiscus goldsworthii</i>	0.6	0.1
<i>Indigofera monophylla</i>	0.3	0.2
<i>Indigofera rugosa</i>	0.5	0.1
<i>Triodia brizoides</i>	0.4	35
<i>Triodia epactia</i>	0.4	15
<i>Triodia wiseana</i>	0.4	5
<i>Triumfetta maconochieana</i>	0.4	0.1
<i>Triumfetta propinqua</i>	0.5	0.1



**PHOTO**





Site Name: WD88  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 02/07/2018  
 GPS Location: GDA94 Zone 50 673857E 7653000N  
 Landform Type: Hillock  
 Slope Class: Steep (23 degrees)  
 Aspect: E  
 Soil Type: Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Dolerite, Granite (other), >50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite, Dolerite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Senna glutinosa* subsp. *glutinosa*  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Aristida holathera</i> var. <i>holathera</i>	0.3	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Crotalaria novae-hollandiae</i> subsp. <i>novae-hollandiae</i>	0.2	0.1
<i>Cullen leucochaetes</i>	2	0.1
<i>Cymbopogon ambiguus</i>	0.5	0.1
<i>Eriachne ciliata</i>	0.2	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Fimbristylis dichotoma</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Gossypium australe</i>	0.5	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polycarpaea longiflora</i>	0.3	0.1
<i>Ptilotus fusiformis</i>	0.3	0.1
<i>Rhynchosia minima</i>		0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.5	0.1
<i>Swainsona formosa</i>	0.7	0.1
<i>Tephrosia densa</i>	0.3	0.1
<i>Trachymene oleracea</i>	0.4	0.1
<i>Tribulus suberosus</i>	0.6	0.1
<i>Triodia brizoides</i>	0.5	1
<i>Triodia epactia</i>	0.5	60
<i>Triodia wiseana</i>	0.6	1



**PHOTO**





Site Name: WD89  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 02/07/2018  
 GPS Location: GDA94 Zone 50 675010E 7660894N  
 Landform Type: Other, Stony plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	1.5
<i>Acacia ancistrocarpa</i>	1.8	0.3
<i>Acacia inaequilatera</i>	3	0.6
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Cassytha capillaris</i>		0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.3	0.1
<i>Corchorus parviflorus</i>	1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2.5	0.6
<i>Ptilotus astrolasius</i>	0.5	0.2
<i>Ptilotus calostachyus</i>	0.8	0.1
<i>Solanum phlomoides</i>	0.7	0.1
<i>Stemodia grossa</i>	0.5	0.1
<i>Tephrosia clementii</i>	0.1	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.4	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia chichesterensis</i> (P3)	0.3	5
<i>Triodia lanigera</i>	0.5	20
<i>Triodia wiseana</i>	0.5	20



**PHOTO**





Site Name: WD90  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 02/07/2018  
 GPS Location: GDA94 Zone 50 674043E 7652926N  
 Landform Type: Drainage Line  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: ENE  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Granite, <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: River stones (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Eucalyptus victrix*  
 Mid Stratum 1: *Acacia pyrifolia* var. *pyrifolia*, *Acacia tumida* var. *pilbarensis*  
 Mid Stratum 2: *Cajanus cinereus*  
 Lower Stratum 1: *Corchorus parviflorus*, *Tephrosia rosea* var. *clementii*  
 Lower Stratum 2: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> aff. <i>hannii</i>	0.8	0.1
<i>Abutilon</i> sp. <i>Dioicum</i> (A.A. Mitchell PRP 1618)	0.7	0.1
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	2	0.5
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2.5	1
* <i>Aerva javanica</i>	0.3	0.1
<i>Amaranthus undulatus</i>	0.1	0.1
<i>Boerhavia burbridgeana</i>		0.1
<i>Cajanus cinereus</i>	1.2	1
* <i>Cenchrus ciliaris</i>	0.1	0.1
<i>Cleome viscosa</i>	0.6	0.1
<i>Corchorus parviflorus</i>	0.6	1
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	0.3	0.1
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	0.5	0.1
<i>Cyperus vaginatus</i>	0.6	0.1
<i>Dampiera candidans</i>	0.4	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Enneapogon lindleyanus</i>	0.4	0.1
<i>Eriachne tenuiculmis</i>	0.4	0.5
<i>Eucalyptus victrix</i>	8	3
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.3	0.1
<i>Euphorbia trigonosperma</i>	0.1	0.1
<i>Fimbristylis dichotoma</i>	0.1	0.1
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	2.5	0.2
<i>Gossypium australe</i>	1.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	0.1
<i>Hibiscus leptocladus</i>	0.5	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.3	0.1
<i>Hybanthus aurantiacus</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.6	0.2



<i>Ipomoea muelleri</i>		0.1
<i>Notoleptopus decaisnei</i>	0.1	0.1
<i>Phyllanthus maderaspatensis</i>	0.4	0.1
<i>Polymeria ambigua</i>	0.1	0.1
<i>Pterocaulon sphaeranthoides</i>	0.4	0.1
<i>Ptilotus axillaris</i>	0.1	0.1
<i>Ptilotus exaltatus</i>	0.1	0.1
<i>Rhynchosia minima</i>		0.1
<i>Senna notabilis</i>	0.4	0.1
<i>Sida clementii</i>	0.3	0.1
<i>Solanum phlomoides</i>	0.3	0.1
<i>Swainsona formosa</i>	0.1	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.7	0.5
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	0.2	0.1
<i>Triodia epactia</i>	0.5	20
<i>Triodia wiseana</i>	0.6	0.5
<i>Triumfetta propinqua</i>	0.4	0.1

**PHOTO**



Site Name: WD91  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 02/07/2018  
 GPS Location: GDA94 Zone 50 674802E 7662311N  
 Landform Type: Drainage Line  
 Slope Class: Level (0 degrees)  
 Soil Type: Sandy Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 0%  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Pig/Animal Disturbance - Cattle activity  
 Fire: > 3 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	3	5
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	2	0.3
<i>Acacia tumida</i> var. <i>pilbarensis</i>	4	25
<i>Aristida holathera</i> var. <i>holathera</i>	0.5	0.5
<i>Bonamia erecta</i>	0.3	3
<i>Cassytha capillaris</i>		0.1
* <i>Cenchrus ciliaris</i>	0.5	0.2
<i>Chrysopogon fallax</i>	0.5	20
<i>Corchorus parviflorus</i>	0.5	0.2
<i>Corymbia hamersleyana</i>	6	4
<i>Digitaria brownii</i>	0.5	0.2
<i>Eriachne mucronata</i>	0.3	0.1
<i>Euphorbia ?trigonosperma</i>	0.3	0.1
<i>Goodenia stobbsiana</i>	0.6	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3.5	0.2
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.4	0.1
<i>Hybanthus aurantiacus</i>	0.8	2
<i>Indigofera monophylla</i>	1	3
<i>Isotropis atropurpurea</i>	0.8	0.1
<i>Paraneurachne muelleri</i>	0.4	0.2
<i>Paspalidium rarum</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.8	0.1
<i>Ptilotus fusiformis</i>	0.4	0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	2.4	0.2
<i>Seringia nephrosperma</i>	1	1
<i>Sida arenicola</i>	0.2	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.4	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.5	20
<i>Triodia lanigera</i>	0.5	10



**PHOTO**





Site Name: WD92  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 02/07/2018  
 GPS Location: GDA94 Zone 50 674186E 7652665N  
 Landform Type: Lower Slope  
 Slope Class: Steep (23 degrees)  
 Aspect: NW  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Granite, <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia inaequilatera*  
 Mid Stratum 2: *Acacia acradenia*  
 Lower Stratum 1: *Triodia brizoides*, *Triodia lanigera*, *Triodia scintillans*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.7	1
<i>Acacia inaequilatera</i>	2	0.8
<i>Bonamia pilbarensis</i>		0.1
<i>Bonamia aff. pilbarensis</i>	0.2	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Dampiera candidans</i>	0.3	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.1	0.2
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.5	0.1
<i>Triodia brizoides</i>	0.4	75
<i>Triodia lanigera</i>	0.5	1
<i>Triodia scintillans</i>	0.3	2
<i>Triodia wiseana</i>	0.5	3



**PHOTO**





Site Name: WD94  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 02/07/2018  
 GPS Location: GDA94 Zone 50 674544E 7652601N  
 Landform Type: Lower Slope  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: SW  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Granite, >50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Eucalyptus leucophloia* subsp. *leucophloia*  
 Mid Stratum 1: *Acacia maitlandii*, *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 2: *Acacia acradenia*  
 Lower Stratum 1: *Acacia spondylophylla*  
 Lower Stratum 2: *Triodia brizoides*, *Triodia epactia*, *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1	0.4
<i>Acacia maitlandii</i>	1.8	0.8
<i>Acacia orthocarpa</i>	2.5	0.1
<i>Acacia spondylophylla</i>	0.6	0.5
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2	0.2
<i>Bonamia alatisemina</i>		0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.2	0.1
<i>Corymbia hamersleyana</i>	1.7	0.1
<i>Cyperus hesperius</i>	0.3	0.1
<i>Dampiera candidans</i>	0.3	0.1
<i>Eriachne ciliata</i>	0.3	0.1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.2	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	2	0.1
<i>Euphorbia careyi</i>	0.2	0.1
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	0.1	0.1
<i>Fimbristylis dichotoma</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Gossypium australe</i>	0.3	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2.5	1.5
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.3	0.1
<i>Hybanthus aurantiacus</i>	0.1	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polycarpha longiflora</i>	0.3	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.6	0.1
<i>Rhynchosia minima</i>		0.1
<i>Sida arenicola</i>	1.5	0.1



<i>Tephrosia virens</i>	0.3	0.1
<i>Triodia brizoides</i>	0.5	45
<i>Triodia epactia</i>	0.5	10
<i>Triodia lanigera</i>	0.5	1
<i>Triodia wiseana</i>	0.6	0.2
<i>Triumfetta maconochieana</i>	0.4	0.1

**PHOTO**



Site Name: WD96  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 02/07/2018  
 GPS Location: GDA94 Zone 50 674388E 7652488N  
 Landform Type: Upper Slope  
 Slope Class: Precipitous (60 degrees)  
 Aspect: SW  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-brown (other)  
 Rock Outcrop: Ironstone, 10-20% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Fire: > 10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*, *Hakea lorea* subsp. *lorea*  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1	0.1
<i>Boerhavia gardneri</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.2	0.1
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	0.5	0.1
<i>Cyperus hesperius</i>	0.2	0.1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Gossypium australe</i>	1	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	1.5	0.1
<i>Indigofera monophylla</i>	0.2	0.1
<i>Rhynchosia minima</i>		0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Triodia epactia</i>	0.5	65
<i>Triodia wiseana</i>	0.5	20
<i>Triumfetta propinqua</i>	0.2	0.1



**PHOTO**





Site Name: WDD01  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 17/06/2019  
 GPS Location: GDA94 Zone 50 672949.53720754E 7662896.12187801N  
 Landform Type: Lower Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: E  
 Soil Type: Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Metamorphic (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Acacia tumida* var. *pilbarensis*  
 Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	6
<i>Acacia ancistrocarpa</i>	2	1
<i>Acacia inaequilatera</i>	3	0.3
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2.5	3.5
<i>Bonamia alatisemina</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	1	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2.5	0.4
<i>Indigofera monophylla</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.2	0.1
<i>Triodia brizoides</i>	0.4	0.1
<i>Triodia epactia</i>	0.4	5
<i>Triodia lanigera</i>	0.4	35



**PHOTO**





Site Name: WDD02  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 17/06/2019  
 GPS Location: GDA94 Zone 50 673381.50827186E 7662798.91542118N  
 Landform Type: Plain  
 Slope Class: Level (0 degrees)  
 Soil Type: Sandy Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: <2%  
 CF Sizes: 2-6mm  
 CF Types: Metamorphic (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Acacia ancistrocarpa*  
 Mid Stratum 1: *Bonamia erecta*  
 Lower Stratum 1: *Triodia epactia*, *Triodia lanigera*, *Triodia schinzii*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	2	7
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	1.3	0.2
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2	0.4
<i>Bonamia erecta</i>	0.4	1
<i>Corchorus parviflorus</i>	0.6	0.1
<i>Eragrostis eriopoda</i>	0.2	0.1
<i>Euphorbia clementii</i> (P3)	0.1	0.1
<i>Triodia epactia</i>	0.4	5
<i>Triodia lanigera</i>	0.4	25
<i>Triodia schinzii</i>	0.6	5



**PHOTO**





Site Name: WDD03  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 17/06/2019  
 GPS Location: GDA94 Zone 50 673034.76815557E 7661761.32944816N  
 Landform Type: Plain  
 Slope Class: Level (0 degrees)  
 Soil Type: Sandy Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 0%  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia ancistrocarpa*  
 Lower Stratum 1: *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	1.8	5
<i>Acacia inaequilatera</i>	1	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2	0.5
<i>Bonamia erecta</i>	0.3	0.3
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	6	0.5
<i>Corymbia zygophylla</i>	2	0.3
<i>Indigofera monophylla</i>	0.3	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Triodia epactia</i>	0.5	0.3
<i>Triodia lanigera</i>	0.5	40



**PHOTO**





Site Name: WDD04  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 17/06/2019  
 GPS Location: GDA94 Zone 50 672713.25051303E 7661005.92491976N  
 Landform Type: Lower Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: E  
 Soil Type: Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Metamorphic (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Acacia inaequilatera*, *Acacia tumida* var. *pilbarensis*, *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Triodia brizoides*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	5
<i>Acacia inaequilatera</i>	2.5	0.4
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2.5	1
<i>Amaranthus undulatus</i>	0.1	0.1
<i>Bonamia alatisemina</i>	0.1	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.4	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2.5	0.3
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia brizoides</i>	0.3	30
<i>Triodia epactia</i>	0.4	5



**PHOTO**





Site Name: WDD05  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 18/06/2019  
 GPS Location: GDA94 Zone 50 672191.86613496E 7662762.76441046N  
 Landform Type: Ridge  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: E  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Metamorphic (other), 10-20% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Metamorphic (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*, *Senna symonii*

Lower Stratum 1: *Triodia brizoides*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.6	3
<i>Acacia inaequilatera</i>	2	0.2
<i>Acacia tumida</i> var. <i>pilbarensis</i>	0.6	0.1
<i>Amaranthus undulatus</i>	0.1	0.1
<i>Aristida burbridgeae</i>	0.3	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cymbopogon ambiguus</i>	0.2	0.1
<i>Cyperus hesperius</i>	0.3	0.1
<i>Eriachne mucronata</i>	0.3	1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Gossypium australe</i>	0.5	0.2
<i>Hakea lorea</i> subsp. <i>lorea</i>	2	0.3
<i>Indigofera monophylla</i>	0.3	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Senna symonii</i>	1.6	3
<i>Solanum phlomoides</i>	0.3	0.1
<i>Tribulus suberosus</i>	0.5	0.2
<i>Triodia brizoides</i>	0.4	25
<i>Triodia epactia</i>	0.4	2
<i>Triodia wiseana</i>	0.4	8
<i>Triumfetta propinqua</i>	0.5	0.2



**PHOTO**





Site Name: WDD06  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 18/06/2019  
 GPS Location: GDA94 Zone 50 671796.38895058E 7663591.86637714N  
 Landform Type: Plain  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Metamorphic (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*, *Acacia inaequilatera*, *Acacia tumida* var. *pilbarensis*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2.5	5
<i>Acacia inaequilatera</i>	3	2.5
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3.5	2
<i>Bonamia alatisemina</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	1.8	0.3
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2.5	0.5
<i>Indigofera monophylla</i>	0.2	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia brizoides</i>	0.4	0.2
<i>Triodia epactia</i>	0.4	35



**PHOTO**





Site Name: WDD07  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 18/06/2019  
 GPS Location: GDA94 Zone 50 672386.56220014E 7663948.32562604N  
 Landform Type: Crest  
 Slope Class: Steep (23 degrees)  
 Aspect: W  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Metamorphic (other), >50% bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Metamorphic (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia tumida* var. *pilbarensis*, *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 2: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.6	2
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3	3
<i>Corymbia hamersleyana</i>	4	0.6
<i>Dampiera candidans</i>	0.4	0.3
<i>Eriachne mucronata</i>	0.3	7
<i>Goodenia stobbsiana</i>	0.4	1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	2
<i>Indigofera monophylla</i>	0.1	0.1
<i>Terminalia supranitifolia</i> (P3)	1.2	0.3
<i>Triodia brizoides</i>	0.3	0.1
<i>Triodia epactia</i>	0.4	33



**PHOTO**





Site Name: WDD08  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 18/06/2019  
 GPS Location: GDA94 Zone 50 672894.04646932E 7663618.60632893N  
 Landform Type: Plain  
 Slope Class: Level (0 degrees)  
 Soil Type: Sandy Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 0%  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: (other) - Man made mound of dirt near edge of quadrat  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia tumida* var. *pilbarensis*

Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3.5	30
<i>Boerhavia coccinea</i>	0.1	0.1
<i>Bonamia alatisemina</i>	0.1	0.1
<i>Bonamia erecta</i>	0.4	0.3
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	5	1
<i>Dampiera candidans</i>	0.4	0.1
<i>Eragrostis eriopoda</i>	0.2	0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia clementii</i> (P3)	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	1.5
<i>Heliotropium vestitum</i>	0.1	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.4	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Leptosema anomalum</i>	0.2	0.1
<i>Paspalidium clementii</i>	0.1	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Solanum diversiflorum</i>	0.1	0.1
<i>Tinospora smilacina</i>		0.1
<i>Triodia epactia</i>	0.5	15
<i>Triodia lanigera</i>	0.5	3
<i>Triodia schinzii</i>	0.5	5



**PHOTO**





Site Name: WDD09  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 18/06/2019  
 GPS Location: GDA94 Zone 50 672840.14571695E 7663868.40421554N  
 Landform Type: Lower Slope  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: E  
 Soil Type: Sandy Loam  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Metamorphic (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Triodia epactia*

Mid Stratum 1: *Acacia acradenia*, *Grevillea wickhamii* subsp. *hispidula*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2.5	4
<i>Acacia inaequilatera</i>	3.5	0.3
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3.5	1.5
<i>Bonamia alatisemina</i>	0.1	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.2	0.1
<i>Dampiera candidans</i>	0.5	0.5
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3.5	3
<i>Indigofera monophylla</i>	0.5	0.1
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.4	35



**PHOTO**





Site Name: WDD10  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 18/06/2019  
 GPS Location: GDA94 Zone 50 673399.02986113E 7663764.77725223N  
 Landform Type: Plain  
 Slope Class: Level (0 degrees)  
 Soil Type: Sandy Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 0%  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia ancistrocarpa*  
 Mid Stratum 2: *Bonamia erecta*  
 Lower Stratum 1: *Triodia schinzii*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	1.8	4
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	0.8	0.3
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2	0.2
<i>Bonamia erecta</i>	0.4	0.5
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.6	0.1
<i>Eragrostis eriopoda</i>	0.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.6	0.2
<i>Heliotropium vestitum</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.4	0.2
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.6	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.3	0.1
<i>Trianthema pilosum</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia schinzii</i>	0.5	35
<i>Triumfetta chaetocarpa</i>	0.4	0.1



**PHOTO**





Site Name: WDD11  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 18/06/2019  
 GPS Location: GDA94 Zone 50 673654.55193132E 7663295.95332357N  
 Landform Type: Plain  
 Slope Class: Level (0 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 0%  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia zygophylla*  
 Mid Stratum 1: *Acacia ancistrocarpa*  
 Lower Stratum 1: *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	2.5	30
<i>Acacia tumida</i> var. <i>pilbarensis</i>	0.5	0.1
<i>Bonamia erecta</i>	0.2	0.1
<i>Corymbia zygophylla</i>	5	1
<i>Eragrostis eriopoda</i>	0.2	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.1	0.1
<i>Indigofera monophylla</i>	0.2	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.4	0.1
<i>Triodia lanigera</i>	0.5	35
<i>Triodia schinzii</i>	0.5	2



**PHOTO**





Site Name: WDD12  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 19/06/2019  
 GPS Location: GDA94 Zone 50 674031.83492858E 7662652.00691635N  
 Landform Type: Plain  
 Slope Class: Level (0 degrees)  
 Soil Type: Clayey Sand  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 10-20%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Metamorphic, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia zygophylla*  
 Mid Stratum 1: *Acacia ancistrocarpa*, *Acacia tumida* var. *pilbarensis*  
 Lower Stratum 1: *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	2.5	9
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2.5	7
<i>Bonamia erecta</i>	0.3	0.2
<i>Corymbia zygophylla</i>	4	1
<i>Eriachne mucronata</i>	0.4	0.1
<i>Halgania solanacea</i> var. <i>solanacea</i> ms	0.2	0.1
<i>Indigofera monophylla</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Triodia lanigera</i>	0.4	35
<i>Triodia schinzii</i>	0.5	0.2



**PHOTO**





Site Name: WDD13  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 19/06/2019  
 GPS Location: GDA94 Zone 50 674881.55E 7663636.54N  
 Landform Type: Plain  
 Slope Class: Level (0 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Metamorphic, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia ancistrocarpa*  
 Lower Stratum 1: *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	2	30
<i>Acacia inaequilatera</i>	1.5	0.2
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2	0.2
<i>Bonamia alatisemina</i>	0.1	0.1
<i>Bonamia erecta</i>	0.3	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.2	0.1
<i>Ptilotus astrolasius</i>	0.2	0.1
<i>Ptilotus calostachyus</i>	0.4	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.4	0.1
<i>Triodia lanigera</i>	0.3	35



**PHOTO**





Site Name: WDD14  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 19/06/2019  
 GPS Location: GDA94 Zone 50 675946.23E 7663305.9N  
 Landform Type: Plain  
 Slope Class: Level (0 degrees)  
 Soil Type: Clayey Sand  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: <2%  
 CF Sizes: 2-6mm, 6-20mm  
 CF Types: Ironstone, Metamorphic, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia ancistrocarpa*, *Acacia inaequilatera*  
 Lower Stratum 1: *Triodia epactia*, *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	1	1
<i>Acacia inaequilatera</i>	2	0.4
<i>Bonamia alatisemina</i>	0.1	0.1
<i>Bonamia erecta</i>	0.3	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Chrysopogon fallax</i>	0.2	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.3	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	4	0.5
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia clementii</i> (P3)	0.1	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Goodenia muelleriana</i>	0.1	0.1
<i>Heliotropium cunninghamii</i>	0.1	0.1
<i>Heliotropium pachyphyllum</i>	0.1	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Portulaca oleracea</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus axillaris</i>		0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.1	0.1
<i>Tinospora smilacina</i>		0.1
<i>Trianthema pilosum</i>	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.4	7
<i>Triodia lanigera</i>	0.4	28
<i>Yakirra australiensis</i> var. <i>australiensis</i>	0.1	0.1



**PHOTO**





Site Name: WDD15  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 19/06/2019  
 GPS Location: GDA94 Zone 50 675744.64E 7663848.15N  
 Landform Type: Plain  
 Slope Class: Level (0 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Light brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Quartz, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia inaequilatera*  
 Mid Stratum 2: *Acacia bivenosa*, *Codonocarpus cotinifolius*  
 Lower Stratum 1: *Triodia chichesterensis*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	1.3	0.1
<i>Acacia bivenosa</i>	1.5	1.5
<i>Acacia inaequilatera</i>	4	3
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Codonocarpus cotinifolius</i>	1.5	2.5
<i>Corchorus parviflorus</i>	0.6	0.1
<i>Corymbia hamersleyana</i>	5	1.5
<i>Goodenia muelleriana</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	0.3
<i>Heliotropium cunninghamii</i>	0.1	0.1
<i>Heliotropium pachyphyllum</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.4	0.2
<i>Ptilotus calostachyus</i>	0.6	0.1
<i>Solanum phlomoides</i>	0.1	0.1
<i>Tinospora smilacina</i>		0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Triodia chichesterensis</i> (P3)	0.3	35



**PHOTO**





Site Name: WDD16  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 19/06/2019  
 GPS Location: GDA94 Zone 50 675803.36E 7663908.65N  
 Landform Type: Drainage Line  
 Slope Class: Level (0 degrees)  
 Soil Type: Clayey Sand  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 2-10%  
 CF Sizes: 2-6mm, 6-20mm  
 CF Types: Quartz, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia acradenia*, *Acacia ancistrocarpa*, *Acacia tumida* var. *pilbarensis*, *Grevillea wickhamii* subsp. *hispidula*, *Petalostylis labicheoides*  
 Mid Stratum 2: *Corchorus parviflorus*, *Indigofera monophylla*  
 Lower Stratum 1: *Chrysopogon fallax*, *Sorghum plumosum* var. *plumosum*, *Themeda triandra*, *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	5
<i>Acacia ancistrocarpa</i>	2	1
<i>Acacia inaequilatera</i>	0.5	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2	1
<i>Bonamia erecta</i>	0.4	0.3
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Cajanus pubescens</i>	2	1
<i>Cassytha capillaris</i>		0.1
<i>Chrysopogon fallax</i>	0.4	12
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	1	1.5
<i>Corymbia hamersleyana</i>	5	8
<i>Cucumis variabilis</i>	0.1	0.1
<i>Dampiera candidans</i>	0.3	0.1
<i>Eriachne mucronata</i>	0.4	0.5
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia trigonosperma</i>	0.1	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Goodenia muelleriana</i>	0.2	0.1
<i>Goodenia stobbsiana</i>	0.4	0.2
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2.5	5
<i>Heliotropium pachyphyllum</i>	0.3	0.2
<i>Hybanthus aurantiacus</i>	0.4	0.1
<i>Indigofera monophylla</i>	0.8	1
<i>Isotropis atropurpurea</i>	0.8	0.2
<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.8	0.1
<i>Petalostylis labicheoides</i>	3	1
<i>Polymeria ambigua</i>	0.1	1
<i>Portulaca oleracea</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.4	0.2



<i>Rhynchosia minima</i>		0.1
<i>Senna notabilis</i>	0.4	0.1
<i>Solanum phlomoides</i>	0.6	0.1
<i>Sorghum plumosum</i> var. <i>plumosum</i>	0.5	10
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.5	0.1
<i>Themeda triandra</i>	1	3
<i>Tinospora smilacina</i>		0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.5	12

**PHOTO**



Site Name: WDD17  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 19/06/2019  
 GPS Location: GDA94 Zone 50 675884.56E 7663953.84N  
 Landform Type: Plain  
 Slope Class: Level (0 degrees)  
 Soil Type: Sandy Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: <2%  
 CF Sizes: 2-6mm, 6-20mm  
 CF Types: Ironstone, Metamorphic, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia ancistrocarpa*  
 Lower Stratum 1: *Triodia epactia*, *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	2	10
<i>Acacia bivenosa</i>	2	0.5
<i>Acacia inaequilatera</i>	3	0.5
<i>Acacia stellaticeps</i>	0.8	0.4
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3	0.6
<i>Bonamia erecta</i>	0.3	0.3
<i>Cassytha capillaris</i>		0.1
<i>Chrysopogon fallax</i>	0.5	0.1
<i>Goodenia stobbsiana</i>	0.4	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.7	0.2
<i>Indigofera monophylla</i>	0.2	0.1
<i>Ptilotus astrolasius</i>	0.5	0.3
<i>Ptilotus calostachyus</i>	0.6	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.6	0.1
<i>Triodia epactia</i>	0.4	13
<i>Triodia lanigera</i>	0.4	22



**PHOTO**





Site Name: WDD18  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 19/06/2019  
 GPS Location: GDA94 Zone 50 673621.57E 7663686.7N  
 Landform Type: Plain  
 Slope Class: Level (0 degrees)  
 Soil Type: Clayey Sand  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 0%  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Acacia inaequilatera*  
 Mid Stratum 1: *Acacia ancistrocarpa*, *Acacia pyrifolia* var. *pyrifolia*, *Grevillea wickhamii* subsp. *hispidula*  
 Mid Stratum 2: *Bonamia erecta*, *Corchorus parviflorus*, *Triumfetta chaetocarpa*  
 Lower Stratum 1: *Triodia schinzii*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	1.8	1
<i>Acacia inaequilatera</i>	2.5	0.4
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	1.3	0.6
<i>Bonamia erecta</i>	0.5	1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.8	0.3
<i>Eriachne obtusa</i>	0.3	0.1
<i>Goodenia microptera</i>	0.3	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.8	0.4
<i>Heliotropium vestitum</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.4	0.2
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Portulaca oleracea</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.5	0.3
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia schinzii</i>	0.5	30
<i>Triumfetta chaetocarpa</i>	0.5	0.2



**PHOTO**





Site Name: WDD19  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 20/06/2019  
 GPS Location: GDA94 Zone 50 671576.9E 7661746.33N  
 Landform Type: Plain  
 Slope Class: Level (0 degrees)  
 Soil Type: Clayey Sand  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 0%  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia ancistrocarpa*  
 Mid Stratum 2: *Bonamia erecta*  
 Lower Stratum 1: *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	2	0.4
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	1.5	0.4
<i>Aristida holathera</i> var. <i>holathera</i>	0.1	0.1
<i>Bonamia alatisemina</i>		0.1
<i>Bonamia erecta</i>	0.4	2
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.3	0.1
<i>Corchorus parviflorus</i>	0.5	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.3	0.1
<i>Eragrostis eriopoda</i>	0.3	0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.2	0.1
<i>Goodenia microptera</i>	0.3	0.1
<i>Gossypium australe</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.2	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus calostachyus</i>	0.6	0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1.6	0.3
<i>Sida clementii</i>	0.3	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.3	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.3	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.5	0.1
<i>Triodia lanigera</i>	0.6	40
<i>Triodia schinzii</i>	0.6	0.2



**PHOTO**





Site Name: WDD20  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 20/06/2019  
 GPS Location: GDA94 Zone 50 672090.74348911E 7661682.96065344N  
 Landform Type: Ridge  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: E  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Dolerite, >50% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Dolerite, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: < 5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia inaequilatera*  
 Mid Stratum 2: *Corchorus parviflorus*, *Gossypium australe*  
 Lower Stratum 1: *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.2	0.1
<i>Acacia ancistrocarpa</i>	0.2	0.1
<i>Acacia inaequilatera</i>	3	0.2
<i>Boerhavia gardneri</i>	0.4	0.2
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.4	0.2
<i>Corymbia hamersleyana</i>	0.8	0.2
<i>Cymbopogon ambiguus</i>	0.3	0.1
<i>Cyperus hesperius</i>	0.2	0.1
<i>Enneapogon lindleyanus</i>		
<i>Eragrostis eriopoda</i>	0.2	0.1
<i>Eriachne mucronata</i>	0.3	0.5
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.2	0.2
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	0.6	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.1	0.1
<i>Gossypium australe</i>	1	0.5
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	0.2	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	0.6	0.2
<i>Heliotropium pachyphyllum</i>	0.2	0.1
<i>Hibiscus coatesii</i>	0.4	0.1
<i>Hibiscus leptocladus</i>	0.3	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.2	0.1
<i>Ptilotus calostachyus</i>	0.2	0.1
<i>Rhynchosia minima</i>		0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.6	0.1
<i>Senna notabilis</i>	0.3	0.1
<i>Solanum phlomoides</i>	0.3	0.1



<i>Tephrosia clementii</i>	0.1	0.1
<i>Tephrosia densa</i>	0.3	0.1
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.2	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Tribulus platypterus</i>	0.6	0.1
<i>Tribulus suberosus</i>	0.5	0.2
<i>Trichodesma zeylanicum</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia wiseana</i>	0.3	12
<i>Triumfetta propinqua</i>	0.4	0.3

**PHOTO**



Site Name: WDD21  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 20/06/2019  
 GPS Location: GDA94 Zone 50 672201.52030945E 7662144.95094166N  
 Landform Type: Lower Slope  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: W  
 Soil Type: Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Metamorphic, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia inaequilatera*, *Acacia tumida* var. *pilbarensis*  
 Mid Stratum 2: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	3
<i>Acacia ancistrocarpa</i>	2	0.5
<i>Acacia inaequilatera</i>	4	4
<i>Acacia tumida</i> var. <i>pilbarensis</i>	4	1.5
<i>Corymbia hamersleyana</i>	5	0.6
<i>Goodenia stobbsiana</i>	0.6	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.5	0.2
<i>Indigofera monophylla</i>	0.5	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus calostachyus</i>	0.4	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.4	35



**PHOTO**





Site Name: WDD22  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 20/06/2019  
 GPS Location: GDA94 Zone 50 675704.52852803E 7663388.74744198N  
 Landform Type: Plain  
 Slope Class: Level (0 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Quartz, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia inaequilatera*  
 Mid Stratum 2: *Acacia bivenosa*, *Codonocarpus cotinifolius*, *Senna glutinosa* subsp. *glutinosa*  
 Lower Stratum 1: *Triodia chichesterensis*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	0.6	0.1
<i>Acacia bivenosa</i>	1.6	1
<i>Acacia inaequilatera</i>	2.5	1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Chrysopogon fallax</i>	0.4	0.1
<i>Codonocarpus cotinifolius</i>	1.6	0.6
<i>Corchorus parviflorus</i>	0.5	0.2
<i>Corymbia hamersleyana</i>	5	7
<i>Cucumis variabilis</i>		0.1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Goodenia stobbsiana</i>	0.1	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	1	0.1
<i>Haloragis gossei</i>	0.1	0.1
<i>Heliotropium pachyphyllum</i>	0.3	0.1
<i>Hybanthus aurantiacus</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.2	0.1
<i>Jasminum didymum</i> subsp. <i>lineare</i>	1.5	0.1
<i>Ptilotus astrolasius</i>	0.2	0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1.2	0.2
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.6	0.6
<i>Sida fibulifera</i>	0.2	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Tinospora smilacina</i>		0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Triodia chichesterensis</i> (P3)	0.3	30
<i>Triodia epactia</i>	0.6	0.3



**PHOTO**





Site Name: WDD23  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 21/06/2019  
 GPS Location: GDA94 Zone 50 672696.51824139E 7661630.01558207N  
 Landform Type: Crest  
 Slope Class: Steep (23 degrees)  
 Aspect: S  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Metamorphic (other), >50% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Metamorphic (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: Half > 5 years and half around 2 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*, *Grevillea wickhamii* subsp. *hispidula*  
 Lower Stratum 1: *Triodia epactia*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.6	3.5
<i>Acacia ancistrocarpa</i>	0.4	0.1
<i>Aristida holathera</i> var. <i>holathera</i>	0.3	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Corymbia hamersleyana</i>	2.5	0.3
<i>Cymbopogon ambiguus</i>	0.3	0.1
<i>Cyperus hesperius</i>	0.2	0.1
<i>Dampiera candicans</i>	0.4	0.1
<i>Eragrostis eriopoda</i>	0.2	0.1
<i>Eriachne mucronata</i>	0.3	0.3
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.2
<i>Goodenia stobbsiana</i>	0.3	0.2
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	4
<i>Heliotropium skeleton</i>	0.4	0.1
<i>Hibiscus leptocladus</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.3	0.2
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus calostachyus</i>	0.8	0.2
<i>Ptilotus fusiformis</i>	0.2	0.1
<i>Ptilotus incanus</i>	0.1	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.1	0.1
<i>Solanum phlomoides</i>	0.4	0.1
<i>Terminalia supranitifolia</i> (P3)	1.3	0.2
<i>Tribulus platypterus</i>	0.4	0.1
<i>Tribulus suberosus</i>	0.4	0.2
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia brizoides</i>	0.2	0.1
<i>Triodia epactia</i>	0.4	13
<i>Triodia wiseana</i>	0.4	9
<i>Triumfetta maconochieana</i>	0.4	0.1



<i>Triumfetta propinqua</i>	0.3	0.1
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**PHOTO**



Site Name: WDD24  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 21/06/2019  
 GPS Location: GDA94 Zone 50 672948.40232055E 7661370.83448441N  
 Landform Type: Plain  
 Slope Class: Level (0 degrees)  
 Soil Type: Clayey Sand  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 0%  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*, *Corymbia zygophylla*  
 Mid Stratum 1: *Acacia ancistrocarpa*  
 Lower Stratum 1: *Triodia lanigera*, *Triodia schinzii*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia ancistrocarpa</i>	2.5	3
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2.5	0.2
<i>Bonamia alatisemina</i>		0.1
<i>Bonamia erecta</i>	0.2	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	4	0.5
<i>Corymbia zygophylla</i>	4	3
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eragrostis eriopoda</i>	0.2	0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia clementii</i> (P3)	0.1	0.1
<i>Euphorbia trigonosperma</i>	0.1	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.6	0.2
<i>Indigofera monophylla</i>	0.4	0.1
<i>Notoleptopus decaisnei</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus fusiformis</i>	0.1	0.1
<i>Rhynchosia minima</i>		0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	2	0.8
<i>Senna notabilis</i>	0.1	0.1
<i>Solanum diversiflorum</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.1	0.1
<i>Tinospora smilacina</i>		0.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.1	0.1
<i>Trianthema pilosum</i>	0.1	0.1
<i>Trichodesma zeylanicum</i>	0.1	0.1
<i>Triodia epactia</i>	0.6	2
<i>Triodia lanigera</i>	0.6	14
<i>Triodia schinzii</i>	0.6	14
<i>Triumfetta chaetocarpa</i>	0.1	0.1
<i>Yakirra australiensis</i> var. <i>australiensis</i>	0.1	0.1



**PHOTO**





Site Name: WDK01  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 17/06/2019  
 GPS Location: GDA94 Zone 50 675763.2784311E 7656809.165914N  
 Landform Type: Mid Slope  
 Slope Class: Very Steep (37 degrees)  
 Aspect: SE  
 Soil Type: Sandy Clay  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: Ironstone (other), 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite, Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia acradenia*, *Acacia inaequilatera*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1	0.1
<i>Acacia inaequilatera</i>	2	0.3
<i>Boerhavia gardneri</i>	0.3	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.2	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	1	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Goodenia microptera</i>	0.2	0.1
<i>Gossypium australe</i>	0.1	0.1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	0.6	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Nicotiana benthamiana</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.2	0.1
<i>Ptilotus exaltatus</i>	0.1	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.1	0.1
<i>Swainsona formosa</i>	0.1	0.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Triodia chichesterensis</i> (P3)	0.4	0.1
<i>Triodia epactia</i>	0.8	70
<i>Triodia wiseana</i>	0.5	0.1
<i>Triumfetta propinqua</i>	0.1	0.1



**PHOTO**





Site Name: WDK02  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 17/06/2019  
 GPS Location: GDA94 Zone 50 675732.76110709E 7656635.43418169N  
 Landform Type: Lower Slope  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: SE  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia inaequilatera*

Lower Stratum 1: *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	3	0.3
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	1.5	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis dichotoma</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Swainsona formosa</i>	0.1	0.1
<i>Swainsona stenodonta</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia chichesterensis</i> (P3)	0.3	3
<i>Triodia epactia</i>	0.5	2
<i>Triodia wiseana</i>	0.7	60



**PHOTO**





Site Name: WDK03  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 17/06/2019  
 GPS Location: GDA94 Zone 50 675676.98988454E 7656265.32676806N  
 Landform Type: Hillock  
 Slope Class: Very Steep (37 degrees)  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Shale (other), 20-50% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Lower Stratum 1: *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	0.5	0.1
<i>Boerhavia gardneri</i>	0.3	0.2
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	0.5	0.1
<i>Gossypium australe</i>	0.4	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Rhynchosia minima</i>		0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Triodia chichesterensis</i> (P3)	0.4	0.1
<i>Triodia epactia</i>	0.4	0.1
<i>Triodia wiseana</i>	0.5	50



**PHOTO**





Site Name: WDK04  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 18/06/2019  
 GPS Location: GDA94 Zone 50 675680.60679895E 7655262.24146023N  
 Landform Type: Crest  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: SW  
 Soil Type: Sandy Clay  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: Ironstone, <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia orthocarpa*, *Acacia tumida* var. *pilbarensis*, *Grevillea wickhamii* subsp. *hispidula*, *Petalostylis labicheoides*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.2	0.1
<i>Acacia orthocarpa</i>	3.5	5
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2.5	2
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2.4	0.5
<i>Indigofera monophylla</i>	0.5	0.1
<i>Petalostylis labicheoides</i>	2	0.2
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus calostachyus</i>	0.4	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.1	0.1
<i>Triodia epactia</i>	0.4	50



**PHOTO**





Site Name: WDK05  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 18/06/2019  
 GPS Location: GDA94 Zone 50 675753.72339223E 7655351.03581591N  
 Landform Type: Mid Slope  
 Slope Class: Steep (23 degrees)  
 Aspect: E  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Ironstone, <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia bivenosa*, *Senna glutinosa* subsp. *glutinosa*

Lower Stratum 1: *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.2	0.1
<i>Acacia bivenosa</i>	1.2	0.2
<i>Cassytha capillaris</i>		0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.2	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	0.5	0.1
<i>Hybanthus aurantiacus</i>	0.2	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.5	0.2
<i>Senna notabilis</i>	0.1	0.1
<i>Senna symonii</i>	0.9	0.1
<i>Triodia epactia</i>	0.4	0.2
<i>Triodia wiseana</i>	0.5	65



**PHOTO**





Site Name: WDK06  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 18/06/2019  
 GPS Location: GDA94 Zone 50 675682.98548572E 7655796.01551992N  
 Landform Type: Hillock  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: N  
 Soil Type: Sandy Clay  
 Soil Colour: White  
 Rock Outcrop: Calcrete? (other), 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm  
 CF Types: Ironstone, Quartz, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia bivenosa*  
 Lower Stratum 1: *Triodia chichesterensis*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia bivenosa</i>	2.5	2
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	4	0.2
<i>Dysphania sphaerosperma</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Pluchea ferdinandi-muelleri</i>	0.4	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.6	0.1
<i>Ptilotus clementii</i>	0.1	0.1
<i>Senna symonii</i>	1.3	0.1
<i>Stackhousia muricata</i>	0.2	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Triodia chichesterensis</i> (P3)	0.45	40
<i>Triodia wiseana</i>	0.4	0.1



**PHOTO**





Site Name: WDK07  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 18/06/2019  
 GPS Location: GDA94 Zone 50 676299.84237657E 7656119.15205472N  
 Landform Type: Other, Low rise (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: N  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*

Lower Stratum 1: *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.2	0.2
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Dampiera candidans</i>	0.2	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia muelleriana</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Ptilotus clementii</i>	0.1	0.1
? <i>Ptilotus helipteroides</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.2	0.1
<i>Triodia epactia</i>	0.5	0.1
<i>Triodia lanigera</i>	0.5	35



**PHOTO**





Site Name: WDK08  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 18/06/2019  
 GPS Location: GDA94 Zone 50 676141.28413964E 7656576.14734893N  
 Landform Type: Hillock  
 Slope Class: Steep (23 degrees)  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: Granite, 20-50% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia inaequilatera*, *Acacia orthocarpa*, *Grevillea wickhamii* subsp. *hispidula*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	2.5	1
<i>Acacia orthocarpa</i>	4	2
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3	0.1
<i>Amaranthus undulatus</i>	0.1	0.1
<i>Aristida contorta</i>	0.1	0.1
<i>Bonamia alatisemina</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	2.5	0.1
<i>Dampiera candidans</i>	0.4	0.1
<i>Eriachne mucronata</i>	0.5	0.1
<i>Eriachne</i> sp. Dugald River (B.K. Simon+ 3007)	0.1	0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	0.1	0.1
<i>Fimbristylis dichotoma</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2.5	3
<i>Hakea lorea</i> subsp. <i>lorea</i>	2	0.1
<i>Hibiscus coatesii</i>	0.7	0.1
<i>Hybanthus aurantiacus</i>	0.4	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Pluchea tetranthera</i>	0.6	0.1
<i>Polycarpaea longiflora</i>	0.2	0.1
<i>Pterocaulon sphacelatum</i>	0.1	0.1
<i>Rhodanthe margarethae</i>	0.2	0.1
<i>Scaevola browniana</i> subsp. <i>browniana</i>	0.4	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.2	0.1
<i>Senna notabilis</i>	0.3	0.1
<i>Solanum horridum</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.1	0.1
<i>Tephrosia virens</i>	1.2	0.1
<i>Tinospora smilacina</i>	0.3	0.1



<i>Tribulus suberosus</i>	0.7	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.5	40

**PHOTO**



Site Name: WDK09  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 18/06/2019  
 GPS Location: GDA94 Zone 50 676327.56656757E 7656554.99701441N  
 Landform Type: Other, Rock outcrop and surrounds (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: SE  
 Soil Type: Sandy Loam  
 Soil Colour: Orange  
 Rock Outcrop: Granite, 20-50% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia orthocarpa*, *Acacia tumida* var. *pilbarensis*, *Grevillea wickhamii* subsp. *hispidula*  
 Lower Stratum 1: *Triodia epactia*  
 Lower Stratum 2: *Bulbostylis barbata*, *Calandrinia pumila*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> sp. Dioicum (A.A. Mitchell PRP 1618)	0.1	0.1
<i>Acacia orthocarpa</i>	2.5	1.5
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3.5	2.5
<i>Aristida contorta</i>	0.2	0.1
<i>Bonamia pannosa</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.2
<i>Byblis pilbarana</i>	0.1	0.1
<i>Calandrinia pumila</i>	0.1	0.5
<i>Cheilanthes brownii</i>	0.2	0.1
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	0.2	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	1.2	0.1
<i>Cyperus hesperius</i>	0.2	0.1
<i>Cyperus pulchellus</i>	0.2	0.1
<i>Cyperus squarrosus</i>	0.1	0.1
<i>Dampiera candidans</i>	0.2	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eragrostis cumingii</i>	0.1	0.1
<i>Eriachne obtusa</i>	0.2	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Eriachne</i> sp. Dugald River (B.K. Simon+ 3007)	0.1	0.1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	0.4	0.1
<i>Fimbristylis dichotoma</i>	0.3	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Gonocarpus ephemerus</i>	0.2	0.1
<i>Goodenia muelleriana</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	0.2
<i>Heliotropium tenuifolium</i>	0.2	0.1
<i>Hibiscus coatesii</i>	0.5	0.1



<i>Hybanthus aurantiacus</i>	0.2	0.1
<i>Nicotiana benthamiana</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Petalostylis labicheoides</i>	2	0.1
<i>Pluchea ferdinandi-muelleri</i>	0.4	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polycarpaea longiflora</i>	0.2	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Pterocaulon sphacelatum</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.8	0.1
<i>Ptilotus exaltatus</i>	0.1	0.1
<i>Schizachyrium fragile</i>	0.2	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.3	0.1
<i>Stemodia viscosa</i>	0.1	0.1
<i>Streptoglossa decurrens</i>	0.1	0.1
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>	0.1	0.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.3	0.1
<i>Trigastrotheca molluginea</i>	0.2	0.1
<i>Triodia epactia</i>	0.4	40
<i>Tripogonella loliiformis</i>	0.1	0.1
<i>Yakirra australiensis</i> var. <i>australiensis</i>	0.1	0.1

**PHOTO**



Site Name: WDK10  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 19/06/2019  
 GPS Location: GDA94 Zone 50 676129.83785774E 7657457.0782441N  
 Landform Type: Mid Slope  
 Slope Class: Precipitous (60 degrees)  
 Aspect: SE  
 Soil Type: Sandy Loam  
 Soil Colour: Brown  
 Rock Outcrop: Ironstone (other), 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Dolerite, Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >10 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Grevillea wickhamii* subsp. *hispidula*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.4	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.5	0.1
<i>Eriachne mucronata</i>	0.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	0.2
<i>Hakea lorea</i> subsp. <i>lorea</i>	0.6	0.2
<i>Indigofera monophylla</i>	0.3	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus exaltatus</i>	0.1	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.2	0.1
<i>Senna symonii</i>	0.5	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Triodia epactia</i>	0.4	1
<i>Triodia wiseana</i>	0.4	50



**PHOTO**





Site Name: WDK11  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 19/06/2019  
 GPS Location: GDA94 Zone 50 675712.76779843E 7657330.76694544N  
 Landform Type: Crest  
 Slope Class: Gently Inclined (3 degrees)  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: Granite, <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm, 600-2000mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Eucalyptus leucophloia* subsp. *leucophloia*  
 Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.9	0.2
<i>Corymbia hamersleyana</i>	0.9	0.1
<i>Cymbopogon ambiguus</i>	0.4	0.1
<i>Eriachne mucronata</i>	0.2	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Eriachne</i> sp. Dugald River (B.K. Simon+ 3007)	0.1	0.2
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	4.5	0.3
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	0.4	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.6	0.1
<i>Ptilotus incanus</i>	0.1	0.1
<i>Schizachyrium fragile</i>	0.1	0.1
<i>Stemodia grossa</i>	0.1	0.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.1	0.1
<i>Triodia epactia</i>	0.4	30
<i>Triodia wiseana</i>	0.5	0.2
<i>Triumfetta propinqua</i>	0.1	0.1



**PHOTO**





Site Name: WDK12  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 19/06/2019  
 GPS Location: GDA94 Zone 50 676531.63E 7657145.63N  
 Landform Type: Other, Low rise (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite, Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*, *Triodia lanigera*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2.4	1
<i>Acacia inaequilatera</i>	1.3	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Dampiera candidans</i>	0.8	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	0.5	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.2	0.1
<i>Ptilotus calostachyus</i>	0.1	0.1
<i>Ptilotus exaltatus</i>	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Triodia epactia</i>	0.5	25
<i>Triodia lanigera</i>	0.1	10
<i>Triodia wiseana</i>	0.8	5



**PHOTO**





Site Name: WDK13  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 19/06/2019  
 GPS Location: GDA94 Zone 50 676470.9540965E 7657056.25795333N  
 Landform Type: Other, Low rise (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: SE  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: Granite, <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite, Quartz, Shale (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*, *Acacia inaequilatera*

Lower Stratum 1: *Triodia chichesterensis*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2.5	0.5
<i>Acacia inaequilatera</i>	3	2
<i>Boerhavia gardneri</i>	0.3	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.6	0.1
<i>Corymbia hamersleyana</i>	3	0.2
<i>Cucumis variabilis</i>	0.6	0.1
<i>Cymbopogon ambiguus</i>	0.7	0.1
<i>Cyperus hesperius</i>	0.3	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	0.6	0.1
<i>Heliotropium tenuifolium</i>	0.1	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Polycarpaea holtzei</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Senna symonii</i>	1.2	0.1
<i>Solanum phlomoides</i>	0.7	0.1
<i>Swainsona formosa</i>	0.1	0.1
<i>Swainsona stenodonta</i>	0.2	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Triodia chichesterensis</i> (P3)	0.3	60
<i>Triodia epactia</i>	0.9	0.1



**PHOTO**





Site Name: WDK14  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 19/06/2019  
 GPS Location: GDA94 Zone 50 676483.96498778E 7655171.3715125N  
 Landform Type: Crest  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: ENE  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Acacia stellaticeps*  
 Lower Stratum 2: *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.8	1
<i>Acacia stellaticeps</i>	0.5	1
<i>Acacia synchronicia</i>	0.8	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.4	0.1
<i>Dampiera candidans</i>	0.2	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Paraneurachne muelleri</i>	0.3	0.2
<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Ptilotus calostachyus</i>	0.7	0.2
<i>Ptilotus exaltatus</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.4	0.1
<i>Trigastrotheca molluginea</i>	0.2	0.1
<i>Triodia epactia</i>	0.5	0.1
<i>Triodia lanigera</i>	0.4	15
<i>Triodia wiseana</i>	0.5	1



**PHOTO**





Site Name: WDK15  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 19/06/2019  
 GPS Location: GDA94 Zone 50 676503.16622519E 7655489.82992135N  
 Landform Type: Ridge  
 Slope Class: Moderately Inclined (10 degrees)  
 Soil Type: Sandy Clay  
 Soil Colour: Red  
 Rock Outcrop: Ironstone, 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*  
 Lower Stratum 1: *Triodia epactia*, *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	2
<i>Acacia ancistrocarpa</i>	0.5	0.1
<i>Acacia orthocarpa</i> x <i>ancistrocarpa</i>	2.3	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.3	0.2
<i>Dampiera candidans</i>	0.4	0.1
<i>Dodonaea coriacea</i>	1.2	0.1
<i>Eriachne mucronata</i>	0.4	0.1
<i>Eriachne obtusa</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.4	0.2
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	0.1
<i>Indigofera monophylla</i>	0.3	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.2	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	2.3	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Senna symonii</i>	1.4	0.1
<i>Seringia nephrosperma</i>	1.3	0.1
<i>Sida arenicola</i>	0.7	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.2	0.1
<i>Solanum phlomoides</i>	0.4	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.7	5
<i>Triodia lanigera</i>	0.6	5



**PHOTO**





Site Name: WDK16  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 20/06/2019  
 GPS Location: GDA94 Zone 50 676311.00594836E 7655678.35047173N  
 Landform Type: Drainage Line  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: SE  
 Soil Type: and Loam (other)  
 Soil Colour: Very light brown pink (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: <2%  
 CF Sizes: 2-6mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Grazing - Kangaroos  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia tumida* var. *pilbarensis*  
 Lower Stratum 1: *Triodia epactia*  
 Lower Stratum 2: *Corchorus parviflorus*, *Goodenia stobbsiana*, *Hybanthus aurantiacus*, *Ptilotus astrolasius*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia bivenosa</i>	3	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	4.5	15
* <i>Aerva javanica</i>	0.3	0.1
<i>Aristida holathera</i> var. <i>holathera</i>	0.5	0.1
<i>Bonamia alatisemina</i>	0.1	0.1
<i>Bonamia erecta</i>	0.7	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Cajanus pubescens</i>	1.2	0.5
<i>Chrysopogon fallax</i>	1.2	0.2
<i>Cleome viscosa</i>	0.1	0.1
<i>Clerodendrum tomentosum</i>	2	0.1
<i>Corchorus parviflorus</i>	0.9	0.3
<i>Corymbia hamersleyana</i>	2.5	0.2
<i>Cucumis variabilis</i>	0.2	0.1
<i>Cymbopogon ambiguus</i>	0.7	0.1
<i>Dampiera candidans</i>	0.3	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eragrostis cumingii</i>	0.1	0.1
<i>Eragrostis eriopoda</i>	0.3	0.1
<i>Eriachne mucronata</i>	0.3	0.1
<i>Euphorbia vaccaria</i> var. <i>vaccaria</i>	0.1	0.1
<i>Goodenia forrestii</i>	0.3	0.3
<i>Goodenia microptera</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.4	0.5
<i>Gossypium australe</i>	0.2	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.4	0.1
<i>Hybanthus aurantiacus</i>	0.2	0.2
<i>Indigofera monophylla</i>	0.4	0.1
<i>Isotropis atropurpurea</i>	0.3	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1



<i>Petalostylis labicheoides</i>	2	0.2
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Polymeria ambigua</i>	0.1	0.1
<i>Portulaca oleracea</i>	0.1	0.1
<i>Pterocaulon sphacelatum</i>	0.3	0.1
<i>Ptilotus astrolasius</i>	0.3	0.2
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Senna symonii</i>	0.2	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.4	0.1
<i>Solanum diversiflorum</i>	0.1	0.1
<i>Solanum horridum</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.4	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Trichodesma zeylanicum</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.2	0.1
<i>Triodia chichesterensis</i> (P3)	0.4	0.1
<i>Triodia epactia</i>	0.5	55

**PHOTO**



Site Name: WDK17  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 20/06/2019  
 GPS Location: GDA94 Zone 50 676668.03529119E 7660278.31473307N  
 Landform Type: Lower Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: S  
 Soil Type: Sandy Clay  
 Soil Colour: Brown  
 Rock Outcrop: Quartz (other), <2% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia inaequilatera*  
 Lower Stratum 1: *Triodia chichesterensis*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	2.5	0.2
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Dysphania sphaerosperma</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	0.1	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.4	0.1
<i>Senna symonii</i>	0.6	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Triodia chichesterensis</i> (P3)	0.3	55
<i>Triodia epactia</i>	0.6	0.1
<i>Triodia lanigera</i>	0.4	0.1



**PHOTO**





Site Name: WDK18  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 20/06/2019  
 GPS Location: GDA94 Zone 50 676627.98707811E 7660127.49526819N  
 Landform Type: Other, Low rise (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia ancistrocarpa*, *Acacia inaequilatera*  
 Lower Stratum 1: *Triodia lanigera*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.3	0.1
<i>Acacia ancistrocarpa</i>	2.5	0.3
<i>Acacia inaequilatera</i>	3	0.2
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	1.5	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Pluchea tetranthera</i>	0.4	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Senna symonii</i>	0.4	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Triodia angusta</i>	0.5	0.2
<i>Triodia lanigera</i>	0.7	45



**PHOTO**





Site Name: WDK19  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 20/06/2019  
 GPS Location: GDA94 Zone 50 676216.54771362E 7659883.43549452N  
 Landform Type: Drainage Line  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: NE  
 Soil Type: Sandy Loam  
 Soil Colour: Very pale brown-cream (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Riverstone (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Exotic Weeds  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia tumida* var. *pilbarensis*, *Grevillea wickhamii* subsp. *hispidula*  
 Lower Stratum 1: *Cajanus pubescens*, *Corchorus parviflorus*, *Hybanthus aurantiacus*  
 Lower Stratum 2: *Swainsona formosa*, *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.5	0.1
<i>Acacia ancistrocarpa</i>	1	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	4	25
* <i>Aerva javanica</i>	0.4	0.1
<i>Aristida holathera</i> var. <i>holathera</i>	0.2	0.1
<i>Boerhavia schomburgkiana</i>		0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cajanus pubescens</i>	0.9	0.2
<i>Cassytha capillaris</i>		0.1
* <i>Cenchrus ciliaris</i>	0.4	0.1
<i>Cleome viscosa</i>	0.2	0.1
<i>Corchorus parviflorus</i>	0.6	5
<i>Corymbia hamersleyana</i>	5	1
<i>Cucumis variabilis</i>	0.2	0.1
<i>Dampiera candidans</i>	0.1	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eragrostis cumingii</i>	0.1	0.1
<i>Eriachne obtusa</i>	0.4	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Euphorbia trigonosperma</i>	0.1	0.1
<i>Euphorbia vaccaria</i> var. <i>vaccaria</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.4	0.1
<i>Gossypium australe</i>	0.6	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.8	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.6	2
<i>Hybanthus aurantiacus</i>	0.3	1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Notoleptopus decaisnei</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1



<i>Paspalidium raram</i>	0.1	0.1
<i>Perotis rara</i>	0.1	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Polymeria ambigua</i>	0.1	0.2
<i>Portulaca oleracea</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus auriculifolius</i>	0.3	0.1
<i>Ptilotus axillaris</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.7	0.1
<i>Ptilotus exaltatus</i>	0.2	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.3	0.1
<i>Solanum phlomoides</i>	0.1	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Streptoglossa decurrens</i>	0.1	0.1
<i>Striga squamigera</i>	0.2	0.1
<i>Swainsona formosa</i>	0.1	0.5
<i>Tinospora smilacina</i>	0.4	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Tribulus platypterus</i>	0.3	0.1
<i>Trichodesma zeylanicum</i>	0.2	0.1
<i>Trigastrotheca molluginea</i>	0.3	0.1
<i>Triodia brizoides</i>	0.3	0.1
<i>Triodia chichesterensis</i> (P3)	0.4	0.1
<i>Triodia epactia</i>	0.7	5
<i>Triodia lanigera</i>	0.4	0.1
<i>Triumfetta johnstonii</i>	0.4	0.1

**PHOTO**



Site Name: WDK20  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 21/06/2019  
 GPS Location: GDA94 Zone 50 670702.61572472E 7656167.77285833N  
 Landform Type: Crest  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: Quartz (other), 10-20% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 3 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Eucalyptus leucophloia* subsp. *leucophloia*  
 Mid Stratum 1: *Acacia acradenia*, *Grevillea wickhamii* subsp. *hispidula*  
 Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.8	3
<i>Acacia tumida</i> var. <i>pilbarensis</i>	1.2	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Dampiera candidans</i>	0.4	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Eriachne</i> sp. Dugald River (B.K. Simon+ 3007)	0.1	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	4.5	0.3
<i>Fimbristylis dichotoma</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.4	0.2
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.8	0.5
<i>Hakea lorea</i> subsp. <i>lorea</i>	0.9	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.4	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.1	0.1
<i>Triodia brizoides</i>	0.4	0.1
<i>Triodia epactia</i>	0.4	40
<i>Triodia wiseana</i>	0.8	0.1
<i>Triumfetta maconochieana</i>	0.4	0.1



**PHOTO**





Site Name: WDK21  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 21/06/2019  
 GPS Location: GDA94 Zone 50 670928.76221255E 7655696.18850427N  
 Landform Type: Crest, and Upper Slope (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: NW  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*, *Grevillea wickhamii* subsp. *hispidula*

Lower Stratum 1: *Triodia epactia*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2.5	1.5
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Dampiera candidans</i>	0.4	0.1
<i>Eriachne mucronata</i>	0.2	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	0.5
<i>Ptilotus calostachyus</i>	0.4	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia brizoides</i>	0.4	0.1
<i>Triodia epactia</i>	0.6	55
<i>Triodia wiseana</i>	0.5	0.1



**PHOTO**





Site Name: WDK22  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 21/06/2019  
 GPS Location: GDA94 Zone 50 671261.83208967E 7655482.57468329N  
 Landform Type: Upper Slope  
 Slope Class: Steep (23 degrees)  
 Aspect: S  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: With Some Shale Pockets (other), <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Lower Stratum 1: *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Boerhavia gardneri</i>	0.3	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	1.8	0.1
<i>Goodenia stobbsiana</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.6	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Rhynchosia minima</i>	0.1	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.2	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Streptoglossa decurrens</i>	0.1	0.1
<i>Triodia wiseana</i>	0.4	30



**PHOTO**





Site Name: WDK23  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 21/06/2019  
 GPS Location: GDA94 Zone 50 671135.60037935E 7655166.56127021N  
 Landform Type: Lower Slope  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: SE  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: Ironstone, <2% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Dolerite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Upper Stratum 1: *Corymbia hamersleyana*  
 Mid Stratum 1: *Acacia acradenia*, *Hakea lorea* subsp. *lorea*  
 Lower Stratum 1: *Triodia chichesterensis*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	0.5
<i>Boerhavia gardneri</i>	0.3	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	0.9	0.2
<i>Hakea lorea</i> subsp. <i>lorea</i>	0.8	0.1
<i>Indigofera rugosa</i>	0.6	0.2
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.5	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Triodia chichesterensis</i> (P3)	0.3	60
<i>Triodia wiseana</i>	0.4	0.1



**PHOTO**





Site Name: WDK24  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 21/06/2019  
 GPS Location: GDA94 Zone 50 671110.33166718E 7655302.46086291N  
 Landform Type: Mid Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: E  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: Mixed Detrital (other), <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: >5 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*, *Grevillea wickhamii* subsp. *hispidula*  
 Lower Stratum 1: *Triodia brizoides*, *Triodia wiseana*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	15	0.5
<i>Boerhavia gardneri</i>	0.3	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.4	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.8	0.2
<i>Indigofera monophylla</i>	0.4	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.2	0.1
<i>Ptilotus calostachyus</i>	0.7	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.3	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Triodia brizoides</i>	0.5	60
<i>Triodia wiseana</i>	0.6	2



**PHOTO**





Site Name: WDK25  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 21/06/2019  
 GPS Location: GDA94 Zone 50 670661.87361E 7655193.51806638N  
 Landform Type: Upper Slope  
 Slope Class: Very Steep (37 degrees)  
 Aspect: W  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: Dolerite? Quartz? (other), 10-20% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Mixed, detrital (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 3 years

**DOMINANT TAXA IN VEGETATION STRATA**

Mid Stratum 1: *Acacia acradenia*, *Indigofera monophylla*, *Sida* sp. Pilbara (A.A. Mitchell PRP 1543), *Triumfetta propinqua*  
 Lower Stratum 1: *Triodia brizoides*

**SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.6	0.5
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cheilanthes contigua</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.6	0.1
<i>Cucumis variabilis</i>	0.1	0.1
<i>Cullen leucochaetes</i>	0.5	0.1
<i>Cymbopogon ambiguus</i>	0.9	0.2
<i>Dampiera candidans</i>	0.4	0.1
<i>Euphorbia careyi</i>	0.2	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.2	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	0.9	0.1
<i>Indigofera monophylla</i>	0.5	0.2
<i>Nicotiana benthamiana</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.4	0.2
<i>Solanum phlomoides</i>	0.5	0.1
<i>Tinospora smilacina</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.2	0.1
<i>Triodia brizoides</i>	0.5	40
<i>Triodia wiseana</i>	0.7	0.5
<i>Triumfetta maconochieana</i>	0.3	0.1
<i>Triumfetta propinqua</i>	0.5	0.2



**PHOTO**





Site Name: WDM01  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 17/06/2019  
 GPS Location: GDA94 Zone 50 675798.08091646E 7654041.80434785N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: E  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Ironstone, Quartz, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2	0.2
<i>Acacia bivenosa</i>	3	0.3
<i>Acacia orthocarpa</i>	3.5	2.5
<i>Acacia spondylophylla</i>	0.7	0.6
<i>Bonamia pilbarensis</i>	0.2	0.1
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	0.4	0.1
<i>Codonocarpus cotinifolius</i>	3.5	0.3
<i>Corchorus parviflorus</i>	0.8	0.1
<i>Corymbia hamersleyana</i>	1	0.1
<i>Eriachne mucronata</i>	0.4	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.4	0.2
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	0.1
<i>Hybanthus aurantiacus</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Petalostylis labicheoides</i>	2	1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Ptilotus clementii</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.6	0.1
<i>Tribulus suberosus</i>	1	0.1
<i>Triodia chichesterensis</i> (P3)	0.2	10
<i>Triodia epactia</i>	0.4	5
<i>Triodia lanigera</i>	0.3	30
<i>Triodia wiseana</i>	0.6	15



**PHOTO**





Site Name: WDM02  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 17/06/2019  
 GPS Location: GDA94 Zone 50 676277.06368747E 7653936.357875N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: E  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Dolerite, Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.6	0.1
<i>Acacia orthocarpa</i>	5	1.2
<i>Acacia orthocarpa</i> x	1.5	0.6
<i>Acacia spondylophylla</i>	0.6	0.2
<i>Acacia stellaticeps</i>	0.6	2
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Codonocarpus cotinifolius</i>	3	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Ptilotus astrolasius</i>	0.5	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Ptilotus clementii</i>	0.1	0.1
<i>Ptilotus exaltatus</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia lanigera</i>	0.4	5
<i>Triodia wiseana</i>	0.5	25



**PHOTO**





Site Name: WDM03  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 17/06/2019  
 GPS Location: GDA94 Zone 50 676463.96243484E 7654091.47014105N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: E  
 Soil Type: Sandy Clay  
 Soil Colour: Light brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: Limited Clearing - Minor track in quadrat  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia bivenosa</i>	0.7	0.1
<i>Cassytha capillaris</i>		0.1
<i>Codonocarpus cotinifolius</i>	2	0.1
<i>Corymbia hamersleyana</i>	0.4	0.1
<i>Dysphania sphaerosperma</i>	0.1	0.1
<i>Heliotropium chrysocarpum</i>	0.2	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Triodia angusta</i>	0.6	25
<i>Triodia chichesterensis</i> (P3)	0.2	3

**PHOTO**



Site Name: WDM04  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 18/06/2019  
 GPS Location: GDA94 Zone 50 675974.73503232E 7654957.15229322N  
 Landform Type: Lower Slope  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: SW  
 Soil Type: Light Clay  
 Soil Colour: Light brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Ironstone, Quartz, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia bivenosa</i>	1.5	0.1
<i>Acacia</i> sp.	0.1	0.1
<i>Cassytha capillaris</i>		0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Pluchea ferdinandi-muelleri</i>	0.6	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Trianthema triquetrum</i>	0.1	0.1
<i>Triodia angusta</i>	0.6	15
<i>Triodia chichesterensis</i> (P3)	0.4	10
<i>Triodia wiseana</i>	0.8	5



**PHOTO**





Site Name: WDM05  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 18/06/2019  
 GPS Location: GDA94 Zone 50 676513.87611395E 7654939.74736052N  
 Landform Type: Flat  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Sandy Clay  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 2-10%  
 CF Sizes: 2-6mm, 6-20mm  
 CF Types: Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - VG - Very Good  
 Disturbance: Exotic Weeds - *Cenchrus ciliaris*  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia bivenosa</i>	3	5
<i>Acacia inaequilatera</i>	3	1.5
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	1.8	0.1
<i>Acacia stellaticeps</i>	1	0.3
* <i>Aerva javanica</i>	0.7	0.1
<i>Boerhavia gardneri</i>	0.2	0.1
<i>Boerhavia schomburgkiana</i>	0.1	0.1
<i>Bonamia alatisemina</i>	0.2	0.1
<i>Bonamia erecta</i>	0.5	2
* <i>Cenchrus ciliaris</i>	0.6	3
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.5	0.3
? <i>Corymbia hamersleyana</i>	0.1	0.1
<i>Eragrostis eriopoda</i>	0.4	0.2
<i>Euphorbia vaccaria</i> var. <i>vaccaria</i>	0.1	0.1
<i>Goodenia forrestii</i>	0.3	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Goodenia muelleriana</i>	0.2	0.1
<i>Gossypium australe</i>	0.1	0.1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	1.5	0.3
<i>Hakea lorea</i> subsp. <i>lorea</i>	2	1
<i>Heliotropium crispatum</i>	0.1	0.1
<i>Hybanthus aurantiacus</i>	0.3	0.1
<i>Indigofera colutea</i>	0.1	0.1
<i>Indigofera monophylla</i>	0.5	0.1
<i>Isotropis atropurpurea</i>	0.6	0.1
<i>Paraneurachne muelleri</i>	0.4	0.2
<i>Pluchea ferdinandi-muelleri</i>	1	0.1
<i>Pluchea tetranthera</i>	1	0.2
<i>Polymeria ambigua</i>	0.1	0.1
<i>Pterocaulon sphacelatum</i>	0.5	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.1	0.1
<i>Solanum diversiflorum</i>	0.1	0.1
<i>Stemodia grossa</i>	0.6	0.1
<i>Streptoglossa decurrens</i>	0.1	0.1
<i>Swainsona formosa</i>	0.2	0.1



<i>Tephrosia rosea</i> var. <i>clementii</i>	0.2	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Trianthema pilosum</i>	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Tribulus platypterus</i>	0.1	0.1
<i>Tribulus suberosus</i>	0.4	0.1
<i>Trichodesma zeylanicum</i>	0.2	0.1
<i>Tridodia epactia</i>	0.6	30

**PHOTO**



Site Name: WDM06  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 18/06/2019  
 GPS Location: GDA94 Zone 50 676293.53112767E 7654736.05352526N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: E  
 Soil Type: Sandy Clay  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Riverstone (other)  
 Vegetation Condition: Northern Vegetation Condition - P - Poor  
 Disturbance: Exotic Weeds - *Cenchrus ciliaris*  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia coriacea</i> subsp. <i>pendens</i>	4	0.2
<i>Acacia inaequilatera</i>	2	0.3
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	1	0.5
<i>Acacia spondylophylla</i>	0.6	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	2	0.1
<i>Adriana tomentosa</i> var. <i>tomentosa</i>	2.5	0.1
* <i>Aerva javanica</i>	0.6	0.1
<i>Alysicarpus muelleri</i>	0.2	0.1
<i>Amaranthus undulatus</i>	0.1	0.1
<i>Boerhavia schomburgkiana</i>	0.1	0.1
<i>Byblis pilbarana</i>	0.1	0.1
<i>Cajanus pubescens</i>	1.5	0.1
<i>Calandrinia stagnensis</i>	0.1	0.1
* <i>Cenchrus ciliaris</i>	0.6	40
* <i>Cenchrus setiger</i>	0.5	0.3
<i>Chrysopogon fallax</i>	0.6	0.1
<i>Cleome viscosa</i>	0.2	0.1
<i>Corchorus parviflorus</i>	0.5	0.1
<i>Cymbopogon ambiguus</i>	0.4	0.1
<i>Cyperus squarrosus</i>	0.1	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Dysphania sphaerosperma</i>	0.1	0.1
<i>Eriachne tenuiculmis</i>	0.4	0.1
<i>Eucalyptus victrix</i>	12	3
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Euphorbia trigonosperma</i>	0.2	0.1
<i>Goodenia forrestii</i>	0.2	0.1
<i>Goodenia microptera</i>	0.3	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Hybanthus aurantiacus</i>	0.2	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Melaleuca linophylla</i>	3	0.6
<i>Petalostylis labicheoides</i>	2	0.1
<i>Phyllanthus maderaspatensis</i>	0.1	0.1
<i>Pluchea ferdinandi-muelleri</i>	0.8	0.1



<i>Pluchea rubelliflora</i>	0.2	0.1
<i>Polycarpaea longiflora</i>	0.4	0.1
<i>Portulaca oleracea</i>	0.1	0.1
<i>Pterocaulon sphacelatum</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.2	0.1
<i>Ptilotus exaltatus</i>	0.1	0.1
<i>Rhynchosia minima</i>		0.1
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Stemodia grossa</i>	0.4	0.1
<i>Stemodia viscosa</i>	0.1	0.1
<i>Streptoglossa decurrens</i>	0.2	0.1
<i>Swainsona formosa</i>	0.2	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.6	0.2
<i>Themeda triandra</i>	0.7	0.2
<i>Trianthema triquetrum</i>	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Trichodesma zeylanicum</i>	0.1	0.1
<i>Triodia epactia</i>	0.4	0.2

**PHOTO**



Site Name: WDM07  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 18/06/2019  
 GPS Location: GDA94 Zone 50 676387.84119996E 7654467.64277913N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: NNW  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Ironstone, Quartz, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: (other) - Historical disturbance in plot, possibly old gravel pits  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	4	0.2
<i>Acacia inaequilatera</i>	2	0.2
<i>Acacia orthocarpa</i>	3	2
<i>Acacia spondylophylla</i>	1	0.2
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Codonocarpus cotinifolius</i>	2.5	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.3	0.2
<i>Portulaca oleracea</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.4	0.1
<i>Ptilotus clementii</i>	0.1	0.1
<i>Triodia chichesterensis</i> (P3)	0.2	1
<i>Triodia epactia</i>	0.4	5
<i>Triodia lanigera</i>	0.4	30
<i>Triodia wiseana</i>	0.5	9



**PHOTO**





Site Name: WDM08  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 18/06/2019  
 GPS Location: GDA94 Zone 50 676540.79806549E 7654130.17365807N  
 Landform Type: Flat  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm  
 CF Types: Ironstone, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	3	1
<i>Acacia bivenosa</i>	0.6	0.1
<i>Acacia spondylophylla</i>	0.4	0.1
<i>Aristida holathera</i> var. <i>holathera</i>	0.6	0.1
<i>Bonamia erecta</i>	0.4	4
<i>Chrysopogon fallax</i>	0.5	0.1
<i>Corchorus parviflorus</i>	0.6	0.1
<i>Corymbia hamersleyana</i>	9	2
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eragrostis desertorum</i>	0.4	0.1
<i>Eriachne mucronata</i>	0.7	0.1
<i>Euphorbia vaccaria</i> var. <i>vaccaria</i>	0.1	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.8	0.2
<i>Heliotropium tenuifolium</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Isotropis atropurpurea</i>	0.6	0.1
<i>Paraneurachne muelleri</i>	0.4	0.2
<i>Ptilotus astrolasius</i>	0.4	0.3
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.5	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia angusta</i>	0.4	0.1
<i>Triodia epactia</i>	0.6	0.1
<i>Triodia wiseana</i>	0.6	20



**PHOTO**





Site Name: WDM09  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 18/06/2019  
 GPS Location: GDA94 Zone 50 676567.20693224E 7656764.35338394N  
 Landform Type: Other, Undulating plain (other)  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: S  
 Soil Type: Sandy Clay  
 Soil Colour: Light brown (other)  
 Rock Outcrop: Granite, 20-50% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> sp.	0.1	0.1
<i>Acacia orthocarpa</i>	4	20
<i>Acacia tumida</i> var. <i>pilbarensis</i>	4	4
<i>Aristida holathera</i> var. <i>holathera</i>	0.1	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.6	0.1
? <i>Corymbia hamersleyana</i>	0.1	0.1
<i>Dampiera candidans</i>	0.1	0.1
<i>Eragrostis cumingii</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Eriachne</i> sp. Dugald River (B.K. Simon+ 3007)	0.1	0.1
<i>Fimbristylis dichotoma</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	4.5	1.5
<i>Heliotropium tenuifolium</i>	0.1	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.5	0.1
<i>Hybanthus aurantiacus</i>	0.1	0.1
<i>Indigofera monophylla</i>	0.4	0.1
<i>Mitrasacme connata</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Petalostylis labicheoides</i>	2.2	0.1
<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Pterocaulon sphacelatum</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.2	0.1
<i>Schizachyrium fragile</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.7	35



**PHOTO**





Site Name: WDM10  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 19/06/2019  
 GPS Location: GDA94 Zone 50 676084.22447017E 7658834.19401095N  
 Landform Type: Mid Slope  
 Slope Class: Very Steep (37 degrees)  
 Aspect: SE  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Granite, <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.5	1.4
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cheilanthes contigua</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Cymbopogon ambiguus</i>	0.4	0.1
<i>Eriachne</i> sp. Dugald River (B.K. Simon+ 3007)	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Gossypium australe</i>	0.8	0.4
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.8	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	1.6	0.1
<i>Indigofera monophylla</i>	0.2	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.5	0.1
<i>Tephrosia densa</i>	0.1	0.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.1	0.1
<i>Triodia epactia</i>	0.5	1.5
<i>Triodia wiseana</i>	0.7	30



**PHOTO**





Site Name: WDM11  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 19/06/2019  
 GPS Location: GDA94 Zone 50 675955.26606599E 7658934.89102684N  
 Landform Type: Crest  
 Slope Class: Gently Inclined (3 degrees)  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: Granite, 20-50% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2.1	20
<i>Corymbia hamersleyana</i>	2.4	0.3
<i>Dampiera candidans</i>	0.5	0.1
<i>Goodenia stobbsiana</i>	0.4	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2.3	2.5
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Triodia epactia</i>	0.6	35

**PHOTO**



Site Name: WDM12  
 Site Type: QUADRAT  
 Dimensions: 25m x 100m  
 Survey Date: 19/06/2019  
 GPS Location: GDA94 Zone 50 676531.85195953E 7658900.70916503N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Soil Type: Sandy Clay  
 Soil Colour: Brown  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Riverstone (other)  
 Vegetation Condition: Northern Vegetation Condition - P - Poor  
 Disturbance: Exotic Weeds - *Cenchrus ciliaris*  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	3.5	0.3
<i>Acacia inaequilatera</i>	1.6	0.1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	6	1
<i>Boerhavia gardneri</i>	0.2	0.1
<i>Boerhavia schomburgkiana</i>	0.1	0.1
<i>Cajanus pubescens</i>	2	0.1
* <i>Cenchrus ciliaris</i>	0.6	60
<i>Chrysopogon fallax</i>	0.5	0.3
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.6	0.3
? <i>Corymbia hamersleyana</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	8	10
<i>Cymbopogon ambiguus</i>	0.6	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.2	0.1
<i>Euphorbia trigonosperma</i>	0.2	0.1
<i>Euphorbia vaccaria</i> var. <i>vaccaria</i>	0.1	0.1
<i>Goodenia forrestii</i>	0.1	0.1
<i>Gossypium australe</i>	1.5	0.4
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	3	0.3
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.3	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.6	0.1
<i>Hybanthus aurantiacus</i>	0.3	0.1
<i>Indigofera monophylla</i>	0.6	0.2
<i>Notoleptopus decaisnei</i>	0.1	0.1
<i>Polymeria ambigua</i>		0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Senna symonii</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.4	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	0.6	0.2
<i>Themeda triandra</i>	0.7	0.2
<i>Trichodesma zeylanicum</i>	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.5	0.5
<i>Triodia wiseana</i>	0.7	0.2
<i>Triumfetta johnstonii</i>	0.4	0.1



**PHOTO**





Site Name: WDM13  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 19/06/2019  
 GPS Location: GDA94 Zone 50 676561.03041843E 7659045.44471491N  
 Landform Type: Lower Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: SE  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: Granite, <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Quartz, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.2	1
<i>Boerhavia gardneri</i>	0.2	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.2	1
<i>Paraneurachne muelleri</i>	0.4	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Triodia chichesterensis</i> (P3)	0.3	4
<i>Triodia epactia</i>	0.4	0.1
<i>Triodia lanigera</i>	0.6	25
<i>Triodia wiseana</i>	0.6	4



**PHOTO**





Site Name: WDM14  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 19/06/2019  
 GPS Location: GDA94 Zone 50 676642.53738351E 7659130.27126527N  
 Landform Type: Lower Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: SE  
 Soil Type: Sandy Clay  
 Soil Colour: Light brown (other)  
 Rock Outcrop: Quartz (other), 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Quartz, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.5	0.2
<i>Acacia inaequilatera</i>	2	0.2
<i>Boerhavia gardneri</i>	0.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2.5	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Triodia chichesterensis</i> (P3)	0.2	60
<i>Triodia epactia</i>	0.4	0.1
<i>Triodia wiseana</i>	0.6	0.5

**PHOTO**



Site Name: WDM15  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 19/06/2019  
 GPS Location: GDA94 Zone 50 676490.09548033E 7659288.13630616N  
 Landform Type: Ridge  
 Slope Class: Very Steep (37 degrees)  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: Granite, >50% bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2.5	0.3
<i>Acacia inaequilatera</i>	1.3	0.1
<i>Amaranthus undulatus</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.3	0.1
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	0.3	0.1
<i>Cyperus hesperius</i>	0.2	0.1
<i>Eriachne mucronata</i>	0.4	0.2
<i>Eriachne</i> sp. Dugald River (B.K. Simon+ 3007)	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Gossypium australe</i>	1.3	0.3
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.4	0.1
<i>Indigofera monophylla</i>	0.4	0.2
<i>Notoleptopus decaisnei</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polycarpaea corymbosa</i>	0.2	0.1
<i>Polycarpaea longiflora</i>	0.1	0.1
<i>Ptilotus incanus</i>	0.1	0.1
<i>Streptoglossa decurrens</i>	0.1	0.2
<i>Tephrosia virens</i>	0.8	0.2
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.1	0.1
<i>Tribulus suberosus</i>	0.4	0.1
<i>Triodia epactia</i>	0.6	3
<i>Triodia wiseana</i>	0.7	27
<i>Triumfetta maconochieana</i>	0.5	2



**PHOTO**





Site Name: WDM16  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 19/06/2019  
 GPS Location: GDA94 Zone 50 676298.12881887E 7659392.50018619N  
 Landform Type: Lower Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: NW  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.5	0.6
<i>Acacia inaequilatera</i>	1.7	0.1
<i>Acacia stellaticeps</i>	0.6	2.5
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Dampiera candidans</i>	0.2	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	8	4
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.7	0.1
<i>Senna symonii</i>	0.5	0.1
<i>Triodia brizoides</i>	0.5	12
<i>Triodia chichesterensis</i> (P3)	0.2	0.1
<i>Triodia epactia</i>	0.5	0.2
<i>Triodia lanigera</i>	0.3	12



**PHOTO**





Site Name: WDM17  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 20/06/2019  
 GPS Location: GDA94 Zone 50 675499.93703235E 7658739.89264682N  
 Landform Type: Lower Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: WSW  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite, Dolerite, Ironstone  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.8	10
<i>Acacia inaequilatera</i>	1.9	0.5
<i>Acacia orthocarpa</i>	2.2	0.3
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	0.7	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.5	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Triodia brizoides</i>	0.6	23
<i>Triodia epactia</i>	0.6	7



**PHOTO**





Site Name: WDM18  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 20/06/2019  
 GPS Location: GDA94 Zone 50 676524.01553997E 7658343.96271061N  
 Landform Type: Upper Slope  
 Slope Class: Very Steep (37 degrees)  
 Aspect: NW  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: Granite, >50% bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.5	25
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Corymbia hamersleyana</i>	4.5	0.2
<i>Cyperus hesperius</i>	0.2	0.1
<i>Dampiera candidans</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.2	0.2
<i>Eriachne</i> sp. Dugald River (B.K. Simon+ 3007)	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.8	5
<i>Indigofera monophylla</i>	0.6	0.1
<i>Polycarpaea corymbosa</i>	0.2	0.1
<i>Polycarpaea longiflora</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Tephrosia virens</i>	0.5	0.1
<i>Triodia epactia</i>	0.4	22
<i>Triodia wiseana</i>	0.5	8
<i>Triumfetta maconochieana</i>	0.3	0.1



**PHOTO**





Site Name: WDM19  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 20/06/2019  
 GPS Location: GDA94 Zone 50 676197.06773749E 7658324.32264935N  
 Landform Type: Lower Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Aspect: NW  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	2.2	20
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia stobbsiana</i>	0.4	0.3
<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Senna symonii</i>	1.3	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia epactia</i>	0.6	25

**PHOTO**



Site Name: WDM20  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 20/06/2019  
 GPS Location: GDA94 Zone 50 675881.41041016E 7658223.94882918N  
 Landform Type: Lower Slope  
 Slope Class: Gently Inclined (3 degrees)  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Granite, 2-10% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Ironstone, Quartz, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.6	0.3
<i>Acacia inaequilatera</i>	2	0.3
<i>Boerhavia gardneri</i>	0.2	0.1
<i>Cassytha capillaris</i>		0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.4	0.1
<i>Corymbia hamersleyana</i>	4.5	0.2
? <i>Corymbia hamersleyana</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Senna notabilis</i>	0.1	0.1
<i>Swainsona formosa</i>	0.1	0.1
<i>Tephrosia virens</i>	0.2	0.1
<i>Triodia chichesterensis</i> (P3)	0.3	40
<i>Triodia epactia</i>	0.3	0.2
<i>Triodia wiseana</i>	0.6	5



**PHOTO**





Site Name: WDM21  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 20/06/2019  
 GPS Location: GDA94 Zone 50 675500.66621333E 7658467.17332888N  
 Landform Type: Lower Slope  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: SW  
 Soil Type: Clayey Sand  
 Soil Colour: Light brown (other)  
 Rock Outcrop: No bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm  
 CF Types: Granite, Ironstone, Quartz, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	2.5	0.6
<i>Corymbia hamersleyana</i>	5	2
<i>Dysphania sphaerosperma</i>	0.1	0.1
<i>Salsola australis</i>	0.1	0.1
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Triodia chichesterensis</i> (P3)	0.3	18
<i>Triodia wiseana</i>	0.6	7

**PHOTO**



Site Name: WDM22  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 20/06/2019  
 GPS Location: GDA94 Zone 50 675239.85653386E 7658543.24919295N  
 Landform Type: Crest  
 Slope Class: Moderately Inclined (10 degrees)  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: Same As Outcrop Photo From Wdm21 (other), 10-20% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia inaequilatera</i>	2	0.2
<i>Acacia orthocarpa</i>	4	6
<i>Boerhavia gardneri</i>	0.2	0.1
<i>Cassytha capillaris</i>		0.1
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	1.5	0.2
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Crotalaria novae-hollandiae</i> subsp. <i>novae-hollandiae</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Fimbristylis simulans</i>	0.1	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	2	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Rhynchosia minima</i>		0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.2	0.1
<i>Solanum phlomoides</i>	0.6	0.1
<i>Tribulus suberosus</i>	0.6	0.1
<i>Triodia chichesterensis</i> (P3)	0.2	0.1
<i>Triodia wiseana</i>	0.6	28



**PHOTO**





Site Name: WDM23  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 21/06/2019  
 GPS Location: GDA94 Zone 50 670398.88018432E 7654534.24438193N  
 Landform Type: Crest  
 Slope Class: Moderately Inclined (10 degrees)  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: Granite, 20-50% bedrock exposed  
 CF Abundance: 50-90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years and some < 5 years (eastern side)

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.4	5
<i>Amaranthus undulatus</i>	0.1	0.1
<i>Aristida burbridgeae</i>	0.5	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cheilanthes contigua</i>	0.1	0.1
<i>Cleome viscosa</i>	0.2	0.1
<i>Corchorus parviflorus</i>	0.6	0.3
<i>Corymbia hamersleyana</i>	0.3	0.1
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	0.3	0.2
<i>Cyperus hesperius</i>	0.2	0.1
<i>Dampiera candicans</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.3	0.4
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	0.1	0.1
<i>Eriachne</i> sp. Dugald River (B.K. Simon+ 3007)	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Goodenia microptera</i>	0.1	0.1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	1.6	0.6
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.8	5
<i>Indigofera monophylla</i>	0.3	0.1
<i>Nicotiana benthamiana</i>	0.1	0.1
<i>Notoleptopus decaisnei</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Paspalidium tabulatum</i>	0.1	0.1
<i>Peripleura virgata</i>	0.2	0.1
<i>Polycarpaea longiflora</i>	0.1	0.1
<i>Ptilotus astrolasius</i>	0.3	0.2
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.8	0.1
<i>Solanum horridum</i>	0.1	0.1
<i>Streptoglossa decurrens</i>	0.1	0.1
<i>Terminalia circumalata</i>	8	3
<i>Themeda triandra</i>	0.4	0.1
<i>Tinospora smilacina</i>		0.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.1	0.1
<i>Tribulus suberosus</i>	0.4	0.1



<i>Trichosanthes cucumerina</i> var. <i>cucumerina</i>		0.1
<i>Triodia brizoides</i>	0.4	15
<i>Triodia wiseana</i>	0.4	10
<i>Triumfetta maconochieana</i>	0.5	0.1

**PHOTO**



Site Name: WDM24  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 21/06/2019  
 GPS Location: GDA94 Zone 50 670923.74728204E 7654524.47742276N  
 Landform Type: Ridge  
 Slope Class: Precipitous (60 degrees)  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Quartz (other), >50% bedrock exposed  
 CF Abundance: 20-50%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm, 200-600mm  
 CF Types: Granite, Quartz (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	1.2	1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.2	0.1
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i>	2	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	0.2	0.1
<i>Cyperus hesperius</i>	0.1	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eriachne mucronata</i>	0.3	0.3
<i>Euphorbia careyi</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	2.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	5
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Streptoglossa decurrens</i>	0.1	0.1
<i>Terminalia supranitifolia</i> (P3)	2.5	3
<i>Tinospora smilacina</i>		0.1
<i>Triodia wiseana</i>	0.7	25
<i>Triumfetta maconochieana</i>	0.1	0.1



**PHOTO**





Site Name: WDM25  
 Site Type: QUADRAT  
 Dimensions: 12.5m x 200m  
 Survey Date: 21/06/2019  
 GPS Location: GDA94 Zone 50 671224.05E 7654426.8N  
 Landform Type: Drainage Line  
 Slope Class: Very Gently Inclined (1 degree)  
 Aspect: S  
 Soil Type: Clay Loam  
 Soil Colour: Brown  
 Rock Outcrop: Granite, 2-10% bedrock exposed  
 CF Abundance: 10-20%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm  
 CF Types: Riverstone (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Abutilon</i> aff. <i>hannii</i>	0.3	0.1
<i>Acacia acradenia</i>	0.8	0.1
<i>Acacia bivenosa</i>	2.2	0.5
<i>Acacia coriacea</i> subsp. <i>pendens</i>	1.6	0.2
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>	2.5	1
<i>Acacia tumida</i> var. <i>pilbarensis</i>	3	0.6
<i>Amaranthus undulatus</i>	0.1	0.2
<i>Ammannia baccifera</i>	0.2	0.2
<i>Boerhavia gardneri</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cajanus pubescens</i>	0.5	0.2
* <i>Cenchrus ciliaris</i>	0.3	0.1
<i>Cheilanthes contigua</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Clerodendrum tomentosum</i>	0.5	0.1
<i>Corchorus parviflorus</i>	0.6	0.2
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>	0.3	0.1
<i>Cucumis variabilis</i>		0.1
<i>Cymbopogon ambiguus</i>	0.2	0.2
<i>Cyperus squarrosus</i>	0.1	0.1
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	0.1	0.1
<i>Eragrostis cumingii</i>	0.3	0.1
<i>Eriachne tenuiculmis</i>	0.2	0.1
<i>Eucalyptus victrix</i>	9	12
<i>Euphorbia biconvexa</i>	0.1	0.1
<i>Euphorbia careyi</i>	0.1	0.2
<i>Euphorbia clementii</i> (P3)	0.2	0.1
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	0.2	0.2
<i>Euphorbia trigonosperma</i>	0.1	0.1
* <i>Flaveria trinervia</i>	0.4	0.2
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	1.6	0.2
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Gossypium australe</i>	0.4	0.4
<i>Hybanthus aurantiacus</i>	0.4	0.2
<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.7	0.2



<i>Melaleuca linophylla</i>	2.5	25
<i>Nicotiana benthamiana</i>	0.1	0.2
<i>Notoleptopus decaisnei</i>	0.1	0.2
<i>Oldenlandia crouchiana</i>	0.1	0.3
<i>Operculina aequiseipala</i>	0.1	0.2
<i>Paspalidium clementii</i>	0.2	0.1
<i>Paspalidium tabulatum</i>	0.2	0.1
<i>Phyllanthus maderaspatensis</i>	0.2	0.3
<i>Pluchea rubelliflora</i>	0.2	0.4
<i>Polycarpaea longiflora</i>	0.1	0.2
<i>Polymeria ambigua</i>		0.2
<i>Pterocaulon sphacelatum</i>	0.1	1.5
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Rhynchosia minima</i>		0.1
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.5	0.3
<i>Senna notabilis</i>	0.1	0.1
<i>Sesbania cannabina</i>	0.4	3
<i>Solanum horridum</i>	0.1	0.1
<i>Solanum phlomoides</i>	0.1	0.2
<i>Sporobolus australasicus</i>	0.1	0.1
<i>Stemodia grossa</i>	0.1	0.4
<i>Swainsona formosa</i>	0.1	0.4
<i>Tephrosia densa</i>	0.5	0.1
<i>Tephrosia rosea</i> var. <i>clementii</i>	1.4	0.2
<i>Terminalia circumalata</i>	7	2
<i>Tinospora smilacina</i>		0.2
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.1	0.2
<i>Tribulus hirsutus</i>	0.1	0.1
<i>Trichodesma zeylanicum</i>	0.2	0.2
<i>Trichosanthes cucumerina</i> var. <i>cucumerina</i>		0.1
<i>Triodia brizoides</i>	0.2	5
<i>Triodia wiseana</i>	0.6	15
<i>Triumfetta maconochieana</i>	0.4	0.2



**PHOTO**





Site Name: WDM26  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 21/06/2019  
 GPS Location: GDA94 Zone 50 671134.8996902E 7654351.10525668N  
 Landform Type: Upper Slope  
 Slope Class: Very Steep (37 degrees)  
 Aspect: SE  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: Dolerite (other), 2-10% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Dolerite, Quartz, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: 5-10 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>	1.6	0.1
<i>Indigofera monophylla</i>	0.1	0.1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Polygala glaucifolia</i>	0.1	0.1
<i>Stackhousia muricata</i>	0.2	0.1
<i>Tephrosia densa</i>	0.1	0.1
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>	0.1	0.1
<i>Triodia chichesterensis</i> (P3)	0.3	5
<i>Triodia wiseana</i>	0.8	30



**PHOTO**





Site Name: WDM27  
 Site Type: QUADRAT  
 Dimensions: 50m x 50m  
 Survey Date: 21/06/2019  
 GPS Location: GDA94 Zone 50 670611.0849716E 7654191.6864771N  
 Landform Type: Lower Slope  
 Slope Class: Moderately Inclined (10 degrees)  
 Aspect: NW  
 Soil Type: Sandy Clay Loam  
 Soil Colour: Red-Brown (other)  
 Rock Outcrop: Dolerite (other), <2% bedrock exposed  
 CF Abundance: >90%  
 CF Sizes: 2-6mm, 6-20mm, 20-60mm, 60-200mm  
 CF Types: Granite, Dolerite, Quartz, Calcrete (other)  
 Vegetation Condition: Northern Vegetation Condition - E - Excellent  
 Disturbance: None  
 Fire: < 5 years

**DOMINANT TAXA IN VEGETATION STRATA****SPECIES LIST**

Taxon Name	Avg. Height	Cover Alive
<i>Acacia acradenia</i>	0.2	0.1
<i>Boerhavia gardneri</i>	0.2	0.1
<i>Bonamia pilbarensis</i>	0.1	0.1
<i>Bulbostylis barbata</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Corchorus parviflorus</i>	0.5	15
<i>Dampiera candidans</i>	0.3	0.2
<i>Eriachne</i> sp. Dugalld River (B.K. Simon+ 3007)	0.1	0.1
<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Indigofera rugosa</i>	0.3	1
<i>Oldenlandia crouchiana</i>	0.1	0.1
<i>Ptilotus auriculifolius</i>	0.1	0.1
<i>Ptilotus calostachyus</i>	0.2	0.1
<i>Solanum phlomoides</i>	0.2	0.1
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)	0.1	0.1
<i>Trigastrotheca molluginea</i>	0.1	0.1
<i>Triodia chichesterensis</i> (P3)	0.2	18
<i>Triodia wiseana</i>	0.4	2



**PHOTO**





## **Appendix L: Matrix of Vascular Plant Taxa Recorded within Each Vegetation Unit Described in the Study Area**



Taxon	Vegetation Unit														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Abutilon</i> aff. <i>hannii</i> , <i>Abutilon</i> aff. <i>hannii</i>														X	
<i>Abutilon</i> sp. <i>Pilbara</i> (W.R. Barker 2025)											X				
<i>Abutilon</i> sp. <i>Dioicum</i> (A.A. Mitchell PRP 1618)					X	X			X				X	X	
<i>Acacia acradenia</i>	X	X	X	X	X	X	X		X	X	X	X	X	X	
<i>Acacia ancistrocarpa</i>	X	X		X		X			X	X	X	X		X	
<i>Acacia bivenosa</i>				X	X			X		X	X	X		X	
<i>Acacia colei</i> var. <i>colei</i>														X	
<i>Acacia coriacea</i> subsp. <i>pendens</i>									X					X	
<i>Acacia inaequilatera</i>	X	X		X	X	X	X	X	X	X	X	X	X	X	
<i>Acacia maitlandii</i>		X											X	X	
<i>Acacia orthocarpa</i>	X	X			X		X	X	X		X	X	X	X	
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>									X	X	X			X	
<i>Acacia spondylophylla</i>		X		X	X			X	X		X		X	X	
<i>Acacia stellaticeps</i>	X	X			X			X		X	X	X			
<i>Acacia synchronica</i>	X														X
<i>Acacia trachycarpa</i>														X	
<i>Acacia tumida</i> var. <i>pilbarensis</i>	X	X	X		X				X	X	X	X	X	X	
<i>Adriana tomentosa</i> var. <i>tomentosa</i>														X	
* <i>Aerva javanica</i>						X			X		X			X	
<i>Alysicarpus muelleri</i>														X	
<i>Amaranthus interruptus</i>			X						X						
<i>Amaranthus undulatus</i>		X		X					X		X		X	X	
<i>Ammannia baccifera</i>														X	
<i>Aristida burbidgeae</i>									X					X	
<i>Aristida contorta</i>											X		X		
<i>Aristida holathera</i> var. <i>holathera</i>	X		X						X	X	X		X	X	
<i>Atalaya hemiglauca</i>														X	
<i>Boerhavia coccinea</i>	X	X	X	X	X	X			X	X	X			X	
<i>Boerhavia gardneri</i>		X		X	X	X	X		X		X	X	X	X	
<i>Boerhavia repleta</i>														X	
<i>Boerhavia schomburgkiana</i>									X		X			X	



Taxon	Vegetation Unit														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Bonamia alatisemina</i>	X	X								X	X		X	X	
<i>Bonamia erecta</i>	X									X	X	X		X	
<i>Bonamia pannosa</i>											X		X		
<i>Bonamia pilbarensis</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
<i>Bulbostylis barbata</i>	X	X	X	X	X	X	X	X	X	X	X		X	X	
<i>Byblis pilbarana</i>													X	X	
<i>Cajanus pubescens</i>							X				X			X	
<i>Calandrinia pumila</i>													X		
<i>Calandrinia stagnensis</i>														X	
<i>Cassytha capillaris</i>		X	X	X	X	X		X	X	X	X	X	X	X	
* <i>Cenchrus ciliaris</i>									X		X	X		X	X
* <i>Cenchrus setiger</i>											X			X	
<i>Cheilanthes brownii</i>									X				X		
<i>Cheilanthes contigua</i>			X	X					X					X	
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>													X		
<i>Chrysopogon fallax</i>										X	X	X		X	
<i>Clerodendrum tomentosum</i> var. <i>tomentosum</i> , <i>Clerodendrum tomentosum</i>				X			X		X	X	X			X	
<i>Cleome uncifera</i> subsp. <i>uncifera</i>	X	X			X	X				X	X	X	X		
<i>Cleome viscosa</i>	X	X	X	X	X	X	X	X	X	X	X		X	X	
<i>Codonocarpus cotinifolius</i>	X	X	X		X			X			X	X			
<i>Corymbia hamersleyana</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
<i>Corchorus ?incanus</i> subsp. <i>incanus</i>	X													X	
<i>Corchorus parviflorus</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
<i>Corchorus tridens</i>														X	
<i>Corymbia zygophylla</i>										X					
<i>Crotalaria medicaginea</i> var. <i>neglecta</i>							X							X	
<i>Crotalaria novae-hollandiae</i> subsp. <i>novae-hollandiae</i>									X					X	
<i>Cucumis variabilis</i>		X		X					X		X	X	X	X	
<i>Cullen leucanthum</i>														X	
<i>Cullen leucochaites</i>					X		X		X				X	X	



Taxon	Vegetation Unit														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Cullen martinii</i>											X				
<i>Cymbopogon ambiguus</i>			X	X	X		X		X		X		X	X	
* <i>Cynodon dactylon</i>														X	
<i>Cynodon prostratus</i>	X														X
<i>Cyperus hesperius</i>		X	X	X					X				X	X	
<i>Cyperus pulchellus</i>													X		
<i>Cyperus squarrosus</i>													X	X	
<i>Cyperus vaginatus</i>														X	
<i>Dactyloctenium radulans</i>														X	
<i>Dampiera candicans</i>	X	X	X	X	X		X		X	X	X		X	X	
<i>Desmodium filiforme</i>													X		
<i>Dichanthium fecundum</i>														X	
<i>Digitaria brownii</i>											X				
<i>Dodonaea coriacea</i>				X	X				X		X	X			
<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>		X	X	X	X	X	X		X	X	X		X	X	
<i>Dysphania sphaerosperma</i>	X					X		X						X	
<i>Enneapogon caeruleus</i>				X	X		X		X					X	
<i>Enneapogon lindleyanus</i>						X			X					X	
<i>Eragrostis cumingii</i>											X		X	X	
<i>Eragrostis desertorum</i>											X				
<i>Eragrostis eriopoda</i>	X								X	X	X	X			
* <i>Eragrostis minor</i>											X				
<i>Eragrostis speciosa</i>														X	
<i>Eragrostis tenellula</i>														X	
<i>Eriachne aristidea</i>					X				X		X		X		
<i>Eriachne benthamii</i>														X	
<i>Eriachne mucronata</i>			X	X	X	X			X	X	X	X	X	X	
<i>Eriachne obtusa</i>	X			X	X					X	X		X	X	
<i>Eriachne pulchella</i> subsp. <i>dominii</i>	X	X	X	X	X	X	X	X	X	X	X		X	X	X
<i>Eriachne</i> sp. Dugald River (B.K. Simon+ 3007)		X	X	X	X				X				X		



Taxon	Vegetation Unit														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Eriachne tenuiculmis</i>											X			X	
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		X	X	X					X				X	X	
<i>Eucalyptus victrix</i>														X	
<i>Eulalia aurea</i>											X			X	
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	X	X			X	X	X		X	X	X		X	X	
<i>Euphorbia biconvexa</i>														X	
<i>Euphorbia careyi</i>			X	X	X		X		X		X		X	X	
<i>Euphorbia clementii</i> (P3)		X								X	X	X	X	X	
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>		X		X	X				X	X	X	X	X	X	
<i>Euphorbia trigonosperma</i>	X								X	X	X			X	
<i>Euphorbia vaccaria</i> var. <i>vaccaria</i>		X				X					X	X	X	X	
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>											X		X	X	
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>				X					X				X		
<i>Ficus brachypoda</i>			X						X						
<i>Fimbristylis dichotoma</i>	X	X	X	X				X	X				X	X	X
<i>Fimbristylis elegans</i>									X					X	
<i>Fimbristylis rara</i>														X	
<i>Fimbristylis simulans</i>	X	X	X	X	X	X	X	X	X	X	X		X		
* <i>Flaveria trinervia</i>									X					X	
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>									X				X	X	
<i>Gomphrena cunninghamii</i>		X	X	X	X	X	X		X		X		X	X	
<i>Gonocarpus ephemerus</i>													X		
<i>Goodenia cusackiana</i>									X						
<i>Goodenia forrestii</i>					X						X			X	
<i>Goodenia microptera</i>	X	X	X	X	X	X			X	X	X	X	X	X	
<i>Goodenia muelleriana</i>	X					X			X	X	X	X	X	X	
<i>Goodenia stobbsiana</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
<i>Goodenia triodiophila</i>														X	
<i>Gossypium australe</i>		X		X			X		X	X	X		X	X	
<i>Gossypium robinsonii</i>							X								
<i>Grevillea pyramidalis</i> subsp. <i>leucadendron</i>		X		X	X	X	X		X		X		X	X	



Taxon	Vegetation Unit														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	X	X	X	X	X	X	X		X	X	X	X	X	X	
<i>Hakea lorea</i> subsp. <i>lorea</i>	X	X	X	X	X	X	X		X	X	X	X	X	X	
<i>Haloragis gossei</i> var. <i>gossei</i> , <i>Haloragis gossei</i>						X					X	X			
<i>Halgania solanacea</i> var. <i>solanacea</i> ms										X					
<i>Heliotropium chrysocarpum</i>								X				X			
<i>Heliotropium crispatum</i>											X				
<i>Heliotropium cunninghamii</i>		X			X	X			X	X	X	X	X	X	
<i>Heliotropium pachyphyllum</i>					X				X	X	X	X	X	X	
<i>Heliotropium skeleton</i>	X		X		X				X		X				
<i>Heliotropium tenuifolium</i>				X							X	X	X	X	
<i>Heliotropium vestitum</i>										X					
<i>Hibiscus coatesii</i>				X	X				X				X	X	
<i>Hibiscus goldsworthii</i>									X						
<i>Hibiscus leptocladus</i>									X		X		X	X	
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>				X					X	X	X	X	X	X	
<i>Hybanthus aurantiacus</i>				X	X	X			X	X	X	X	X	X	
<i>Indigofera colutea</i>											X			X	
<i>Indigofera linifolia</i>							X							X	
<i>Indigofera monophylla</i>	X	X	X	X	X	X	X		X	X	X	X	X	X	
<i>Indigofera rugosa</i>					X		X		X			X	X		
<i>Indigofera trita</i>									X					X	
<i>Ipomoea muelleri</i>													X	X	
<i>Isotropis atropurpurea</i>											X		X	X	
<i>Jasminum didymum</i> subsp. <i>lineare</i>			X						X		X	X		X	
<i>Lepidium ?pholidogynum</i>											X			X	
<i>Leptosema anomalum</i>										X					
<i>Maireana</i> sp.															X
<i>Mallotus nesophilus</i>									X						
<i>Melaleuca glomerata</i>														X	
<i>Melaleuca linophylla</i>														X	
<i>Melhania oblongifolia</i>														X	



Taxon	Vegetation Unit														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Mitrasacme connata</i>											X		X		
<i>Nicotiana benthamiana</i>				X					X				X	X	
<i>Nicotiana occidentalis</i>														X	
<i>Notoleptopus decaisnei</i>						X			X	X	X			X	
<i>Oldenlandia crouchiana</i>		X	X	X	X	X	X	X	X		X	X	X	X	
<i>Operculina aequisejala</i>														X	
<i>Paraneurachne muelleri</i>	X	X			X						X	X		X	
<i>Paspalidium clementii</i>		X		X			X		X	X	X			X	
<i>*Passiflora foetida</i> var. <i>hispida</i>									X					X	
<i>Paspalidium rarum</i>											X			X	
<i>Paspalidium tabulatum</i>			X						X					X	
<i>Perotis rara</i>											X			X	
<i>Peripleura virgata</i>				X					X						
<i>Petalostylis labicheoides</i>		X			X						X	X	X	X	
<i>Phyllanthus maderaspatensis</i>						X			X		X			X	
<i>Pluchea dentex</i>									X		X				
<i>Pluchea ferdinandi-muelleri</i>	X							X	X		X	X	X	X	
<i>Pluchea rubelliflora</i>														X	
<i>Pluchea tetranthera</i>	X	X		X						X	X	X	X	X	
<i>Polymeria ambigua</i>											X	X	X	X	
<i>Polycarpaea corymbosa</i>	X	X	X	X		X			X	X	X		X	X	
<i>Polygala glaucifolia</i>	X	X	X	X		X	X	X	X	X	X		X		
<i>Polycarpaea holtzei</i>	X	X	X	X	X		X		X	X	X		X	X	
<i>Polycarpaea longiflora</i>		X	X	X	X				X		X		X	X	
<i>Polygala</i> aff. <i>saccopetala</i>											X				
<i>Portulaca oleracea</i>	X				X	X				X	X		X	X	X
<i>Pterocaulon sphacelatum</i>				X							X		X	X	
<i>Pterocaulon sphaeranthoides</i>									X		X			X	
<i>Ptilotus astrolasius</i>	X	X	X	X	X	X		X	X	X	X	X	X	X	
<i>Ptilotus auriculifolius</i>	X	X	X	X	X	X	X	X	X	X	X		X	X	
<i>Ptilotus axillaris</i>			X			X			X	X	X	X	X	X	



Taxon	Vegetation Unit														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Ptilotus calostachyus</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
<i>Ptilotus clementii</i>	X				X	X		X							
<i>Ptilotus exaltatus</i>	X	X		X	X				X		X	X	X	X	X
<i>Ptilotus fusiformis</i>		X	X	X					X	X	X			X	
<i>Ptilotus incanus</i>			X	X					X				X	X	
<i>Ptilotus polystachyus</i>				X								X			
<i>Rhodanthe margarethae</i>													X		
<i>Rhynchosia minima</i>				X			X		X	X	X	X	X	X	
<i>Salsola australis</i>				X		X		X	X		X	X		X	
<i>Scaevola browniana</i> subsp. <i>browniana</i>	X												X		
<i>Scaevola spinescens</i>														X	
<i>Schizachyrium fragile</i>			X								X		X		
<i>Sclerolaena densiflora</i>												X			
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>							X		X	X	X	X		X	
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>			X	X	X				X			X	X	X	
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	X			X	X				X						
<i>Senna notabilis</i>		X	X	X	X	X		X	X	X	X	X	X	X	
<i>Senna symonii</i>	X	X		X	X			X	X	X	X	X		X	
<i>Seringia nephrosperma</i>				X							X		X		
<i>Sesbania cannabina</i>														X	
<i>Sida arenicola</i>				X						X	X		X		
<i>Sida clementii</i>										X	X			X	
<i>Sida fibulifera</i>												X		X	X
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)		X	X	X	X				X	X	X		X	X	
<i>Solanum diversiflorum</i>					X				X	X	X			X	
<i>Solanum horridum</i>			X		X		X		X		X		X	X	
<i>Solanum phlomoides</i>	X	X	X	X	X	X	X		X	X	X	X	X	X	
<i>Sorghum plumosum</i> var. <i>plumosum</i>											X				
<i>Sporobolus australasicus</i>	X		X			X	X	X			X	X	X	X	X
<i>Stackhousia muricata</i>							X	X				X			
<i>Stemodia grossa</i>		X	X			X			X		X		X	X	



Taxon	Vegetation Unit														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Stemodia viscosa</i>													X	X	
<i>Streptoglossa decurrens</i>									X		X	X	X	X	
<i>Striga squamigera</i>									X		X			X	
<i>Swainsona formosa</i>				X		X		X	X		X			X	
<i>Swainsona stenodonta</i>				X				X							
<i>Synaptantha tillaeacea</i> var. <i>tillaeacea</i>	X	X			X	X	X			X	X		X	X	
<i>Tephrosia clementii</i>	X	X			X	X			X	X	X				
<i>Tephrosia densa</i>							X		X					X	
<i>Tephrosia rosea</i> var. <i>clementii</i>											X		X	X	
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)		X	X			X			X	X	X	X	X	X	
<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)		X	X	X	X	X	X		X	X	X	X	X		
<i>Tephrosia supina</i>											X				
<i>Tephrosia virens</i>		X	X		X	X			X				X	X	
<i>Terminalia circumalata</i>									X				X	X	
<i>Terminalia supranitifolia</i> (P3)			X						X					X	
<i>Themeda triandra</i>									X		X			X	
<i>Tinospora smilacina</i>						X			X	X	X	X	X	X	
<i>Trachymene oleracea</i> subsp. <i>oleracea</i>		X	X	X			X		X	X	X		X	X	
<i>Triodia angusta</i>	X							X			X	X			
<i>Tribulopsis angustifolia</i>								X							
<i>Triodia brizoides</i>		X	X	X	X		X		X	X	X		X	X	
<i>Triumfetta chaetocarpa</i>										X					
<i>Triodia chichesterensis</i> (P3)	X	X		X	X	X	X	X	X		X	X		X	
<i>Triumfetta clementii</i>									X				X	X	
<i>Trichosanthes cucumerina</i> var. <i>cucumerina</i>									X					X	
<i>Triodia epactia</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
<i>Tribulus hirsutus</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
<i>Triumfetta johnstonii</i>											X		X	X	
<i>Triodia lanigera</i>	X	X		X	X	X				X	X		X		
<i>Tripogonella loliiformis</i>													X		

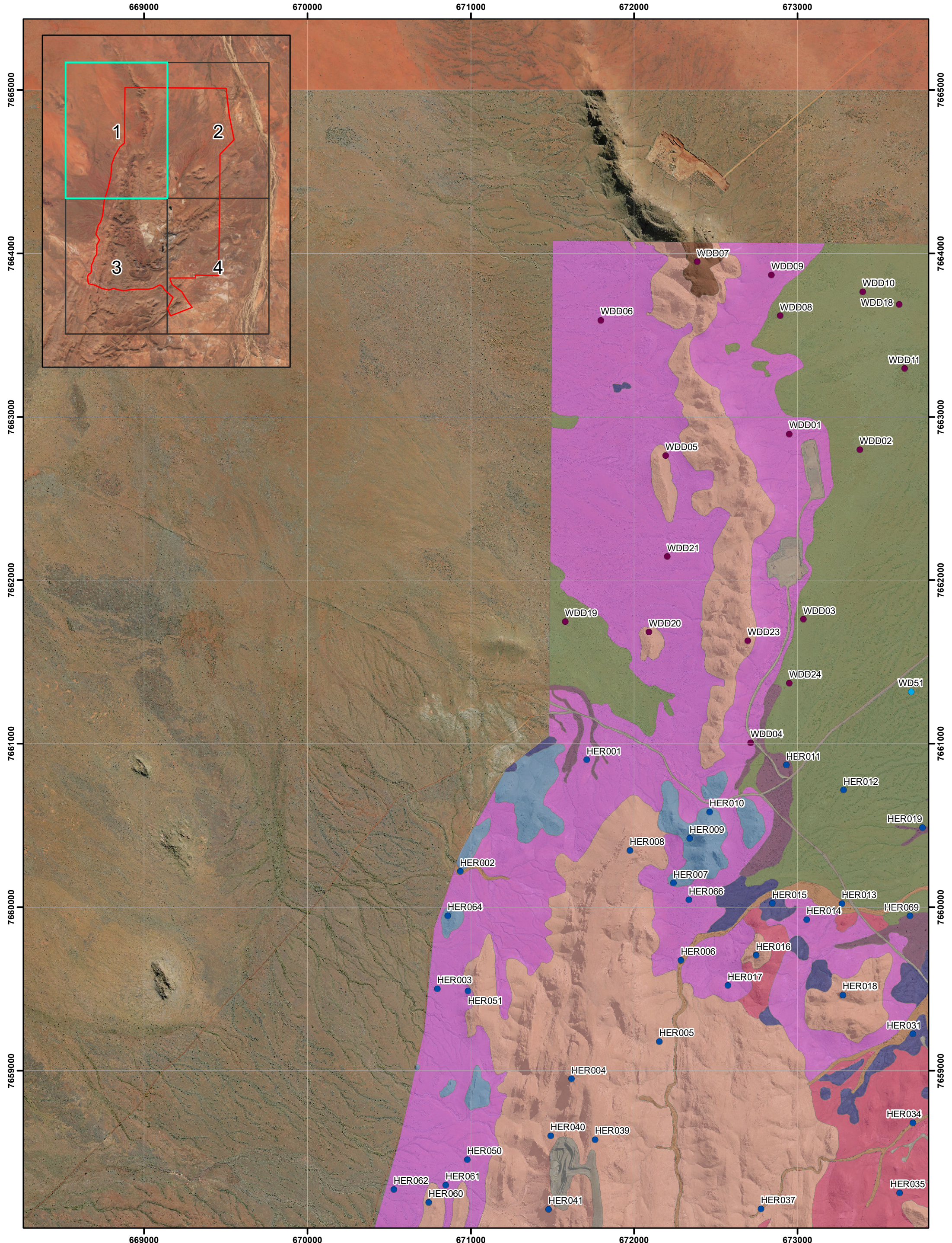


Taxon	Vegetation Unit														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Triodia longiceps</i>														X	X
<i>Triumfetta maconochieana</i>			X	X					X				X	X	
<i>Trigastrotheca molluginea</i>	X	X	X	X	X	X		X	X	X	X	X	X	X	
<i>Trianthema pilosum</i>			X							X	X			X	
<i>Tribulus platypterus</i>				X	X				X		X	X		X	
* <i>Trianthema portulacastrum</i>														X	
<i>Triumfetta propinqua</i>		X	X	X					X		X		X	X	
<i>Triodia schinzii</i>										X					
<i>Tribulus suberosus</i>		X		X	X	X	X		X		X		X	X	
<i>Trianthema triquetrum</i>	X							X			X			X	X
<i>Triodia wiseana</i>	X	X	X	X	X	X	X	X	X		X	X	X	X	
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i> , <i>Trichodesma zeylanicum</i>				X					X	X	X		X	X	
<i>Velleia connata</i>											X				
<i>Vigna triodiophila</i> (P3)									X					X	
<i>Waltheria indica</i>											X			X	
<i>Yakirra australiensis</i> var. <i>australiensis</i>	X		X			X			X	X	X	X	X	X	
<i>Zornia albiflora</i>	X												X		



## **Appendix M: Detailed Vegetation Mapping of the Study Area**

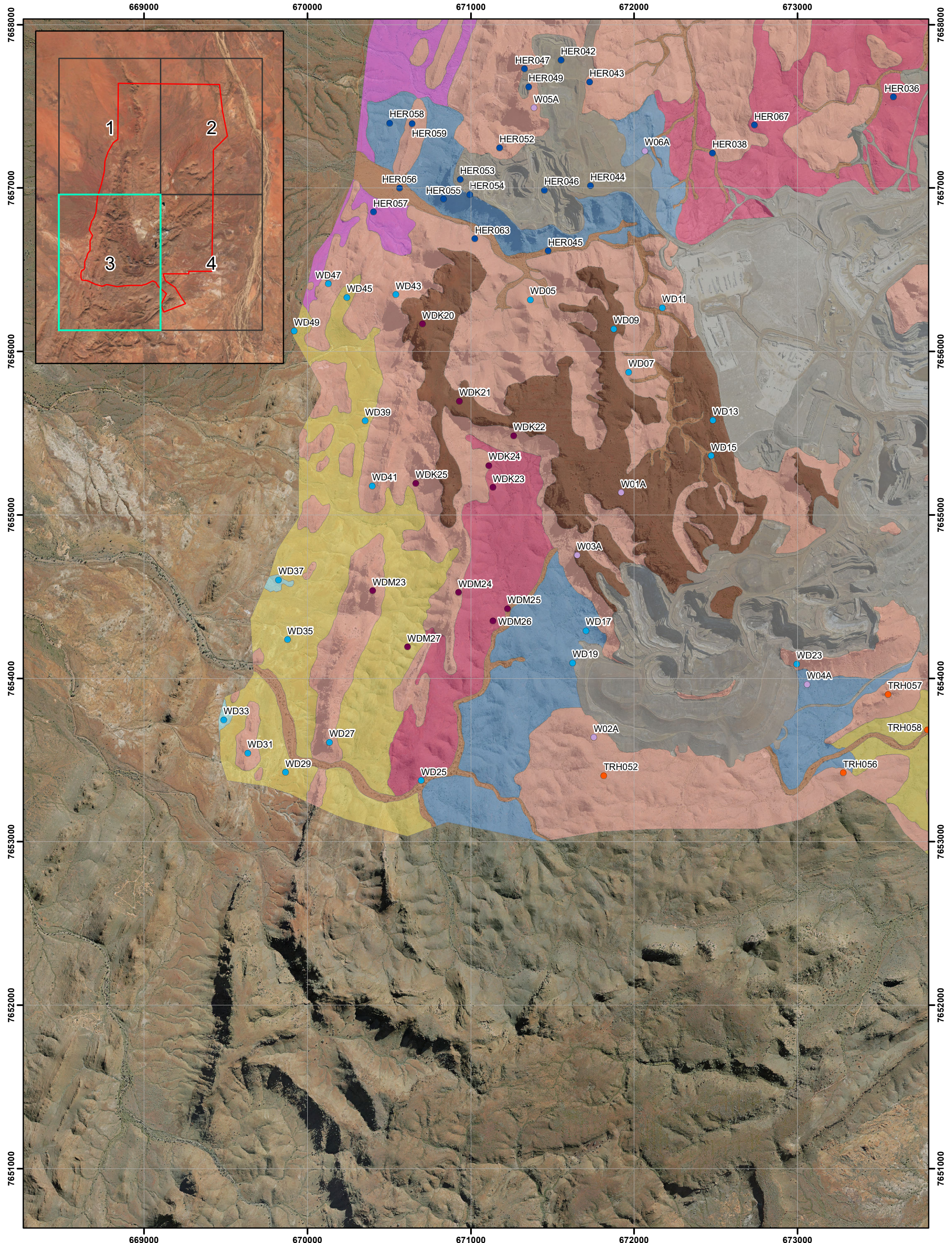




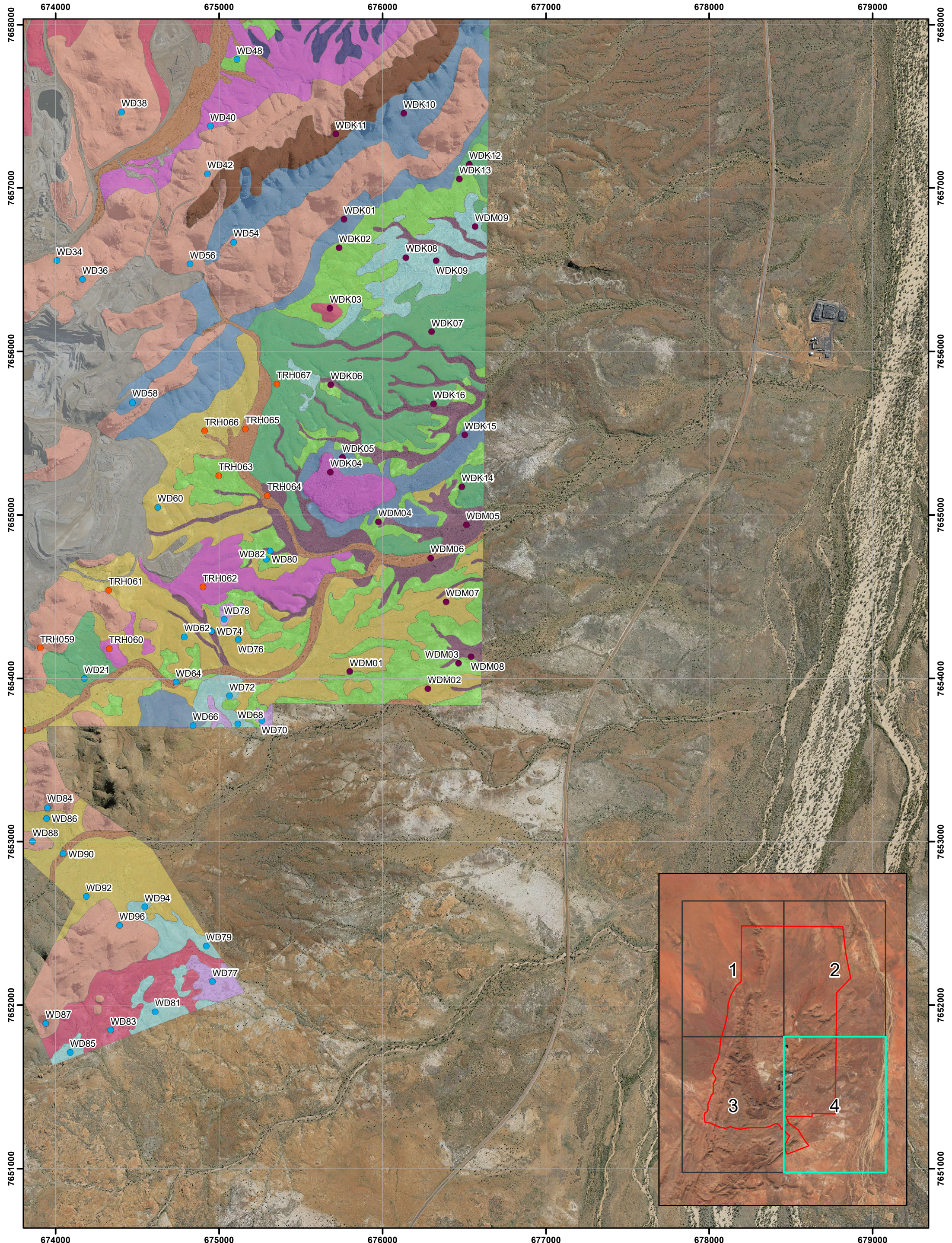














Legend

Study Area

Vegetation Units

- 1

Tall open to sparse shrubland dominated by *Acacia orthocarpa*, *A. ancistrocarpa* and occasionally *A. acradenia* over low sparse shrubland of mixed species dominated by *A. stellaticeps* over low hummock grassland dominated by *Triodia lanigera* and occasionally *T. epactia* on red-brown clay loam with granite, quartz or ironstone stones on colluvial stone plains and low flat-topped rises.
- 2

Tall to mid sparse shrubland of mixed species dominated by *Acacia acradenia*, *A. inaequilatera*, *Grevillea wickhamii* subsp. *hispidula* and occasionally *A. tumida* var. *pilbarensis* and *A. ancistrocarpa* over low sparse shrubland of mixed species including *Indigofera monophylla* and *Goodenia stobbsiana* over low hummock grassland dominated by *Triodia epactia* and/or *T. brizoides* on red, brown or red-brown clay loam with metamorphic, ironstone, quartz and occasionally granite stones, occasionally with metamorphosed granite or granite outcropping, on lower slopes and colluvial outwashes of ranges and occasionally on low flat-topped rises.
- 3

Low open woodland to isolated trees of *Eucalyptus leucophloia* subsp. *leucophloia* and/or *Corymbia hamersleyana* over tall to mid sparse to open shrubland dominated by *Acacia acradenia*, *Grevillea wickhamii* subsp. *hispidula* and *A. tumida* var. *pilbarensis* over low sparse shrubland of mixed species including *Dampiera candicans*, *Indigofera monophylla*, *Goodenia stobbsiana* and *Triumfetta maconochieana* over low hummock grassland dominated by *Triodia epactia* and often *T. brizoides* or *T. wiseana* over low sparse tussock grassland dominated by *Eriachne mucronata* on red, brown or red brown clay loam with ironstone or metamorphosed granite stones over ironstone or metamorphosed granite outcropping on plateaus, crests and upper slopes of ranges.
- 4

Tall to mid sparse shrubland dominated by *Acacia inaequilatera*, *A. acradenia* and *Grevillea wickhamii* subsp. *hispidula* over low sparse shrubland of mixed species including *Corchorus parviflorus* and *Indigofera monophylla* over low hummock grassland dominated by *Triodia epactia* and/or *T. wiseana*, or occasionally *T. brizoides* and *T. chichesterensis*, on red, brown or red-brown clay loam with metamorphosed granite, dolerite and occasionally ironstone stones over metamorphosed granite or dolerite outcropping on mid and upper slopes of ranges, and low ridges and hills.
- 5

Tall to mid sparse shrubland of mixed species dominated by *Acacia acradenia*, *A. inaequilatera* and *A. orthocarpa* over low sparse shrubland of mixed species dominated by *Acacia spondylophylla* over low hummock grassland dominated by a combination of *Triodia chichesterensis*, *T. wiseana*, *T. epactia*, *T. brizoides* and *T. lanigera* on red-brown clay loam with metamorphosed granite, ironstone, dolerite, quartz and calcrete stones, occasionally over metamorphosed granite and dolerite outcropping, on lower slopes and colluvial outwashes of ranges and low flat-topped rises.
- 6

Low open woodland to isolated trees of *Corymbia hamersleyana* over tall to mid sparse shrubland dominated by *Acacia inaequilatera*, *A. acradenia* and *Grevillea wickhamii* subsp. *hispidula* over low hummock grassland dominated by *Triodia chichesterensis* and/or *T. wiseana* on brown or occasionally red clay loam with calcrete, quartz and metamorphosed granite stones, occasionally over calcrete outcropping, on colluvial outwashes of ranges and colluvial stony plains.
- 7

Tall to mid sparse shrubland of mixed species including *Acacia inaequilatera*, *Grevillea pyramidalis* subsp. *leucadendron* and *A. orthocarpa* over low hummock grassland dominated by *Triodia chichesterensis* and/or *T. wiseana* on brown, red or red-brown clay loam with dolerite, calcrete and quartz stones, often with dolerite outcropping, on low hills.
- 8

Low isolated trees of *Corymbia hamersleyana* over tall to mid sparse shrubland dominated by *Acacia bivenosa* and *A. inaequilatera* over low hummock grassland dominated by *Triodia chichesterensis* and/or *T. wiseana* and *T. angusta* on brown, red-brown or grey-brown clay loam with dolerite, calcrete, ironstone and quartz stones on colluvial stony plains.
- 9

Low isolated trees of *Corymbia hamersleyana* over mid sparse shrubland to isolated shrubs dominated by *Acacia acradenia*, *A. inaequilatera* and *Grevillea wickhamii* subsp. *hispidula* over low hummock grassland dominated by *T. wiseana*, *T. epactia* and occasionally *T. brizoides* on red, brown or red-brown clay loam with ironstone, metamorphosed granite or occasionally dolerite or quartz stones over ironstone or metamorphosed granite outcropping on cliffs, ridges and crests and upper to mid slopes of ranges.
- 10

Low isolated trees of *Corymbia hamersleyana* and/or *Corymbia zygophylla* over tall to mid open to sparse shrubland dominated by *Acacia ancistrocarpa* and occasionally *A. tumida* var. *pilbarensis*, *A. inaequilatera* and *Grevillea wickhamii* subsp. *hispidula* over low sparse shrubland of mixed species dominated by *Bonamia erecta*, *Indigofera monophylla* and *Ptilotus astrolasius* over low hummock grassland dominated by *Triodia lanigera* and occasionally *T. schinzii* and/or *T. epactia* on red, brown or red-brown sandy or clay loam, often with quartz or ironstone stones, on plains.
- 11

Low isolated trees of *Corymbia hamersleyana* over tall open to sparse shrubland dominated by *A. tumida* var. *pilbarensis*, *A. ancistrocarpa* and *A. acradenia* over low open to sparse shrubland of mixed species including *Bonamia erecta*, *Isotropis atropurpurea* and *Corchorus parviflorus* over low hummock and tussock grassland dominated by *Chrysopogon fallax*, *Triodia epactia* and occasionally *T. lanigera* on red, brown or red-brown sandy or clay loam with colluvial stones in minor drainage features including flats and small creeks.
- 12

Low open woodland of *Corymbia hamersleyana* over tall sparse shrubland dominated by *Acacia inaequilatera* over mid sparse shrubland dominated by *Acacia bivenosa* and *Codonocarpus cotinifolius* over low sparse shrubland of mixed species dominated by *Corchorus parviflorus*, *Indigofera monophylla*, *Heliotropium chrysocarpum* and *Heliotropium pachyphyllum* over low hummock grassland dominated by *Triodia chichesterensis* and occasionally *T. epactia* or *T. angusta* on red, brown or grey-brown clay loam with calcrete or quartz stones on undulating plains.
- 13

Isolated low trees dominated by *Corymbia hamersleyana* over tall to mid sparse shrubland dominated by *Acacia orthocarpa*, *Grevillea wickhamii* subsp. *hispidula* and often *A. maitlandii* and *A. tumida* var. *pilbarensis* over low sparse shrubland of mixed species including *Corchorus parviflorus*, *Dampiera candicans*, *Goodenia stobbsiana*, *Indigofera monophylla* and *Scaevola browniana* subsp. *browniana* over low hummock grassland dominated by *Triodia epactia* and occasionally *T. brizoides* or *T. lanigera* on orange, brown or red-brown sandy or clay loam with granite and quartz stones over granite outcropping on undulating plains or low rises.
- 14

Low open woodland to isolated trees dominated by *Eucalyptus victrix* and/or *Corymbia hamersleyana* over tall open to sparse shrubland of mixed species dominated by *Acacia pyrifolia* var. *pyrifolia*, *A. tumida* var. *pilbarensis* and *Melaleuca linophylla* over mid to low open to sparse shrubland of mixed species including *Cajanus pubescens*, *Indigofera monophylla*, *Tephrosia rosea* var. *clementii*, *Corchorus parviflorus* and *Jasminum didymum* subsp. *lineare* over low tussock and hummock grassland to open tussock and hummock grassland of mixed species dominated by *Triodia epactia*, *Cenchrus ciliaris*, *Chrysopogon fallax*, *Cymbopogon ambiguus* and *Eriachne tenuiculmis* on red or brown clay or sandy loam, usually with colluvial stones, in major creeks.
- 15

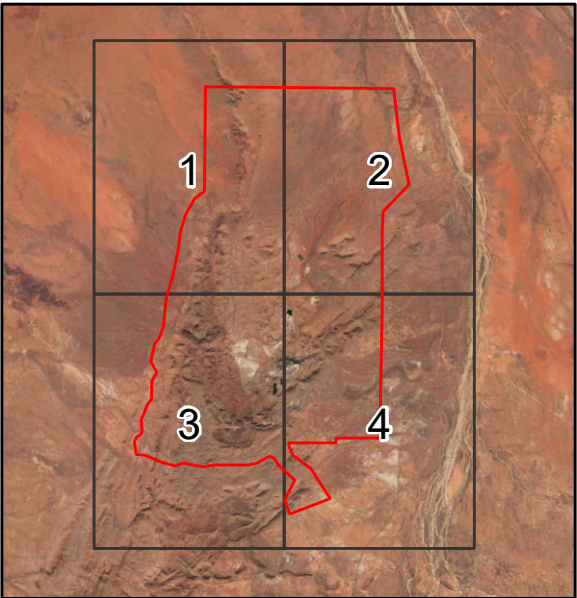
Mid isolated shrubs of *Acacia synchronicia* over low isolated chenopod shrubs of *Maireana* sp. over low sparse forbland, tussock grassland and sedgeland of mixed species including *Portulaca oleracea*, *Ptilotus exaltatus*, *Cynodon prostratus*, *Sporobolus australasicus* and *Fimbristylis dichotoma* on red clay loam with colluvial stones on plains.
- C

Approved Clearing
- D

Degraded Land

Quadrat Locations

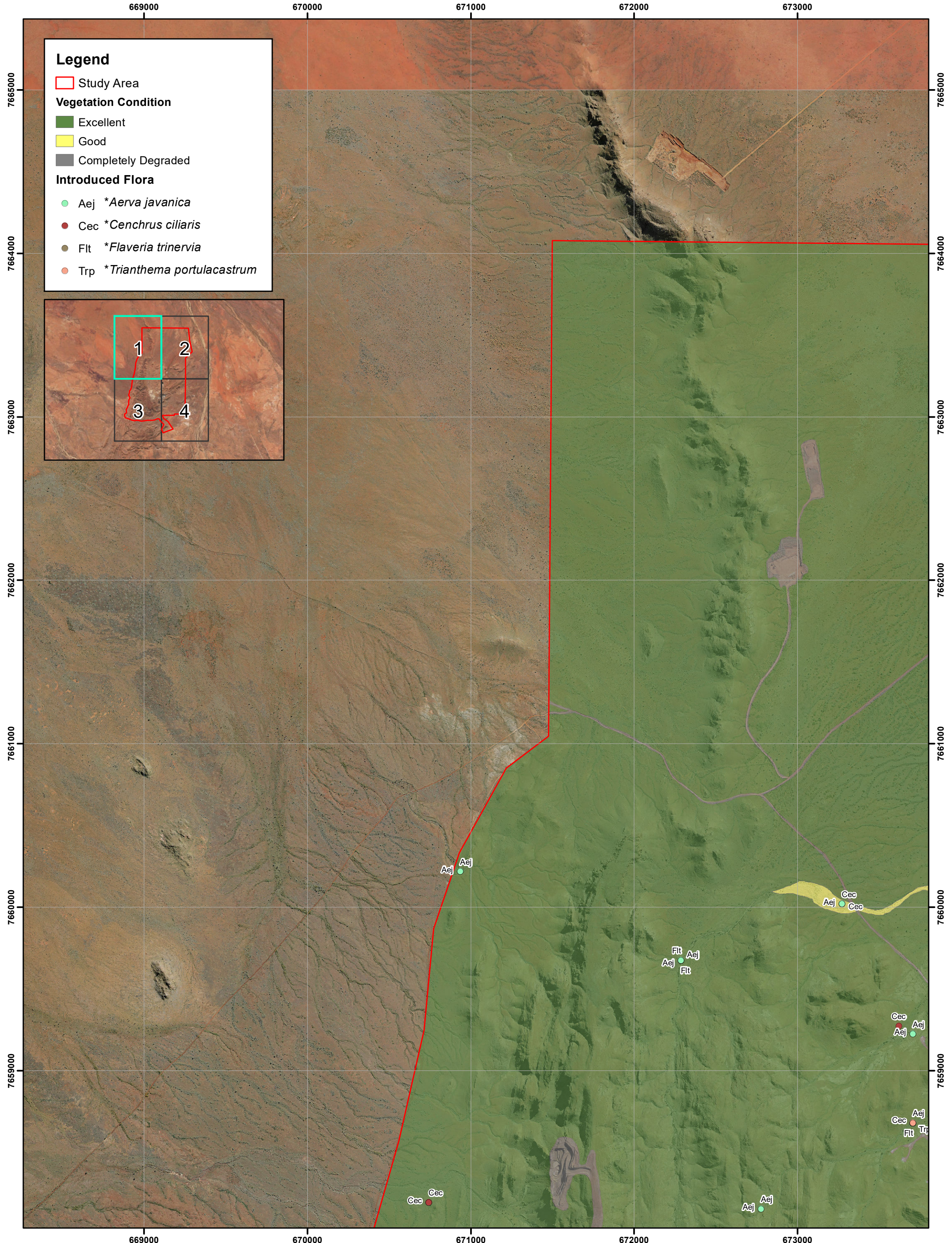
- 2019 Survey
- 2018 Survey
- TRH quadrats (reassessed 2019)
- GNH Upgrade Project (Woodman Environmental 2013c)
- Hercules Project (Woodman Environmental 2012c)
- Wodgina 2018 Rehabilitation Monitoring (Woodman Environmental 2018)





**Appendix N: Detailed Vegetation Condition and Locations of Introduced  
Flora Taxa of the Study Area**





This map should only be used in conjunction with WEC report MRL19-19-04.



**Detailed Vegetation Condition and Locations of Introduced Flora Taxa of the Study Area**

Revision: 0 - 4 Apr 2020

Scale: 1:20,000 (A3)

Author: David Coultas

WEC Ref: MRL19-19-04

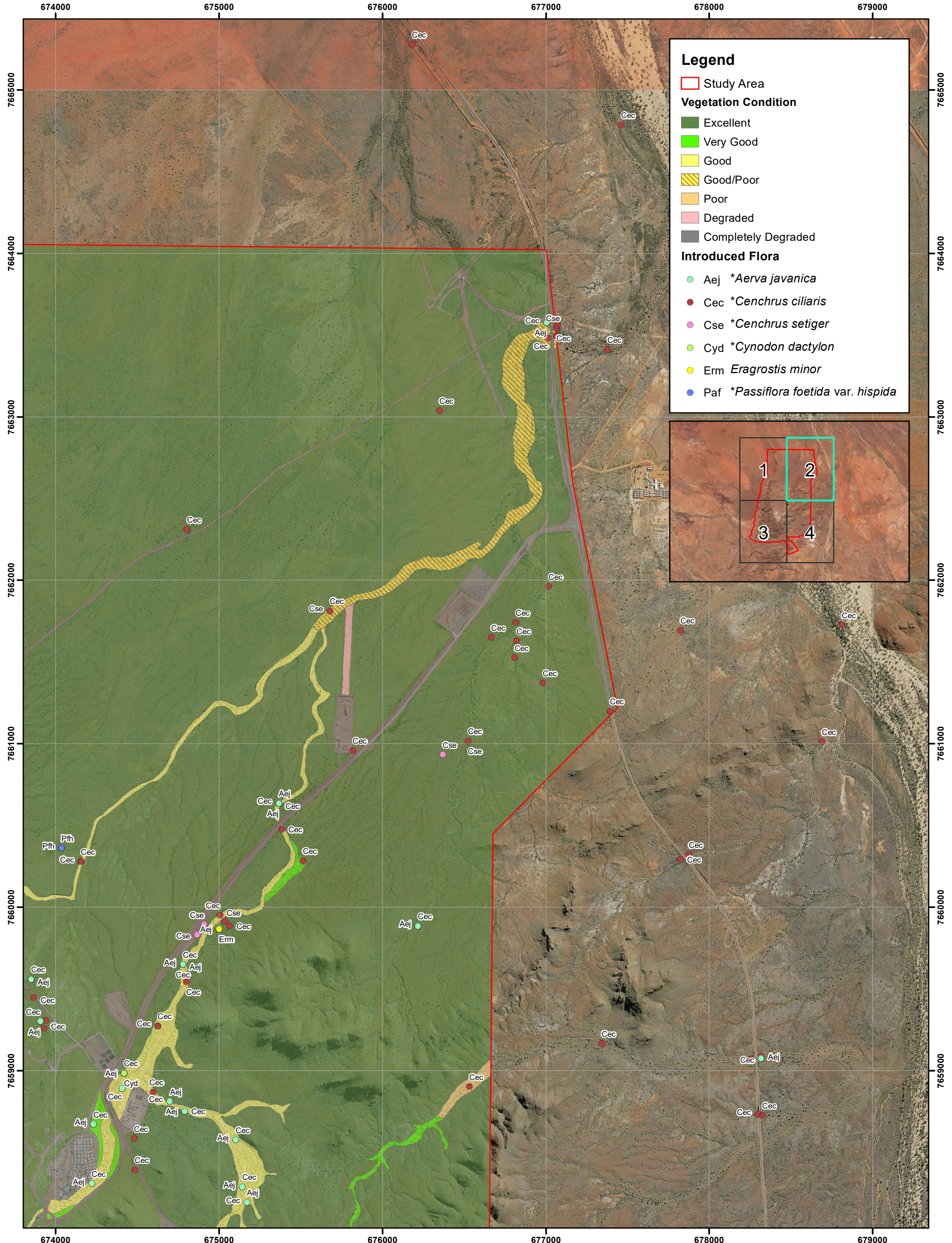
Filename: MRL19-19-04-App-N.mxd

Projection: GDA 1994 MGA Zone 50

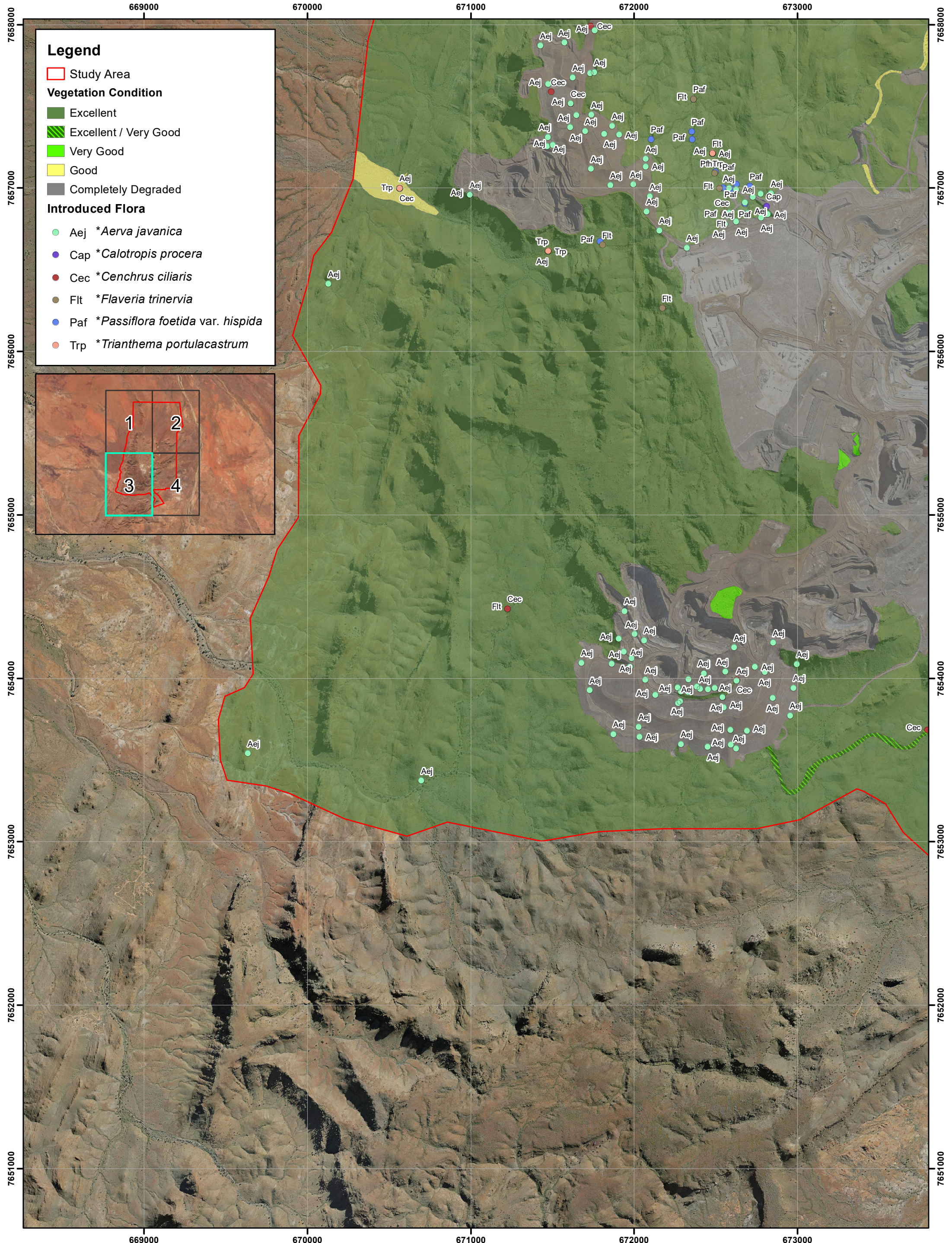
**Appendix**

**N1**

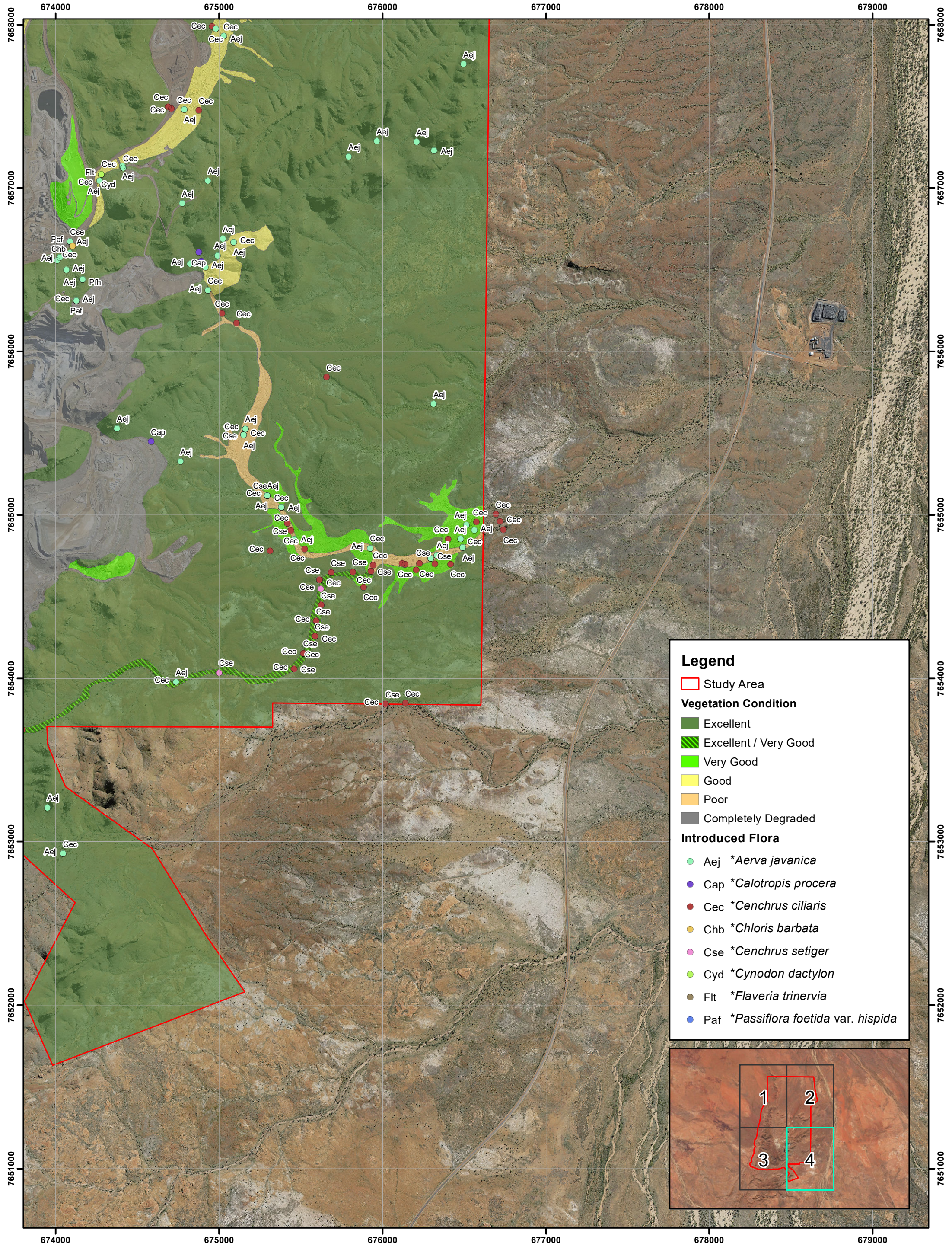












**Legend**

Study Area

**Vegetation Condition**

Excellent

Excellent / Very Good

Very Good

Good

Poor

Completely Degraded

**Introduced Flora**

AeJ \**Aerva javanica*

Cap \**Calotropis procera*

Cec \**Cenchrus ciliaris*

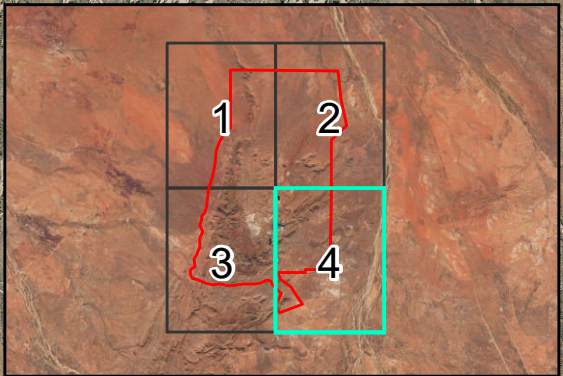
Chb \**Chloris barbata*

Cse \**Cenchrus setiger*

Cyd \**Cynodon dactylon*

Flt \**Flaveria trinervia*

Paf \**Passiflora foetida* var. *hispida*





## **ATTACHMENT 5 - WODGINA PROJECT LEVEL 2 VERTEBRATE FAUNA SURVEY APRIL 2019 (VERSION 5) (WESTERN WILDLIFE MAY 2020)**





# Wodgina Lithium Project:

## Level 2 Vertebrate Fauna Survey 2019



Prepared for: MARBL Lithium Operation Pty Ltd

Prepared by: Western Wildlife  
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Ph: 0427 510 934



May 2020



## Executive Summary

### **Introduction**

The Wodgina Lithium Project is owned by the MARBL Lithium Joint Venture (MARBL JV) and operated through the managing entity MARBL Lithium Operations Pty Ltd (MARBL). The Wodgina mining area has been the location for various mining operations over the past several decades; therefore, fauna assessments of differing scopes have been undertaken over the years to support environmental assessment and mining approvals.

Lack of a contemporary Level 2 vertebrate fauna survey across the entire mine site has previously been identified as a gap in the fauna knowledge base of the Wodgina area. To address this gap, Western Wildlife were commissioned to carry out an additional two-phase Level 2 fauna survey of the Wodgina mine site (hereafter referred to as the Study Area).

The purpose of the survey was to collate existing data and gather contemporary baseline fauna data where necessary to inform the environmental impact assessment process. This report includes the findings of the two-phase baseline vertebrate fauna survey, conducted in April and October 2019.

### **Methods**

The fauna survey was undertaken in accordance with relevant guidance published by the Australian and Western Australia governments, including:

- *Statement of environmental principles, factors and objectives* (Environmental Protection Authority (EPA) 2016a)
- *Environmental factor guideline – terrestrial fauna* (EPA 2016b)
- *Technical guidance – terrestrial fauna surveys* (EPA 2016c)
- *Technical Guide: terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA and DEC 2010)
- State and Federal guidelines for surveying conservation significant fauna.

The literature review was focused on collating fauna records that had been collected during previous surveys within the Study Area.



The fauna survey comprised two phases, with each field survey carried out by four zoologists between 8 - 19 April 2019 and 16 – 26 October 2019. The fauna survey included:

- trapping at six sites for seven nights, each with ten pitfall traps (six buckets and four PVC pipes), ten funnel traps, 20 Elliott traps and two cage traps
- bird surveys at each trapping site and opportunistically
- bat surveys with acoustic detectors at 7 sites in April and 13 sites in October
- Night Parrot survey with passive acoustic detectors at 6 sites in April
- camera trap survey at 40 sites in April and 42 sites in October, targeting Northern Quoll (*Dasyurus hallucatus*)
- spot-lighting transects and searches
- keeping opportunistic records of fauna.

Species of conservation significance were classified as: **Threatened** if listed as Extinct in the Wild, Critically Endangered, Endangered or Vulnerable under *The Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or *Biodiversity Conservation Act 2016* (BC Act); **Migratory** if listed as Migratory under the EPBC Act and/or BC Act, excluding those species also listed as threatened; **Specially Protected** if listed as Other Specially Protected Species or Conservation Dependent Fauna under the BC Act; **Priority** if listed as Priority by DBCA and **Locally Significant** if considered by the author to potentially be of local significance.

## **Results and Discussion**

Six fauna habitats occur in the Study Area:

- Ironstone Ridgetop
- Rocky Ridge and Gorge
- Rocky Foothills
- Stony Rise
- Spinifex Stony Plain
- Drainage Line

Other than the Ironstone Ridgetop and Rocky Ridge and Gorge, the habitats present are widespread in the Pilbara Bioregion. Habitats of importance within the Study Area are the Rocky Ridge and Gorge habitat (as it supports Threatened fauna and is limited in extent) and the Drainage Line habitat (as it supports diverse faunal assemblages and may act as corridors for movement).

The faunal assemblage of the Study Area as a whole is diverse as the Study Area contains a range of habitats. Many of the species that occur in the Study Area are widely distributed through arid Australia. The predicted faunal assemblage includes up to ten frogs, 108 reptiles, 140 birds and 33 native mammals and eight introduced mammals. The observed assemblage thus far includes five frogs, 71 reptiles, 89 birds, 25 native mammals and six introduced mammals. Seventeen conservation significant fauna have either been recorded or are listed as potentially occur in the Study Area. The species are grouped into their conservation significance categories and discussed below.



### Threatened species

Six threatened species potentially occur in the Study Area, of which three have been recorded during the current or previous surveys:

- Pilbara Olive Python (*Liasis olivaceous barroni*) - EPBC Act (Vulnerable), BC Act (Vulnerable)
- Grey Falcon (*Falco hypoleucos*) - BC Act (Vulnerable)
- Night Parrot (*Pezoporus occidentalis*) - EPBC Act (Endangered), BC Act (Critically Endangered)
- Northern Quoll (*Dasyurus hallucatus*) - EPBC Act (Endangered), BC Act (Endangered) – **Recorded**
- Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*) - EPBC Act (Vulnerable), BC Act (Vulnerable) – **Recorded**
- Ghost Bat (*Macroderma gigas*) - EPBC Act (Vulnerable), BC Act (Vulnerable) – **Recorded**

The Northern Quoll, Pilbara Leaf-nosed Bat and Ghost Bat are all known to occur in the Study Area. The Northern Quoll is likely to be a resident breeding species, albeit one that is less numerous than in previous years, probably due to the impact of bushfires in 2014 and 2016 (Stantec 2017).

The Pilbara Leaf-nosed Bat is known to forage in the Study Area, particularly in the Drainage Line habitat. No permanent diurnal roosts are present or thought likely to be present, though a transitory diurnal roost and nocturnal refuges have been recorded in the western part of the Study Area.

Similarly, the Ghost Bat is likely to forage across the Study Area, with diurnal roosts and potential maternity roosts recorded in the Study Area. Significant numbers of Ghost Bats have been recorded on occasion.

### Migratory species

Four Migratory species potentially occur in the Study Area, of which two have been recorded during current or previous surveys:

- Oriental Plover (*Charadrius veredus*)
- Wood Sandpiper (*Tringa glareola*) – **Recorded**
- Common Sandpiper (*Tringa hypoleucos*) – **Recorded**
- Fork-tailed Swift (*Apus pacificus*)

The Common Sandpiper and Wood Sandpiper are known to occur in the Study Area. The Study Area does not provide important habitat for migratory species, however a few individuals may occur at times.



### Specially Protected species

A single Specially Protected species potentially occurs in the Study Area:

- Peregrine Falcon (*Falco peregrinus*)

Although not recorded in the Study Area, the Peregrine Falcon potentially occurs as a breeding species or a foraging visitor. Although the Study Area provides habitat for this species, its population is large and secure.

### Priority species

Six Priority species potentially occur in the Study Area, of which three have been recorded on the current or previous surveys:

- Black-striped Ctenotus (*Ctenotus nigrilineatus*) – Priority 1
- Gane's Blind Snake (*Anilius ganei*) – Priority 1
- Long-tailed Dunnart (*Sminthopsis longicaudata*) - Priority 4 – **Recorded**
- Spectacled Hare-wallaby (*Lagorchestes conspicillatus*) – Priority 4 - **Recorded**
- Lakeland Downs Mouse (*Leggadina lakedownensis*) – Priority 4
- Western Pebble-mound Mouse (*Pseudomys chapmani*) - Priority 4 – **Recorded**

The Black-striped Ctenotus and Gane's Blind Snake are data deficient and known from only a few locations. They have not been recorded in the Study Area, but the habitats present therein may support these species.

The Long-tailed Dunnart was recorded in 2009 and is likely to be restricted to rocky habitats. The Western Pebble-mound Mouse is likely to be common and widespread within its habitat of Spinifex Stony Plains. The Spectacled Hare-wallaby was recorded in 2018 and is likely to occur in low densities on the Spinifex Stony Plain, favouring long-unburnt areas. Although unrecorded thus far, the Lakeland Downs Mouse may occur, as the Study Area is within its range and potentially suitable habitats are present.



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## 1. Introduction

The Wodgina Lithium Project is owned by the MARBL Lithium Joint Venture (MARBL JV) and operated through the managing entity MARBL Lithium Operations Pty Ltd (MARBL). The Wodgina mining area has been the location for various mining operations over the past several decades; therefore, fauna assessments of differing scopes have been undertaken over the years to support environmental assessment and mining approvals.

Lack of a contemporary Level 2 vertebrate fauna survey was identified as a gap in the fauna survey coverage of the Study Area. To fill this gap, Western Wildlife was commissioned to carry out an additional two-phase Level 2 fauna survey, and to extend the fauna habitat mapping into an Additional Study Area to the south.

The purpose of the fauna survey was to gather baseline fauna data to inform environmental impact assessment as part of Project approvals. The key objectives of the fauna survey were to:

- Collate existing fauna data and collect contemporary trapping data for the Study Area.
- Extend the fauna habitat mapping to cover the Additional Study Area.
- List the vertebrate fauna that were recorded in and/or have the potential to occur in the Study Area.
- Identify species of conservation significance, or habitats of particular importance for fauna, that may occur.

This report includes the findings of the two-phase baseline vertebrate fauna survey, conducted in April and October 2019.

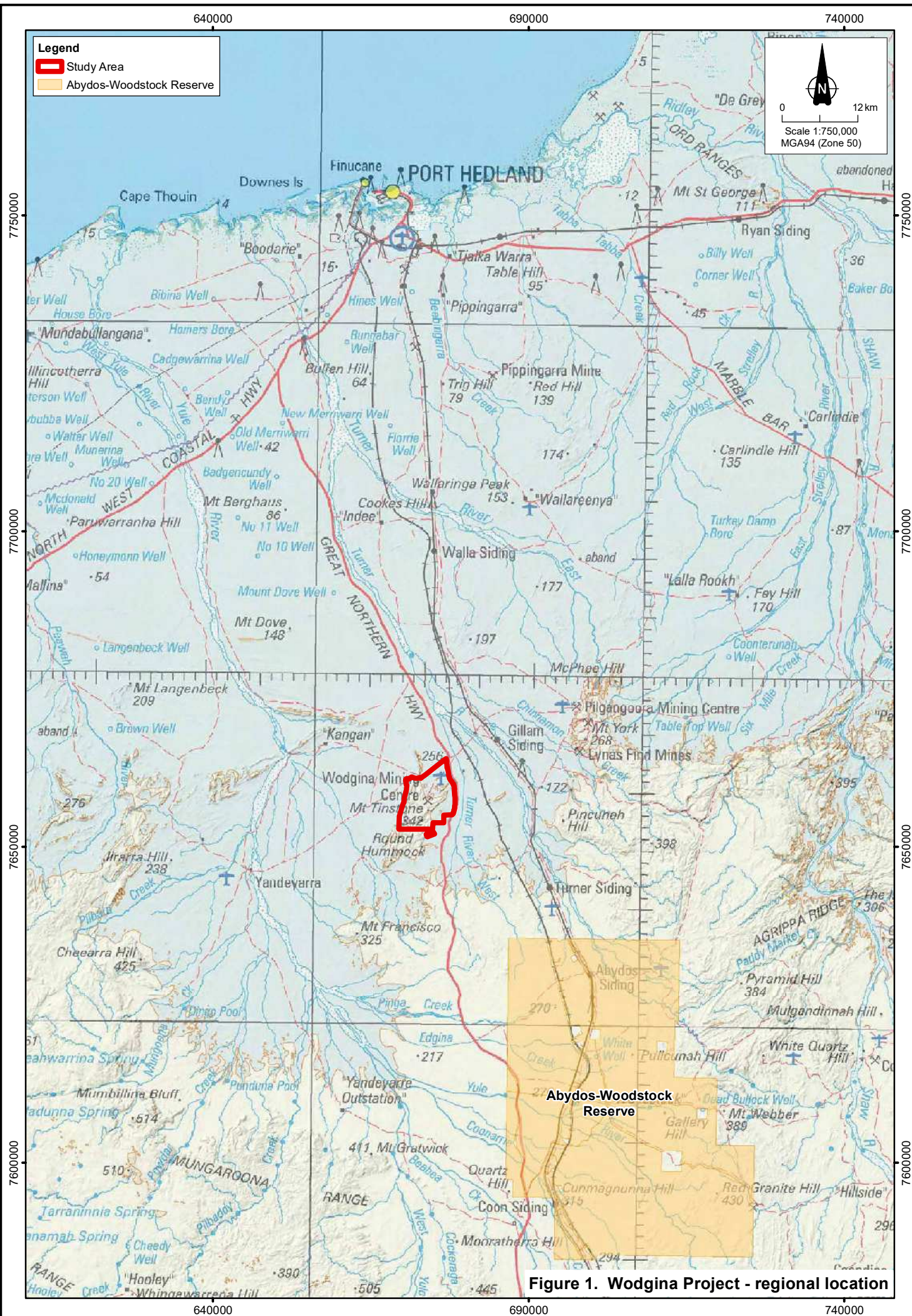
### 1.1 Regional Context

The Wodgina Project is located 95 km south of Port Hedland in the Pilbara region of Western Australia (Figure 1).

The Interim Biogeographic Regionalisation for Australia (IBRA) classifies Australia's landscapes into 89 Bioregions based on common climate, geology, landform, native vegetation and species information. These Bioregions are further subdivided into 419 subregions.

The Project is situated in the Chichester subregion of the Pilbara Bioregion (DEWHA 2004), which is comprised of undulating plains of Achaean granite and basalt, with basalt ranges (Kendrick and McKenzie 2001). The plains support open shrublands of *Acacia* over spinifex hummock grasslands, and the ranges support an open tree-steppe of *Eucalyptus leucophloia* over spinifex hummock grasslands.







The climate is semi-desert tropical, receiving about 300mm of rain per year (Kendrick and McKenzie 2001). The dominant land-uses are grazing on native pastures, Aboriginal lands and reserves, Unallocated Crown Land and Crown Reserves, Conservation and Mining (Kendrick and McKenzie 2001).

## 1.2 Study Area

### 1.2.1 Current Study Area

The Study Area and Additional Study Area for this survey are shown in Figure 2. The operational mining area is situated within the Study Area and was not surveyed. The aim of the current survey was to collate existing fauna data and collect contemporary fauna data in order to describe the terrestrial vertebrate faunal assemblage of the Study Area as a whole. As such, the current survey was focused on the eastern part of the Study Area. The Study Area was extended as part of the October 2019 survey, primarily to increase the extent of the fauna habitat mapping (Additional Study Area).

### 1.2.2 Extent of Previous Surveys Across the Study Area

Three Level 2 (trapping) fauna surveys have been undertaken across differing extents within the Study Area:

- Wodgina DSO Project in 2009 (Outback Ecology 2009),
- Wodgina Hercules DSO Project in 2011 (Outback Ecology 2012)
- Turner River Hub Project in 2010 (Outback Ecology 2010).

The extent of each of these fauna surveys and the location of the trapping sites is shown in Figure 3.

The Turner River Hub study area was very large, and none of the trapping sites were within the current Study Area. However, the results of the remaining two fauna surveys provide data collected within the Study Area, covering much of the western part of the Study Area. These surveys focused mainly on the rocky upland habitats.

Level 1 and targeted fauna surveys for the Northern Quoll (*Dasyurus hallucatus*), Pilbara Leaf-nosed Bat (*Rhinonictis aurantia*) and Ghost Bat (*Macroderma gigas*) were undertaken by Stantec (2018a, 2018b) and 360 Environmental (2018). These surveys cover much of the eastern part of the Study Area (Figure 4), and include searches for potential bat roosting caves.



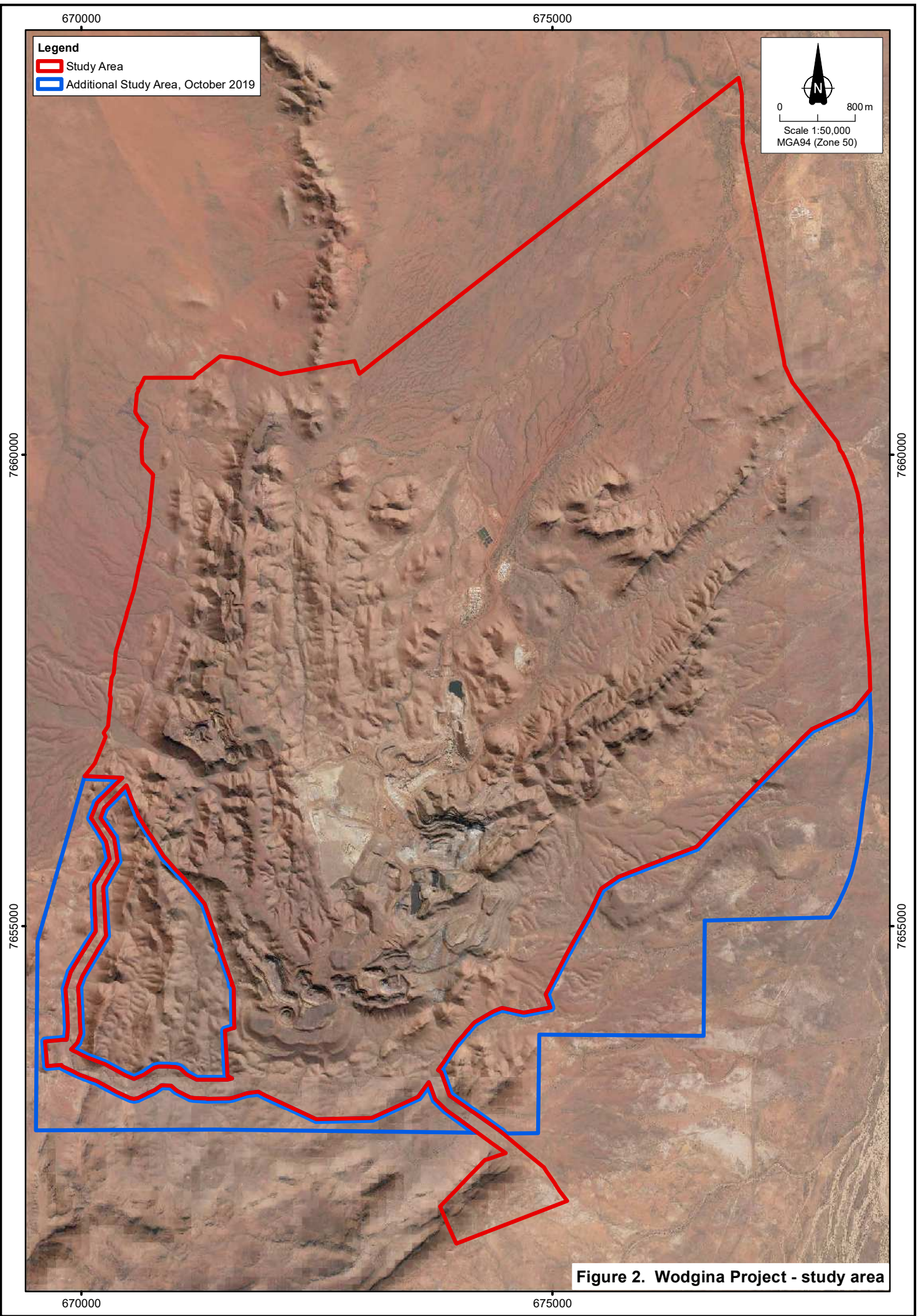
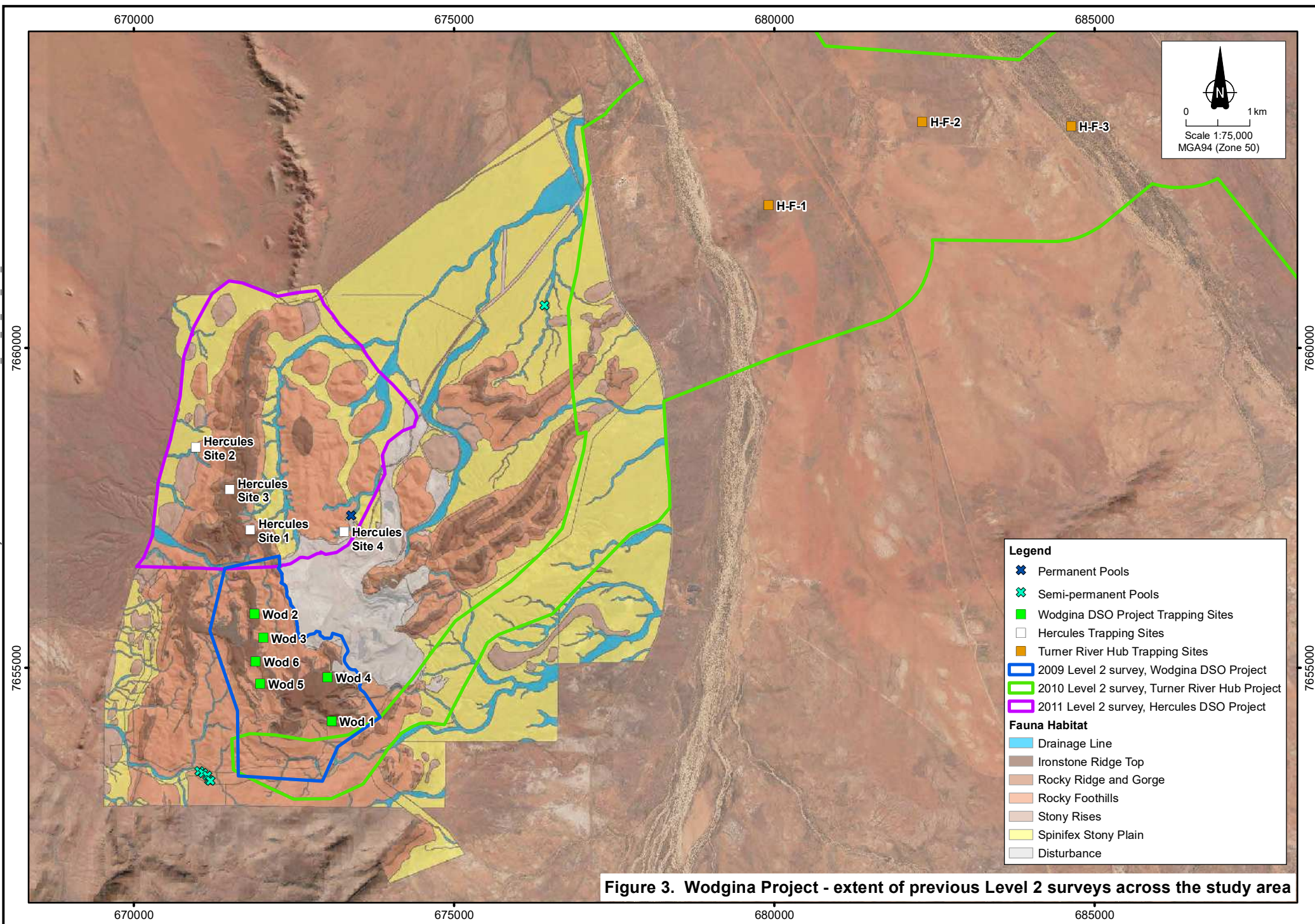


Figure 2. Wodgina Project - study area







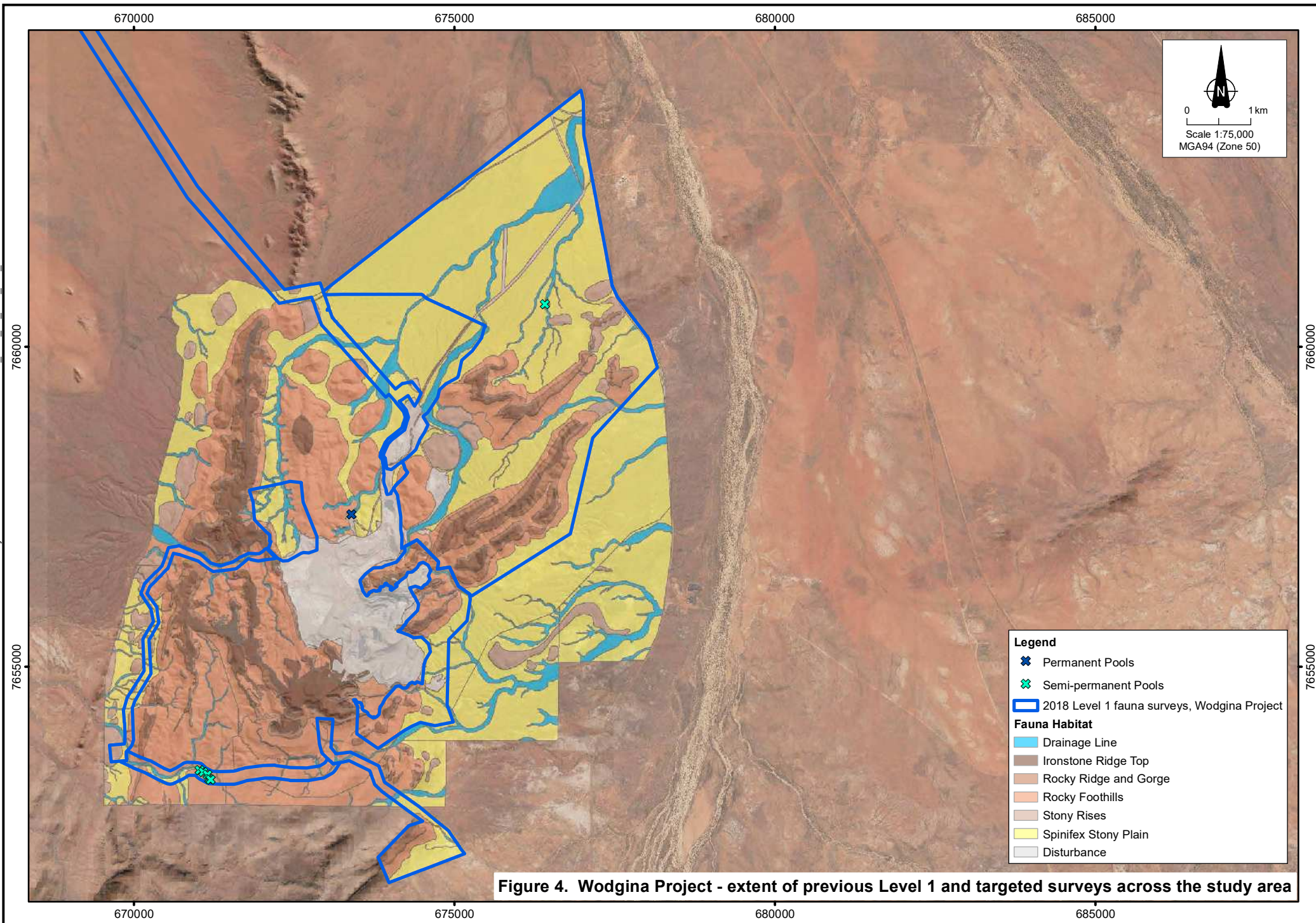


Figure 4. Wodgina Project - extent of previous Level 1 and targeted surveys across the study area



### 1.3 Climate and Weather

The nearest weather station is Marble Bar (site number 004106), about 113 km east of the Study Area. The mean monthly maximum and minimum temperatures and rainfall for this weather station is presented in Figure 5. The data indicate that the highest rainfall and temperatures occur in the summer months, though some rain falls throughout the year.

The average annual rainfall for Marble Bar between 2000 and 2019 is 379.3mm (Bureau of Meteorology 2019). However, annual rainfall was higher than average in 2017 (541.6mm) and 2018 (418.2mm). Weather during both surveys was characterised by warm nights, warm to hot days and high humidity.

Prior to the April 2019 field survey, significant rainfall (about 600mm) fell in the area due to Cyclone Veronica, however, conditions were relatively dry prior to the October survey. The daily temperatures and rainfall prior to and during the field surveys (as recorded at Marble Bar), are presented in Appendix 1.

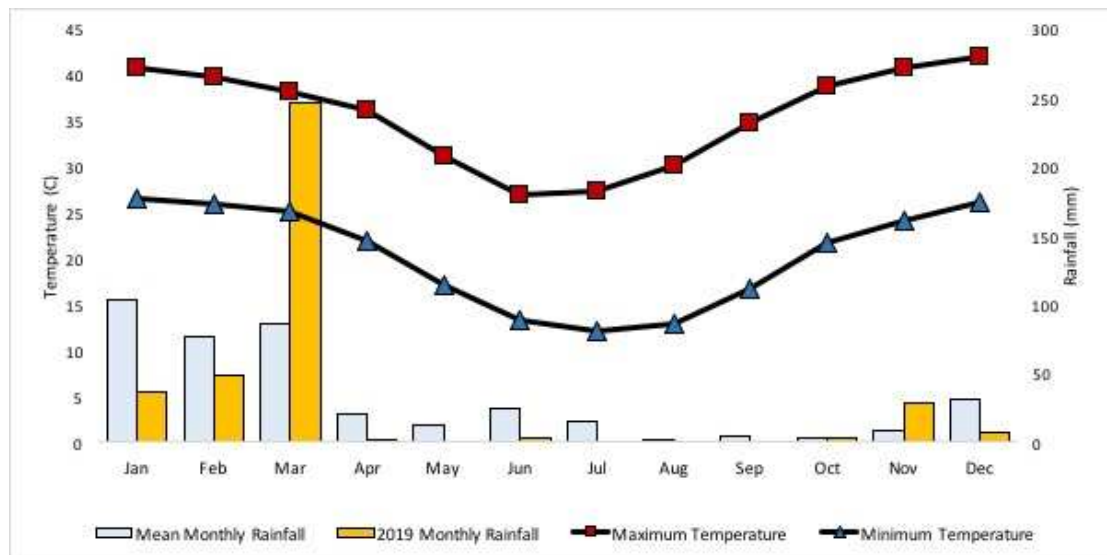


Figure 5. Monthly Climate Statistics for Marble Bar (Bureau of Meteorology 2019).



## 2. Methods

### 2.1 Overview

A two-phase Level 2 vertebrate fauna survey was conducted across the eastern portion of the Study Area in April and October 2019. Targeted surveys for Northern Quoll (*Dasyurus hallucatus*) and the Night Parrot (*Pezoporus occidentalis*) were undertaken where there was habitat that potentially supported each species.

As several fauna surveys have been undertaken across the Study Area between 2009 - 2018 (Biologic 2018a and 2018b, Outback Ecology 2009 and 2012, Stantec 2017, 2018a and 2018b, 360 Environmental 2018a and 2018b), the aim of the current survey was to fill any gaps in coverage, gather contemporary data and collate existing data for the Study Area, rather than replicate past survey effort.

The Additional Study Area was added in October 2019, primarily to allow for increasing the extent of the fauna habitat mapping. Note that although some data were collected in the Additional Study Area, the area includes rocky ridges that have not been searched for potential bat roosting habitat.

The methods are further described in the sections below.

### 2.2 Guidance Documents

The fauna survey was conducted with reference to the following documents:

- Environmental factor guideline: terrestrial fauna (EPA 2016b)
- Technical guidance: terrestrial fauna surveys (EPA 2016c)
- Technical guide: terrestrial vertebrate fauna surveys for environmental impact assessment (EPA and DEC 2010)
- Interim guideline for preliminary surveys of night parrot (*Pezoporus occidentalis*) in Western Australia (DPAW 2017)
- Survey Guidelines for Australia's Threatened Mammals (DSEWPac 2011a)
- Survey Guidelines for Australia's Threatened Birds (DEWHA 2010)
- Survey Guidelines for Australia's Threatened Reptiles (DSEWPac 2011b)

### 2.3 Personnel

Four zoologists undertook each phase of the fieldwork in April and October 2019, with bat call analysis provided by Dr Kyle Armstrong of Specialised Zoological. Details of the survey team and their experience are shown in Table 1. This report was prepared by Ms Jenny Wilcox.



**Table 1. Fauna Survey Personnel.**

Name	Role	Qualification	Experience	Survey
Jenny Wilcox	Supervising Vertebrate Zoologist (plan and lead fieldwork, analyse data, prepare report)	BSc.Biol/Env.Sci., Hons.	20 years	April & October
Mike Brown	Vertebrate zoologist (fieldwork, SM4 passive acoustic detector analysis)	BSc.Env.Sci.	13 years	April
Cameron Everard	Vertebrate zoologist (fieldwork)	BSc.Env.Sci.	13 years	April
Brenden Metcalf	Vertebrate zoologist (fieldwork)	BSc.Biol., Hons.	20 years	April & October
Amy Griffiths	Vertebrate zoologist (fieldwork)	BSc.Biol., Hons.	9 years	October
Tim Gamblin	Vertebrate zoologist (fieldwork)	BSc.Env.Sci.	12 years	October
Kyle Armstrong	Bat call analysis	PhD. Zool.	21 years	April & October

## 2.4 Taxonomy and Nomenclature

Taxonomy and nomenclature for fauna species used in this report follow the Western Australian Museum checklists, updated April 2019. In the text, common names are used where appropriate, and all scientific names are given in species lists. Where a species lacks a common name, they are referred to by their scientific name.

Surveys have been undertaken across the Study Area over several years, and there have been taxonomic changes within this time, mainly where a single species has been split into several species. Effort has been made to assign older records to their current names, where possible.

## 2.5 Literature Review

A comprehensive literature review was undertaken by Stantec (2018b), including a review of other fauna surveys in the region such as those at Mt Dove (34km northwest of the Study Area), Abydos DSO Project (45km east of the Study Area) and North Star (38km east of the Study Area). The review by Stantec (2018b) was undertaken in the context of both the Study Area and an 80km gas pipeline extending to the north of the Study Area. The details of this review are not reproduced here, and may be found in Stantec (2018b).

The review for the current survey focused on the Study Area only. As such, the results of the following surveys undertaken between 2009 and 2018 have been collated:

- 360 Environmental. (2018a). Flora, Vegetation and Fauna Assessment Wodgina Mine and Proposed Airstrip. Unpublished report prepared for Mineral Resources Limited.
- 360 Environmental. (2018b). Wodgina Mine and Additional Gas Pipeline: Flora, Vegetation, Fauna and Northern Quoll Assessment. Unpublished report prepared for Mineral Resources Limited.



- Biologic (2018a). *Wodgina DSO Project: Northern Quoll Monitoring Survey*. Unpublished report to Atlas Iron Limited.
- Biologic (2018b). *Wodgina DSO Project: Pilbara Leaf-nosed Bat and Ghost Bat Monitoring Survey*. Unpublished report to Atlas Iron Limited.
- Outback Ecology (2009). *Wodgina DSO Project: Terrestrial Vertebrate Fauna Assessment*. Unpublished report prepared for Atlas Iron Limited.
- Outback Ecology (2012). *Hercules Project: Terrestrial Vertebrate Fauna Baseline Survey*. Unpublished report prepared for Atlas Iron Limited.
- Stantec (2017). *Northern Quoll Monitoring Survey 2017*. Unpublished report prepared for Atlas Iron Limited.
- Stantec (2018a). *Results of the Wodgina Supplementary Bat Survey*. Unpublished memo to Mineral Resources Limited, November 2018.
- Stantec (2018b). *Wodgina Project: Level 1 fauna Survey, targeted conservation significant fauna survey and desktop assessment*. Unpublished report prepared for Mineral Resources Limited, September 2018.

The databases listed in Table 2 were searched for fauna records in and around the Study Area. In all cases the extent of the database search was larger than the extent of the Study Area in order to pick up records of species in the wider area that may also occur in the Study Area.

**Table 2. Databases used in the preparation of Appendices 5 - 8.**

Database	Type of records held	Area searched
NatureMap (DBCA 2007-)  Note that the NatureMap database collates records from several other databases.	<ul style="list-style-type: none"> <li>• WA Museum Specimen Databases for reptiles frogs, birds and mammals - records of specimens held in the Western Australian Museum. Includes historical records.</li> <li>• Fauna Survey Returns Database - records collected from fauna surveys carried out in Western Australia. Includes observational and trapping data.</li> <li>• Birds Australia Atlas Database - Records of bird observations in Australia, 1998-2009.</li> <li>• Birddata - records of bird observations in Australia, 2010-current.</li> </ul>	40km radius around a point in the center of the Study Area (118° 40' 48" E, 21° 10' 23" S). Extract obtained April 2019.
DBCA's Threatened and Priority Fauna Database (DBCA 2018)	Information and records on Threatened and Priority species in Western Australia.	15km buffer around the study area (search performed by 360 Environmental 2018)
EPBC Act Protected Matters Search Tool	Information and modelled distributions for matters protected under the EPBC Act, including threatened species and ecological communities, migratory species and marine species.	10km radius around a point in the center of the Study Area (118° 40' 48" E, 21° 10' 23" S). Extract obtained April 2019.



Where possible, coastal species, vagrants and species that favour habitats absent from the Study Area (e.g. sandplains) have been excluded from the list, unless further discussion is warranted. The lists of fauna expected to occur in the Study Area were reviewed against a number of sources, including publications that provide information on general patterns of distribution of frogs (Tyler *et al.* 2000), reptiles (Wilson and Swan 2017, Storr *et al.* 1983, 1990, 1999 and 2002), birds (Barrett *et al.* 2003; Johnstone and Storr 1998 and 2004) and mammals (Churchill 2008, Menkhorst and Knight 2011; Van Dyck and Strahan 2008).

## **2.6 Field Survey**

### **2.6.1 Licensing**

All fauna works in 2019 were carried out under Regulation 27 Fauna Taking (Biological Assessment) License BA2700041 issued by the Department of Biodiversity, Conservation and Attractions (DBCA). Trapping for Northern Quolls were undertaken under a Section 40 Authorisation to Take or Disturb Threatened Species.

### **2.6.2 Timing**

The fauna survey was undertaken in two phases:

- 8 – 19 April 2019
- 16 – 26 October 2019

This is during the recommended September – April survey period for reptiles in the Eremaean region, and the April survey followed a period of very heavy rainfall, providing ideal timing for birds and mammals (EPA and DEC 2010).

### **2.6.3 Trapping for Terrestrial Fauna**

Trapping for terrestrial fauna (frogs, reptiles and small mammals) was undertaken using a combination of pitfall traps, Elliot traps, funnel traps and cage traps. In previous surveys, trapping was undertaken at 10 sites in the Study Area, six in 2009 as part of the Wodgina DSO Project (Outback Ecology 2009), and four in 2011 as part of the Hercules Project (Outback Ecology 2012) (Figures 3 and 4). These surveys generally covered the eastern part of the Study Area.

Rather than duplicate this work, the placement of trapping sites in the current survey aimed to increase the geographic spread of the survey and sample habitats that were not previously trapped. The ironstone ridgetop and rocky ridge and gorge habitats were not trapped in 2019. The ironstone ridgetop was surveyed extensively in the previous trapping surveys, with half of the ten sites representing this habitat. The rocky ridge and gorge habitat is difficult to survey with standard methods, and was instead targeted with camera traps and large Elliott traps (described further in the following sections).



Six trapping sites were installed in 2019, each trapping site consisting of ten pitfall traps (six buckets and four PVC pipes), ten funnel traps, 20 Elliott traps and two cage traps open for seven nights (Figure 6, Table 3). The number and types of traps were chosen to sample the likely faunal assemblage while allowing for timely checking of traps to preserve animal welfare. Each pitfall trap was placed on a 7m flywire drift fence. Each bucket pitfall trap was a 40cm deep, white 20L bucket and each PVC pipe was a 60cm deep, 150mm diameter pipe. A piece of egg carton was used as shelter for any fauna in the trap. A funnel traps was set along each pitfall trap drift fence, with the fence bisecting the funnel entrances. Funnel traps were shaded with a shade-cloth cover (Plate 1).



**Plate 1. Examples of trap line set-up at WL Site 01 (left) and WL Site 06 (right).**

Elliott traps were placed in a separate transect with the cage traps at either end. All cage and Elliott traps were placed under vegetation to shade any captured animals and cage traps were covered with a hessian sack. All Elliott and cage traps were baited with a mixture of rolled oats, sardines, peanut butter and vanilla essence.

The number of trap-nights for each trap type are given in Table 4, for both the previous and current survey, and photographs of each site surveyed in 2019 are given in Plates 2 - 7. All animals caught were identified and recorded, and generally released immediately at the site of capture.



**Table 3. Trapping site locations 2009 - 2019.**

Survey	Site	Dates open	Location (WGS84, Zone 50)	Habitat
April/May 2009  Wodgina DSO Project; Outback Ecology 2009)	Site 1	21/4/2009 – 28/4/2009	673089 E 7654166 N	Rocky Ridge and Gorge (Ironstone Ridge in Outback Ecology 2009)
	Site 2	22/4/2009 – 29/4/2009	671886 E 7655840 N	Ironstone Ridge Top (Hill crest in Outback Ecology 2009)
	Site 3	24/4/2009 – 1/5/2009	672023 E 7655465 N	Rocky Foothills (Scree slope in Outback Ecology 2009)
	Site 4	25/4/2009 – 2/5/2009	673027 E 7654849 N	Ironstone Ridge Top (minor drainage line in Outback Ecology 2009)
	Site 5	26/4/2009 – 3/5/2009	671973 E 7654752 N	Rocky Foothills (Gully in Outback Ecology 2009)
	Site 6	26/4/2009 – 3/5/2009	671905 E 7655097 N	Ironstone Ridge Top (Open mixed shrubland in Outback Ecology 2009)
March 2011  (Hercules Project; Outback Ecology 2012)	Site 1	Seven nights between 17 – 27/3/2011	671823 E 7657152 N	Ironstone Ridge Top (Rocky Ridge in Outback Ecology 2012)
	Site 2	Seven nights between 17 – 27/3/2011	670970 E 7658443 N	Spinifex Stony Plain (Stony Plain in Outback Ecology 2012)
	Site 3	Seven nights between 17 – 27/3/2011	671498 E 7657783 N	Ironstone Ridge Top (Rocky Ridge in Outback Ecology 2012)
	Site 4	Seven nights between 17 – 27/3/2011	673285 E 7657123 N	Drainage Line
April 2019  (this survey)	WL Site 01	9/4/2019 – 16/4/2019 & 19/10/2019 – 26/10/2019	675087 E 7662336 N	Drainage Line
	WL Site 02	9/4/2019 – 16/4/2019 & 19/10/2019 – 26/10/2019	675676 E 7661767 N	Stony Rise
	WL Site 03	12/4/2019 – 19/4/2019 & 19/10/2019 – 26/10/2019	678203 E 7657191 N	Spinifex Stony Plain
	WL Site 04	10/4/2019 – 17/4/2019 & 19/10/2019 – 26/10/2019	675818 E 7656131 N	Spinifex Stony Plain
	WL Site 05	11/4/2019 – 18/4/2019 & 19/10/2019 – 26/10/2019	675054 E 7658445 N	Rocky Foothills
	WP Site 06	12/4/2019 – 19/4/2019 & 19/10/2019 – 26/10/2019	678203 E 7657191 N	Drainage Line



**Table 4. Survey effort at each trap site.**

Survey	Site	Number of trap-nights				
		Bucket Pitfalls	PVC Pipe Pitfalls	Funnel traps	Elliot traps	Cage traps
April/May 2009  Wodgina DSO Project; Outback Ecology 2009)	Wod 01	35	35	140	140	14
	Wod 02	35	35	140	140	14
	Wod 03	35	35	140	140	14
	Wod 04	35	35	140	140	14
	Wod 05	35	35	140	140	14
	Wod 06	35	35	140	140	14
	<b>Subtotal:</b>	<b>210</b>	<b>210</b>	<b>840</b>	<b>840</b>	<b>84</b>
March 2011  (Hercules Project; Outback Ecology 2012)	Site 01	35	35	140	140	14
	Site 02	35	35	140	140	14
	Site 03	35	35	140	140	14
	Site 04	35	35	140	140	14
	<b>Subtotal:</b>	<b>140</b>	<b>140</b>	<b>560</b>	<b>560</b>	<b>56</b>
April 2019  (this survey)	WL Site 01	84	48	140	280	28
	WL Site 02	84	48	140	280	28
	WL Site 03	84	48	140	280	28
	WL Site 04	84	48	140	280	28
	WL Site 05	84	48	140	280	28
	WL Site 06	84	48	140	280	28
	<b>Subtotal:</b>	<b>504</b>	<b>288</b>	<b>840</b>	<b>1,680</b>	<b>168</b>
<b>Total:</b>		<b>854</b>	<b>368</b>	<b>2,240</b>	<b>3,080</b>	<b>308</b>

#### 2.6.4 Trapping for Northern Quoll

In April 2019, two sites (Quoll 1 and Quoll 2) were established to target Northern Quoll, with the aim of detecting females (if present) and determining the population size (Figure 7). Each site consisted of a transect of 20 large Elliot traps, baited with a mixture of rolled oats, peanut butter and sardines, liberally marinated in fish oil (burley oil). Traps were placed in shaded locations, such as rock crevices, small caves or under large spinifex hummocks. All traps were open for seven nights 13 – 19 April 2009.

Any Northern Quoll captured were weighed, sexed and marked to allow identification of recaptures.

Also shown in Figure 7 are the locations of the Northern Quoll monitoring sites established as part of the Wodgina DSO Project. These sites were sampled annually 2010 – 2018, each site consisting of 20 large Elliott or cage traps open for seven nights (Biologic 2018a).



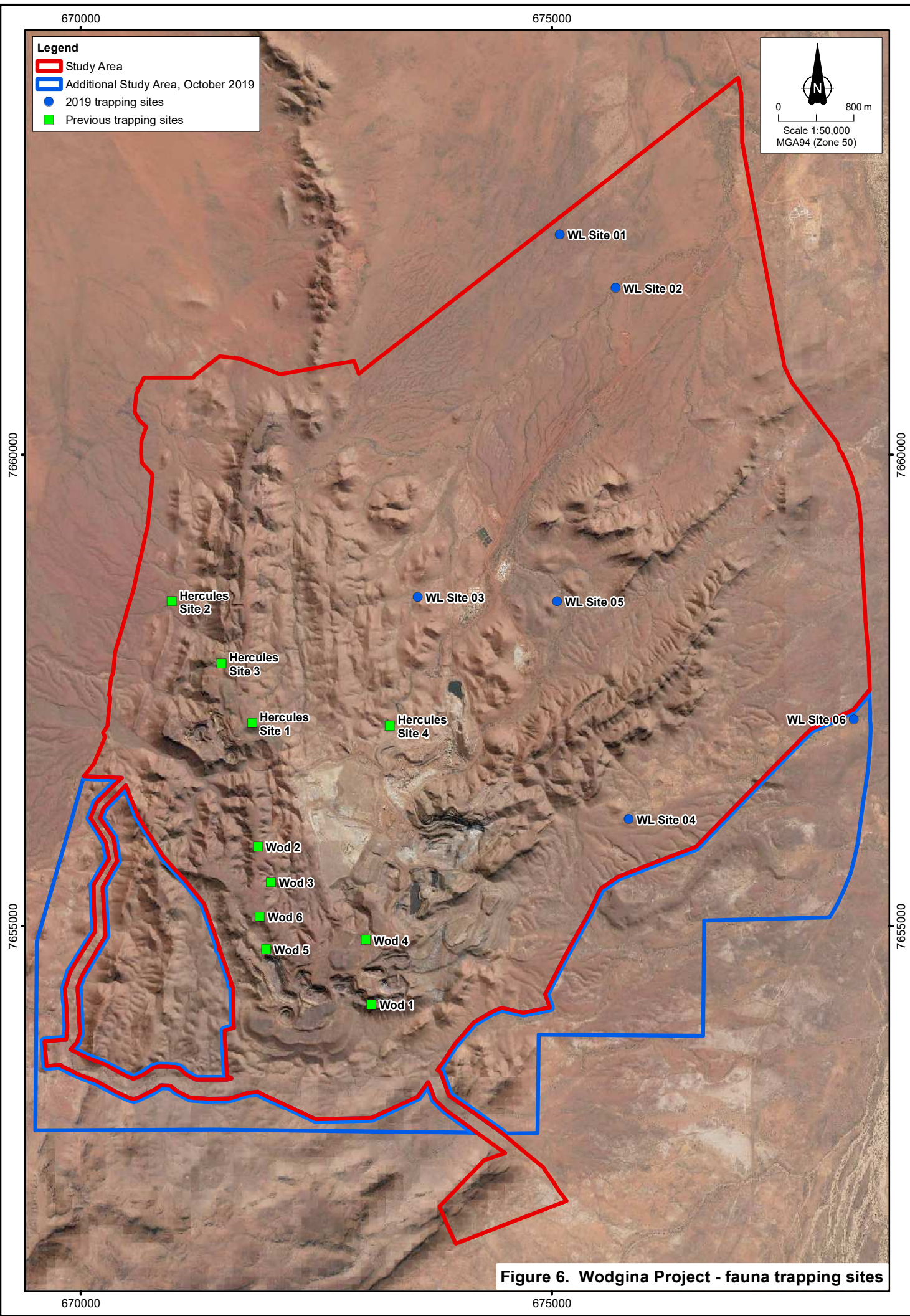


Figure 6. Wodgina Project - fauna trapping sites





**Plate 2. WL Site 01.**



**Plate 3. WL Site 02.**



**Plate 4. WL Site 03.**





**Plate 5. WL Site 04.**

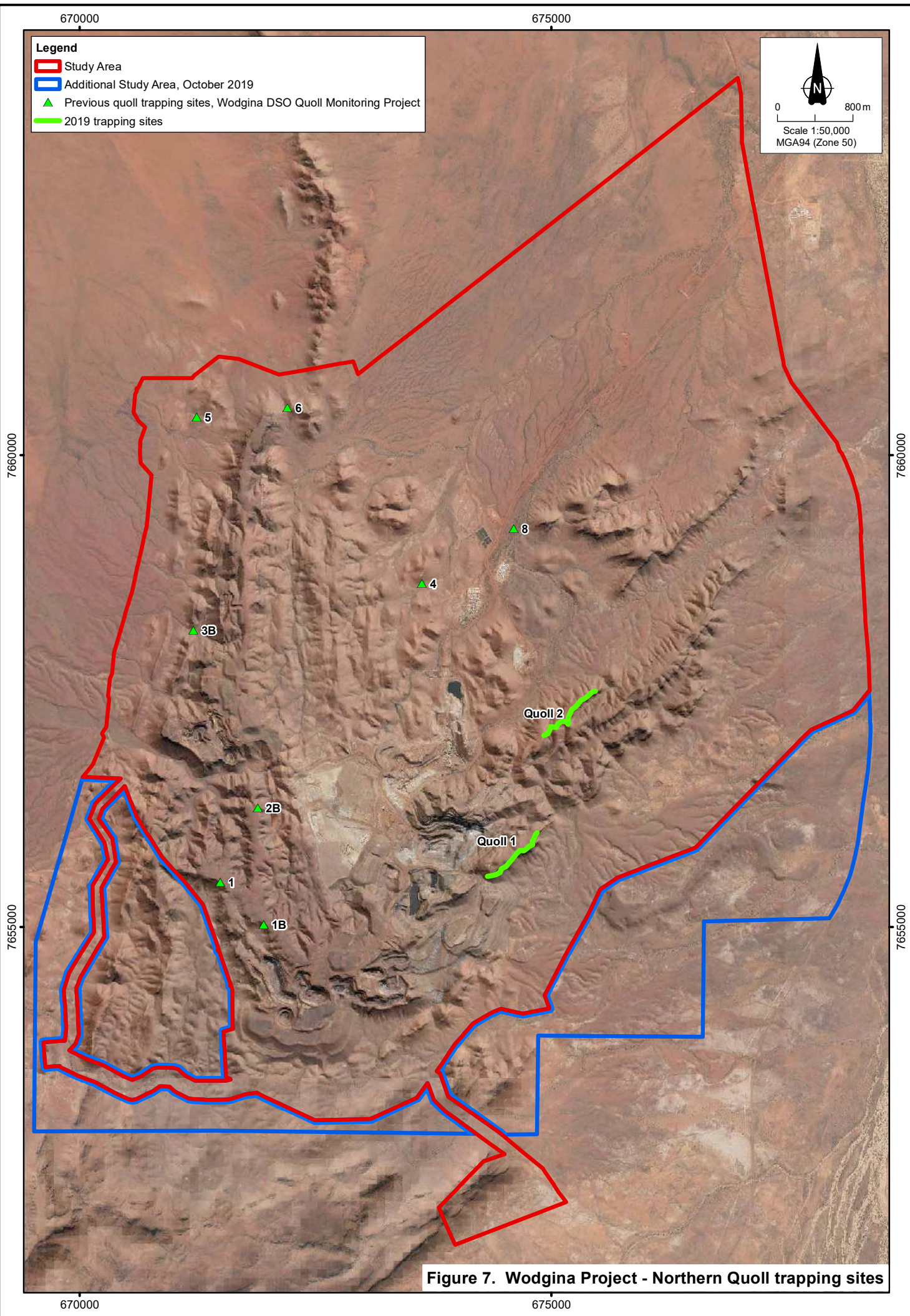


**Plate 6. WL Site 05.**



**Plate 7. WL Site 06.**







### 2.6.5 Bird Surveys

Bird surveys were undertaken at each trapping site to give a total of six 20 minute surveys at each site on each of the April and October surveys, resulting in 24 hours of survey across the two phases of survey. Surveys were unbounded, but within 300m of the trapping site. Surveys at trapping sites were undertaken concurrently with morning trap checks, between sunrise and approximately 10am. Birds were recorded if seen or heard. Birds were recorded as present only, and a frequency of occurrence calculated for each site. Birds were also recorded opportunistically.

### 2.6.6 Bat Survey

Bat calls were recorded using two Anabat Swift call detectors set to record between dusk and dawn. Detectors were deployed overnight at each trap site and then for one to three nights at selected sites around the Survey Area, to give a total of 12 nights of recordings in April and 14 nights of recording in October 2019 (Appendix 2, Figure 8). The calls were then analysed by Kyle Armstrong of Specialised Zoological, and the bat calls identified to species level where possible. The locations of the bat detectors used in the 2018 survey by Stantec (2018b) are also shown in Figure 8.

### 2.6.7 Night Parrot Survey

In April 2019, after the cyclonic rain experienced in the region, Songmeter 4 (SM4) passive acoustic detectors were deployed in potentially suitable habitat across the target survey area (Appendix 2, Figure 8). Each SM4 was secured to a stake to hold it about 0.5m off the ground, and was set to record between dusk and dawn each night for five or six nights, giving a total of 31 recording nights across six sites. The locations of the SM4 passive acoustic detectors used in the 2018 survey by Stantec (2018b) are also shown in Figure 9. No SM4 passive acoustic detectors were deployed in October 2019, as after the April 2019 survey the habitats present were considered unlikely to be important for the species.

All of the SM4 recordings were analysed in Wildlife Acoustic's Bioacoustic Monitoring System Kaleidoscope Pro. Recordings were broken up into clusters with similar characteristics and the clusters inspected for consistency. Classifiers generated from known recordings of Night Parrots were used to analyse the data for Night Parrot calls. Random noise, vehicles, insects and other non-relevant recordings were removed and the remaining audio clusters containing bird calls further scrutinized via their sonogram and through audio playback. Night Parrot calls, if found, would be referred to the Night Parrot Recovery Team for confirmation.

### 2.6.8 Spotlighting

Spotlighting was carried out on the 16<sup>th</sup> and 17<sup>th</sup> April 2019, from 6:15pm – 8:30pm, then again on the 21<sup>st</sup> and 22<sup>nd</sup> October 2019, from 6:15pm – 9:30pm. Two teams of two personnel undertook either road-spotting using vehicle headlights, hand-searching using head-torches or a combination of the two. The routes followed are shown in Figure 10.



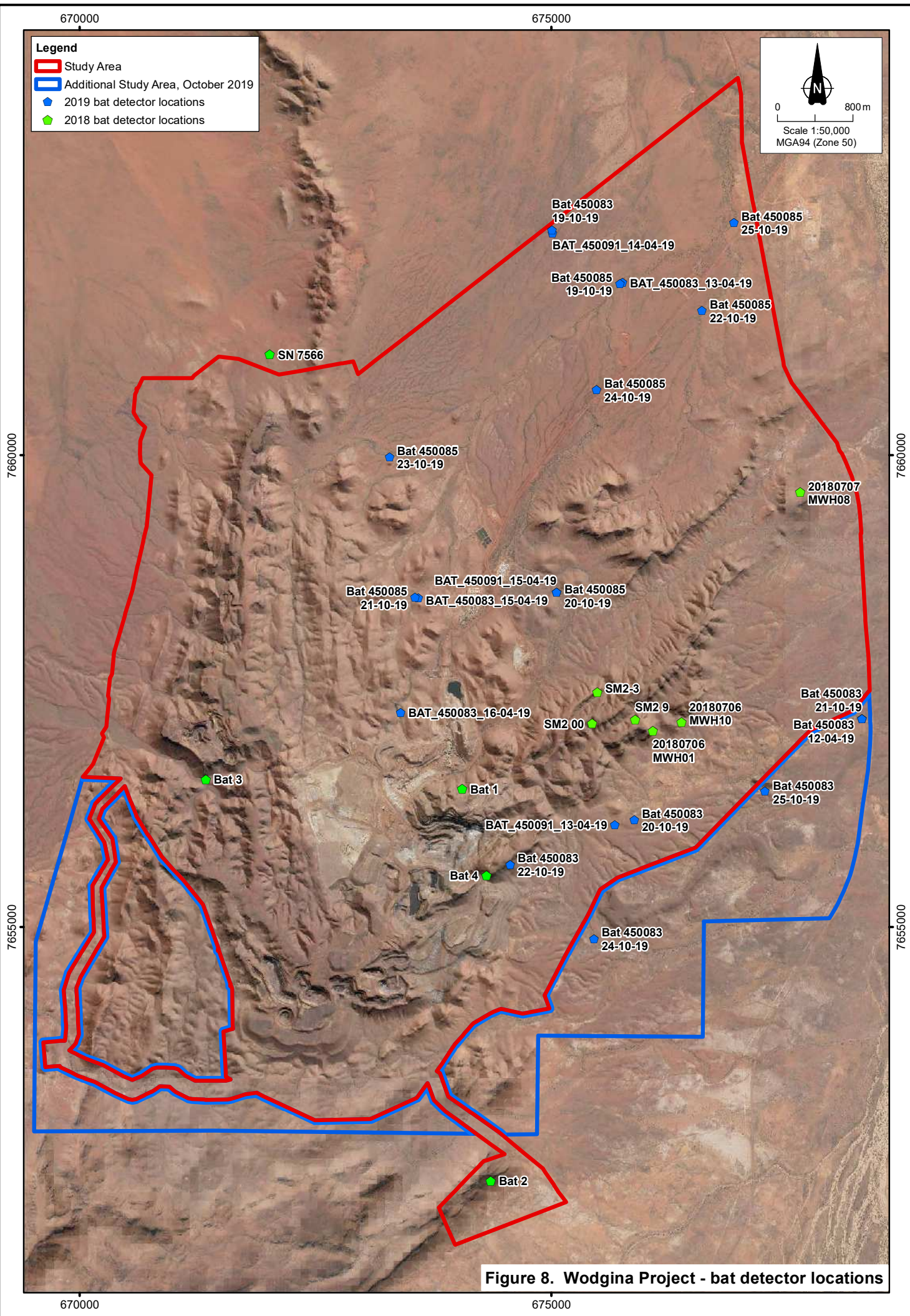
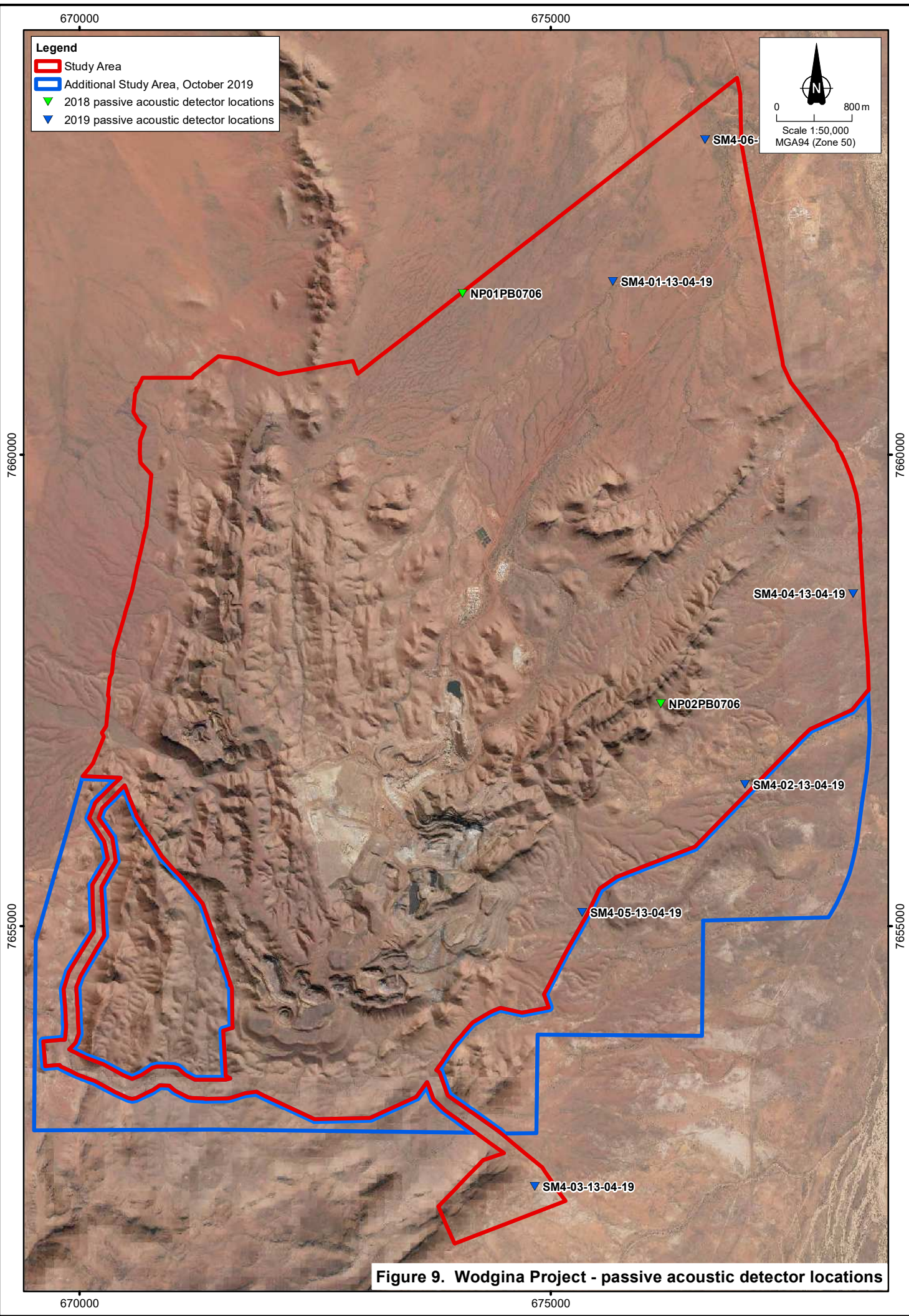


Figure 8. Wodgina Project - bat detector locations







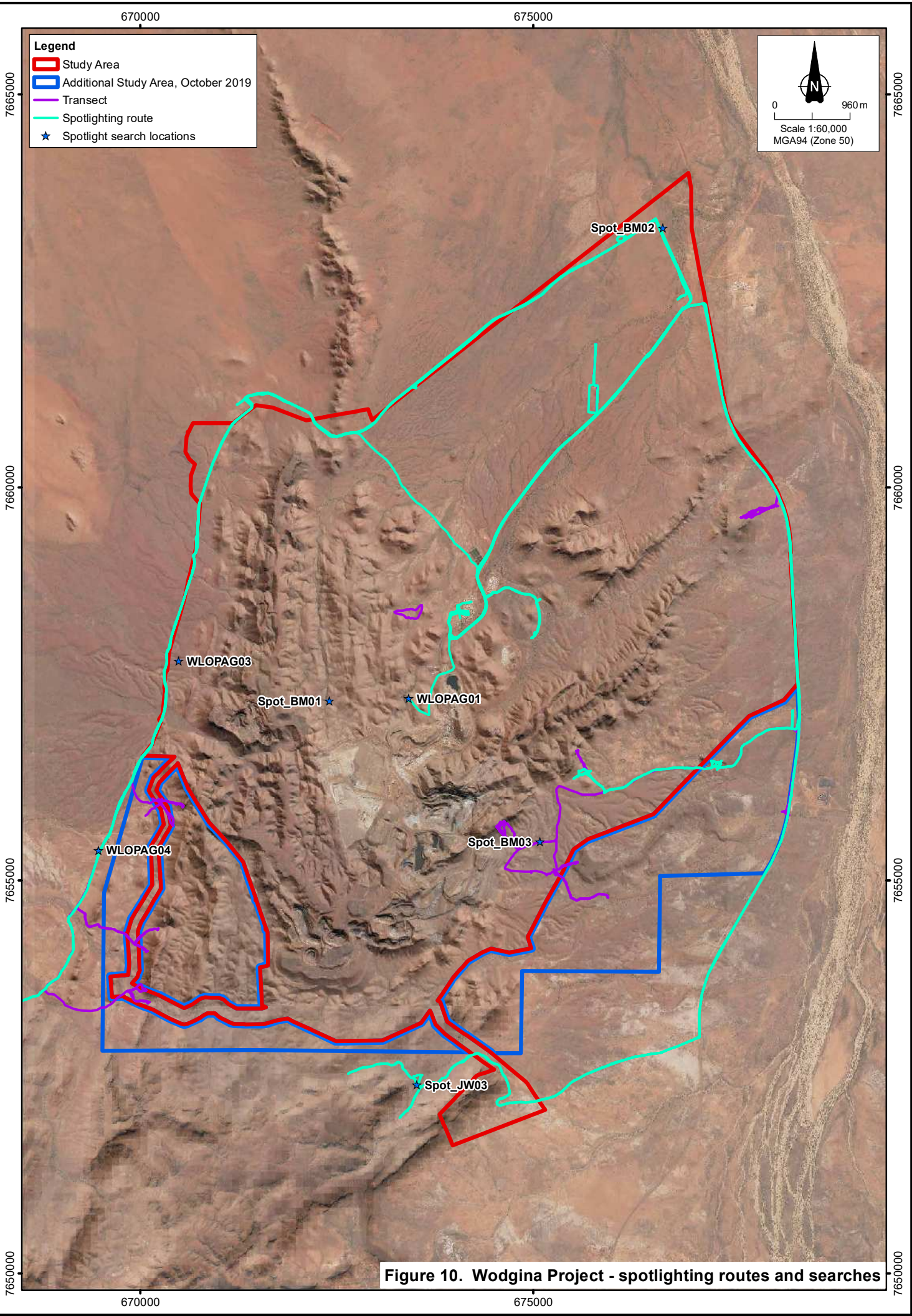


Figure 10. Wodgina Project - spotlighting routes and searches



### 2.6.9 Camera Trap Survey

Camera traps were deployed at 40 sites during the April field survey, for a total of 169 trap-nights and 42 sites during the October field survey for a total of 208 trap-nights. (Appendix 4, Figure 11). Cameras were primarily deployed to target rocky habitats that may support Northern Quolls, with some consideration given to detecting the Spectacled Hare-wallaby on plains during the October survey. Cameras were baited with a mixture of rolled oats, peanut butter and sardines, liberally splashed with fish oil (burley oil) and each individual camera was set for four or five nights. The locations of the camera traps used in the 2018 survey by Stantec (2018b) are also shown in Figure 11.

### 2.6.10 Opportunistic Records

At all times, observations of fauna were noted when they contributed to the accumulation of information on the fauna of the site. These included casual observations of reptiles, mammals and birds seen while travelling between sites or while undertaking other activities, such as targeted searches. Opportunistic observations were recorded to a general location for common species, and conservation significant species were recorded with a GPS location. Opportunistic walks and drives were undertaken in some areas in order to gather further records (Figure 10).

## 2.7 Habitat Mapping

This report uses the standardized habitat names and mapping as produced by Stantec (2018b). Further habitat mapping was undertaken for the Additional Study Area in October 2019. The fauna habitats were identified using interpretation of aerial photography and field observations.

## 2.8 Assessment of Conservation Significance

### 2.8.1 Legislative Protection for Fauna

*The Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Commonwealth Government's primary piece of environmental legislation. Listed under Part 3 of the EPBC Act are 'Matters of National Environmental Significance' (MNES); these include threatened species, threatened ecological communities and migratory species. Threatened fauna species are assessed against categories based on International Union for Conservation of Nature (IUCN) criteria.

The migratory species listed under the EPBC Act are those recognised under international agreements. These agreements are the China-Australia Migratory Bird Agreement (CAMBA), the Japan-Australia Migratory Bird Agreement (JAMBA), the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA), or species listed under the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) for which Australia is a range state.



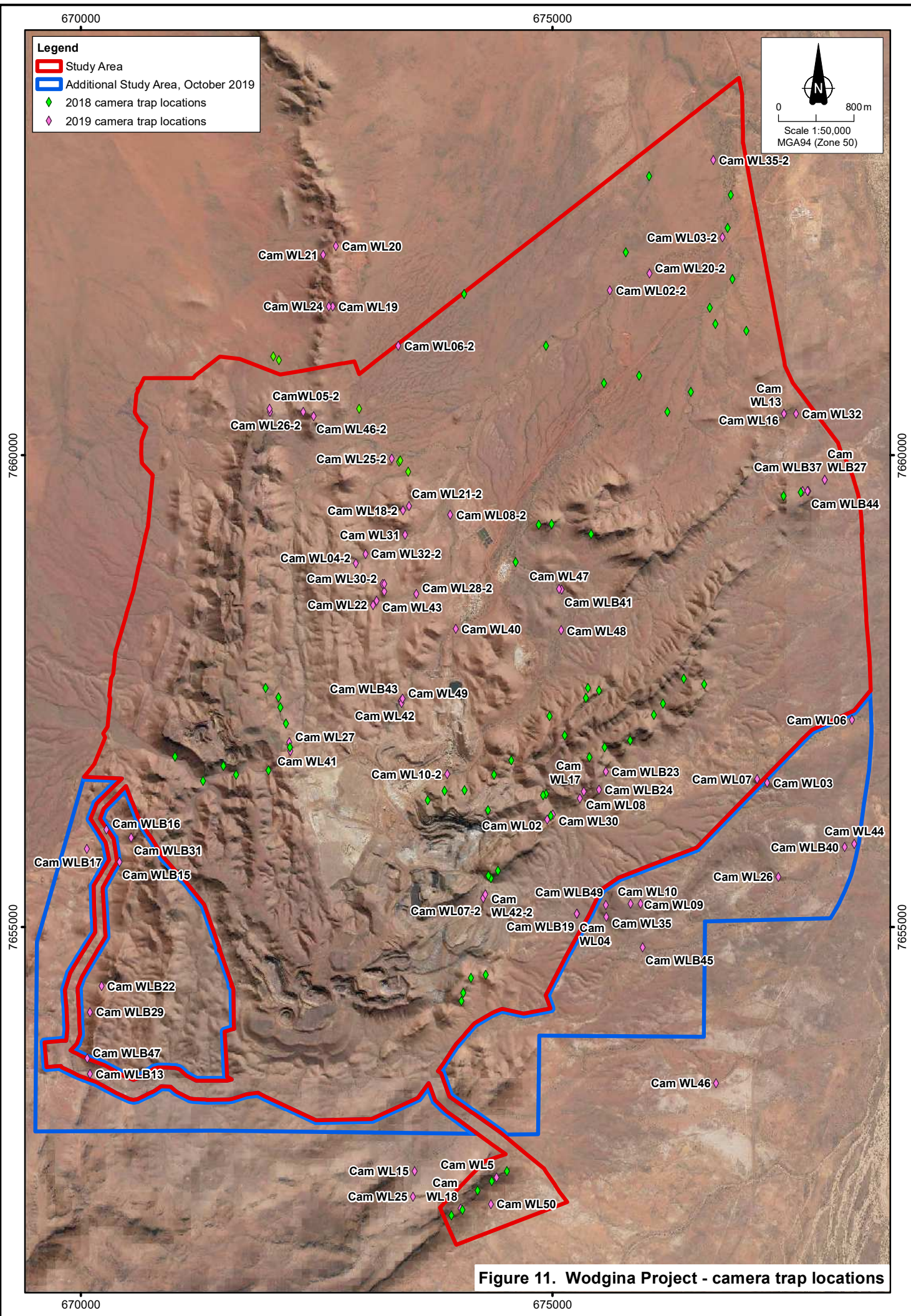


Figure 11. Wodgina Project - camera trap locations



Matters of National Environmental Significance (MNES) include the following categories:

- **Extinct in the wild (EW):** Taxa known to survive only in captivity.
- **Critically Endangered (Cr):** Taxa facing an extremely high risk of extinction in the wild in the immediate future.
- **Endangered (En):** Taxa facing a very high risk of extinction in the wild in the near future.
- **Vulnerable (Vu):** Taxa facing a very high risk of extinction in the wild in the medium-term future.
- **Migratory (Mi):** Taxa listed under international agreements to which Australia is a party.

Reports on the conservation status of most vertebrate fauna species have been produced by the federal Department of Environment and Energy (DoEE) in the form of Action Plans. An Action Plan is a review of the conservation status of a taxonomic group against IUCN categories. Action Plans have been prepared for amphibians (Tyler 1998), reptiles (Cogger *et al.* 1993), birds (Garnett *et al.* 2011) and mammals (Woinarski *et al.* 2014). These publications also use categories similar to those used by the EPBC Act. The information presented in some of the earlier Action Plans may be out of date due to changes since publication.

The *Biodiversity Conservation Act 2016* (BC Act) is State legislation that aims to conserve and protect biodiversity and biodiversity components in Western Australia, including threatened fauna. It is administered by the Department of Biodiversity, Conservation and Attractions (DBCA). In addition to threatened fauna, the BC Act has scope to protect threatened ecological communities and important habitats.

Fauna species are listed under the BC Act as threatened species using IUCN categories, or as specially protected species, as described below.

Threatened Species:

- **Extinct in the wild (EW):** Taxa known to survive only in captivity.
- **Critically Endangered (Cr):** Taxa facing an extremely high risk of extinction in the wild in the immediate future.
- **Endangered (En):** Taxa facing a very high risk of extinction in the wild in the near future.
- **Vulnerable (Vu):** Taxa facing a very high risk of extinction in the wild in the medium-term future.



Specially Protected Species:

- **Migratory (Mi):** A subset of the migratory fauna that are known to visit Western Australia that are protected under the international agreements or treaties, excluding species that are listed as Threatened species.
- **Conservation dependent fauna (CD):** Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened
- **Other specially protected species (OS):** fauna in need of special protection to ensure their conservation.

The BC Act supersedes the *Western Australian Wildlife Conservation Act 1950* (WC Act).

Priority species are not listed under State or Commonwealth Acts. In Western Australia, DBCA maintains a list of Priority Fauna made up of species that are possibly Threatened but do not meet adequacy of survey requirements or are otherwise data deficient. There are four levels of Priority as defined by DBCA, as listed below.

- **Priority 1:** Poorly known species (on threatened lands)
- **Priority 2:** Poorly known species in few locations (some on conservation lands)
- **Priority 3:** Poorly known species in several locations (some on conservation lands)
- **Priority 4:** Rare, near threatened and other species in need of monitoring

## 2.8.2 Levels of Conservation Significance in this report

Five levels of conservation significance are used within this report to indicate the level of significance of fauna species, according to the following criteria:

- **Threatened (T):** Taxa listed as Extinct in the Wild, Critically Endangered, Endangered or Vulnerable under the EPBC Act and/or BC Act. These species are grouped as they are all species considered to be at risk of extinction, are often rare and are likely to be subject to on-going threatening processes.
- **Migratory (Mi):** Taxa listed as Migratory under the EPBC Act and/or BC Act, excluding those species also listed as threatened. These species are grouped as they are not necessarily rare, but may be dependent on specific habitats for a portion of their life-cycle. For these species, loss of important foraging, breeding or stop-over sites may have a disproportionately large impact on populations.
- **Specially Protected (SP):** Taxa listed as Other Specially Protected Species or Conservation Dependent Fauna under the BC Act. These species are not necessarily rare, but may be dependent on on-going conservation to ensure their protection.
- **Priority (P):** Taxa listed as Priority by DBCA. These species are grouped as they are either conservation dependent or data deficient and in need of further survey.



- **Locally Significant (LS):** Locally significant taxa are not listed under State or Commonwealth Acts or in publications on threatened fauna or as Priority species by DBCA, but are considered by the author to potentially be of local significance because they are at the limit of their distribution in the area, they have a very restricted range or they occur in breeding colonies (e.g. some waterbirds). This level of significance has no legislative recognition and is based on interpretation of information on the species patterns of distribution. For example, the Government of Western Australia (2000) used this sort of interpretation to identify significant bird species in the Perth metropolitan area as part of Bush Forever. Recognition of such species is consistent with the aim of preserving regional biodiversity.

## 2.9 Species Accumulation Curves

A species accumulation curve at its most simple is a graph of the number of detected species against sampling effort. However, the curve is usually derived through sub-sampling the dataset to find a mean curve, otherwise known as a sample-based rarefaction curve.

Species accumulation curves were calculated for reptiles, mammals and birds in each habitat. For reptiles and mammals, an 'individuals' based approach was used, as sampling methods was not directly comparable between the two surveys. This means that the species richness was graphed against the number of individuals caught, rather than per each sample. The sampling unit for birds was all species observed in a 20 minute bird survey at a trapping site, and only data from 2019 was used.

The statistical package EstimateS (Colwell 2013) was used to find a non-parametric estimator of species richness; either Chao1, ICE (Incidence-based Coverage Estimator) or Chao2. Chao1 uses abundance data to provide an estimation of the lower bound of species richness and is a good estimator of the actual species richness when the sample size is large or the rare species in the sample have similar detection probabilities (Chao and Chiu 2016). ICE or Chao2 are similar, but uses incidence (presence only, no abundance) data only.

EstimateS (Colwell 2013) uses a bias-corrected form of Chao1 and Chao2 as a default, though these become imprecise when the co-efficient of variation or incidence distribution  $>0.5$ . In these cases, the classic Chao1 and Chao2 were used, and the larger estimate of Chao1(classic) and ACE (Abundance-based Coverage Estimator) or Chao2(classic) and ICE (Incidence-based Coverage Estimator) is used as the estimate of species richness. For large sample sizes, if Chao 1 or Chao 2 are equal to the observed number of species, then the accumulation of species is assumed to have reached an asymptote (Colwell 2013).

Jackknife estimators of species richness are not used, as they typically underestimate the true species richness when the sample is small, (as is often the case in Level 2 surveys) and overestimate when the sample is large. Thus there is only a small window when the Jackknife estimators are close to the true species richness (Chao and Chiu 2016).



## 2.10 Likelihood of Occurrence

Fauna of conservation significance were assessed and ranked for their likelihood of occurrence in the study area, according to the following criteria:

- **Very Low:** The study area is outside the current known distribution of the species as presented in the literature; no suitable habitat was identified as being present during the field survey; for some species, individuals may occur occasionally as vagrants, especially if suitable habitat is located nearby, but the study area itself would not be the species; includes species generally accepted as being locally extinct.
- **Low:** The study area is within or just outside the current known distribution of the species, as presented in the literature; any habitat present is of either limited in extent or marginal quality at best; no recent or nearby records of the species on databases; the species is generally known to be less common in the vicinity of the study area (e.g. for inland sites, where the species usually occurs on the coast).
- **Moderate:** The study area is within the current known distribution of the species, as presented in the literature; habitat of reasonable quality was identified as being present during the field survey; some recent and/or nearby records of the species on databases;
- **High:** The study area is well within the current known distribution of the species, as presented in the literature; habitat of good quality was identified as being present during the field survey; many recent and nearby records of the species on databases.
- **Known to Occur:** The species was positively identified in the study area during this field survey, or recorded as occurring in the study area on previous recent field surveys. Note that for a species 'known to occur', the habitat may still be marginal and therefore the population may be small or the species may visit the site irregularly.

## 3. Survey Limitations

Various factors can limit the effectiveness of a fauna survey. Pursuant to EPA Technical Guidance (EPA 2016c), these factors have been identified and their potential to impact on the effectiveness of the surveys has been assessed in Table 5 below. All fauna surveys have limitations, and not all fauna species present on the site are likely to be sampled during a survey. Fauna may not be recorded because they are rare, they are difficult to trap or observe, or because they are only present on the site for part of the year.



**Table 5. Fauna survey limitations.**

Potential Limitation	Extent of limitation for the fauna survey	
Competency /experience of the team carrying out the survey	Not limiting	Supervising zoologist has 20 years' experience with fauna surveys in Western Australia. Field zoologists have more than 10 years' experience each. The field team included personnel experienced in Pilbara fauna.
Proportion of fauna identified, recorded and/or collected.	Not limiting	More than half of the fauna expected to occur (based on literature review) were recorded during this survey or the 2009 - 2018 surveys.
Sources of information e.g. previously available information (whether historic or recent) as distinct from new data	Not limiting	Several fauna studies have been undertaken within the Study Area between 2009 and 2019, including two Level 1 surveys, two Level 1 surveys and targeted surveys for conservation significant taxa.
Timing/weather/season/cycle	Not limiting	The field survey was undertaken at a suitable time to trap reptiles, and the warm, humid conditions post-cyclone in April were ideal for trapping and bird surveys.
Disturbances (e.g. fire, flood, accidental human intervention etc.), which affected results of survey	Minor limitation	Access to the western portion of the Study Area, including parts of the range to the south of the Study Area, was limited in April as the track was washed out by heavy rains in the weeks prior to the field survey. Several areas to the south of the Study Area were affected by fire, so unsuitable for regional quoll camera trapping as quoll populations can drop to undetectable levels after fire.
Intensity (in retrospect, was the intensity adequate)	Not limiting	Sufficient time was allowed to survey all habitats.
Completeness (e.g. was relevant area fully surveyed)	Not limiting	A representative proportion of all habitats were able to be accessed and surveyed, using trapping and a range of supporting survey methods.
Resources (e.g. degree of expertise available in animal identification to taxon level)	Not limiting	Almost all vertebrate fauna could be identified to species. A minor exception was species of <i>Neobatrachus</i> frogs that are difficult to distinguish on morphology alone.
Remoteness and/or access problems	Minor limitation	Entire Study Area accessible by vehicle or on foot. Access to the western portion of the Study Area, including parts of the range to the south of the Study Area, was limited as the track was washed out by heavy rains in the weeks prior to the April field survey. This resulted in no camera traps being deployed in the southern part of the range. The western portion of the Additional Study Area is rugged and lacks access in parts, and no surveys for bat caves were undertaken due to safety concerns with long traverses in hot weather >40°C.
Availability of contextual (e.g. biogeographic) information on the region	Not limiting	The Pilbara is a relatively well-studied region due to the prevalence of mining activities. The Pilbara Biological Survey also gives context to fauna studies in this region.



## 4. Fauna Habitats of the Study Area

Six fauna habitats were identified in the Study Area by Stantec (2018b). These are summarised in Table 6 and shown in Figure 12. Of these habitats, Stantec (2018b) considered all habitats to be widespread in the region except for the Ironstone Ridgetop and Rocky Ridge and Gorge habitats, both considered to be limited in extent. The fauna habitat mapping was extended within the Additional Study Area in October 2019, covering an additional 1,234.2ha. No new fauna habitats were identified and the majority of the Additoanl Study Area was Spinifex Stony Plain and Rocky Foothills.

**Table 6. Fauna habitats in the Study Area.**

Habitat	Key Habitat Elements	Total Area currently remaining (ha)		
		Study Area	Additional Study Area	Total
Ironstone ridge top	<ul style="list-style-type: none"> <li>Small stones suitable for Western Pebble-mound Mouse.</li> </ul>	208.2	12.4	220.6
Rocky ridge and gorge	<ul style="list-style-type: none"> <li>Outcropping rocky areas, fallen boulders, caves, overhangs and rock crevices.</li> </ul>	371.3	46.1	417.4
Rocky foothills	<ul style="list-style-type: none"> <li>Occasional rocky outcrops.</li> </ul>	1,329.2	393.1	1,722.3
Stony rises	<ul style="list-style-type: none"> <li>Occasional rocky outcrops.</li> </ul>	172.5	95.2	267.7
Spinifex stony plain	<ul style="list-style-type: none"> <li>Many minor drainage lines (not mapped separately) provides shelter for fauna.</li> <li>Small stones suitable for Western Pebble-mound Mouse.</li> <li>Tree hollows.</li> </ul>	2,297.9	548.0	2,845.9
Drainage line	<ul style="list-style-type: none"> <li>May function as a corridor for fauna movement.</li> <li>Permanent and semi-permanent pools.</li> <li>Tree hollows.</li> <li>Leaf litter accumulations.</li> </ul>	328.1	139.4	467.5
Disturbed areas		722.0	0.0	722.0
<b>Total:</b>		<b>4707.2</b>	<b>1,234.2</b>	<b>6,663.4</b>

Disturbance to most habitats was limited to past mining and pastoral activities (e.g. drilling access tracks, station tracks, livestock and current mine activities). Areas around drainage lines were invaded by Buffel Grass and showed trampling by livestock (cattle).



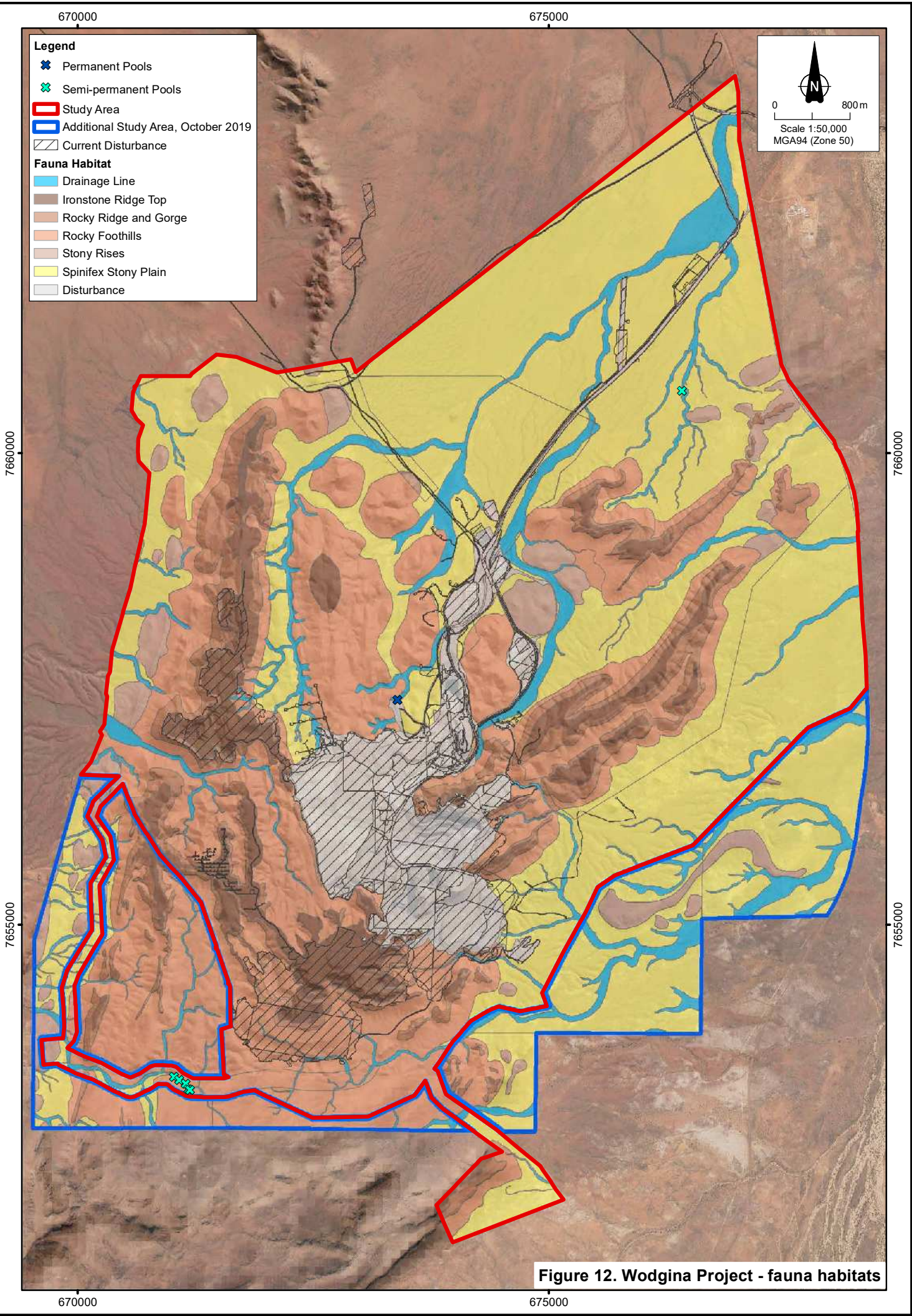


Figure 12. Wodgina Project - fauna habitats





**Plate 8. Ironstone Ridgetop.**



**Plate 9. Rocky Ridge and Gorge.**



**Plate 10. Rocky Foothills.**





**Plate 11. Stony Rise.**



**Plate 12. Spinifex Stony Plain.**



**Plate 13. Drainage Line.**



## 5. Faunal Assemblage of the Study Area

The results of the literature review and field survey were combined to create a list of all the vertebrate fauna potentially occurring at in the Study Area (Appendices 5 - 8). Indicated in the fauna lists are all the species observed during the fauna survey, those recorded in the Study Area on previous surveys between 2009 and 2018, and those recorded in the region as part of the literature review.

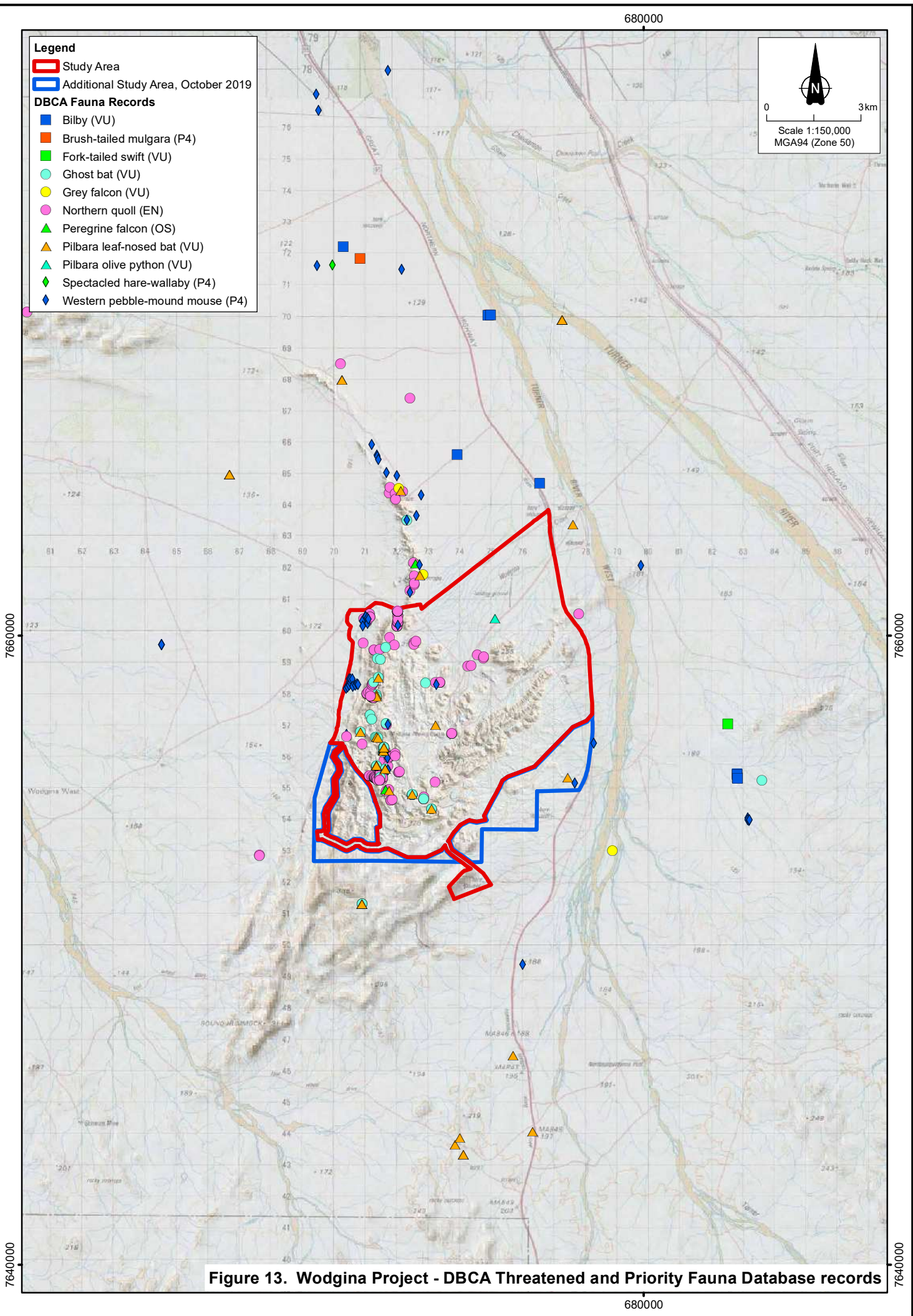
The potentially occurring faunal assemblage is summarised in Table 7. The overall vertebrate faunal assemblage is likely to be largely intact, with the exception of species that are extinct or greatly reduced in their distribution in the Bioregion. The faunal assemblage and conservation significant species likely to occur are further discussed in the sections below.

**Table 7. Summary of vertebrate fauna potentially occurring in the Study Area.**

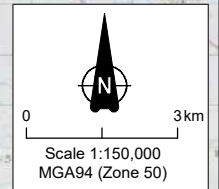
Taxon	Total Species (predicted)	Introduced species	Conservation significant species				
			Threatened (T)	Migratory (Mi)	Specially Protected (SP)	DBCA Priority (P)	Locally significant (LS)
Amphibians	10	0	-	-	-	-	-
Reptiles	108	1	1	-	-	2	-
Birds	140	0	2	4	1	-	-
Mammals	41	8	3	-	-	4	-
Freshwater Fish	8	0	-	-	-	-	-
<b>Totals:</b>	<b>307</b>	<b>9</b>	<b>6</b>	<b>4</b>	<b>1</b>	<b>6</b>	<b>0</b>

The conservation significant fauna recorded within 15km of the Study Area on DBCA's Threatened and Priority Fauna Database are shown in Figure 13. The results of the EPBC Act Protected Matters search are given in Appendix 10. The significant fauna potentially occurring in the Study Area are discussed in the following sections and summarised in Table 14, with the individual records collected on this survey presented in Appendix 11. The analysis of the bat call data collected on the field survey is given in Appendix 12.





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## 5.1 Amphibians

Ten species of frog potentially occur, of which four have been recorded in the Study Area between 2009 and 2019 and a fifth species identified to genus level only (Table 8, Appendix 5). Five frogs were recorded during the 2019 survey, though one of these (*Neobatrachus* sp.) was represented by juveniles only, and these were unable to be identified to species level. The frog species that potentially occur in the Study Area are common and widely distributed in the semi-arid zone.

The Desert Tree Frog (*Litoria rubella*) is likely to be common, occurring in rocky areas near drainage lines as well as around waterholes. Burrowing species aestivate underground when conditions are dry, so are difficult to sample except immediately after wet conditions. These species breed opportunistically after rainfall and are likely to occur in the Drainage Line habitat, though they can also forage in terrestrial habitats when conditions are suitable. Frogs are likely to occur throughout the study area, potentially breeding anywhere that holds relatively fresh water after rainfall, including man-made depressions. Many species develop from tadpoles into frogs very quickly, and can make use of ephemeral pools in minor drainages.

**Table 8. Frogs recorded in the Study Area, 2009 - 2019.**

Species	Survey, site and habitat												
	2009 <sup>1</sup>	2011 <sup>2</sup>					2019 Apr / Oct						
	All 6 sites and habitats combined	1 - Ironstone Ridge Top	2 - Spinifex Stony Plain	3 - Ironstone Ridge Top	4 - Drainage Line	Opportunistic	1 - Spinifex Stony Plain	2 - Drainage Line	3 - Rocky Foothills	4 - Spinifex Stony Plain	5 - Stony Rise	6 - Drainage Line	Opportunistic
Water-holding Frogs													
<i>Cyclorana maini</i>	+	6	14	1	92			1/-	2/-	1/-	2/-	2/-	
<i>Litoria rubella</i>	+	2			35								+
Ground Frogs													
<i>Notaden nichollsi</i>												3/-	
<i>Neobatrachus</i> sp.												6/-	
<i>Uperoleia saxatilis</i>					10						1/-		
Total species:	2	2	1	1	3		-/-	1/-	1/-	1/-	2/-	3/-	
		3					5						

<sup>1</sup> Wodgina DSO (Outback Ecology 2009), <sup>2</sup> Hercules DSO (Outback Ecology (2012))

### 5.1.1 Amphibians of Conservation Significance

No frogs of conservation significance are likely to be present in the Study Area.



## 5.2. Reptiles

There are 108 species of reptile that have the potential to occur, of which 71 were recorded in the Study Area between 2009 and 2019 (Table 9, Appendix 6). The reptile assemblage of the Pilbara Bioregion is very diverse, including a suite of endemic species associated with rocky surfaces (Doughty *et al.* 2011). As the reptile assemblage is generally informed by the ground surface (e.g. sandy, clayey or rocky surfaces) the Study Area is likely to support an assemblage dominated by species that occur on stony and rocky habitats. Species that favour sandy soil are only likely to occur in association with Drainage Lines.

A total of 57 species were recorded during this survey, 49 captured in trapping sites and eight observed opportunistically (Table 9, Plate 14). This survey added several new species to the list of those previously known to occur in the Study Area, as most of the previous trapping sites were in rocky upland habitats and this survey sampled habitats such as Drainage Lines.

Between eight and 22 species were recorded at each trapping site in 2019. The sites in the Drainage Line habitat recorded the highest species richness. This is likely due to a number of factors, including the higher productivity associated with water courses, the habitat complexity (e.g. the presence of woody debris, leaf litter, trees and shrubs) and the presence of sandy colluvial soils that are absent from other habitats in the Study Area.

The sites in the Spinifex Stony Plains also recorded a relatively large number of species in both 2019 and 2011. This habitat is also relatively complex, as it includes many minor drainage lines. The spinifex is also relatively long-unburnt, and the large hummocks provide shelter for reptiles. The site in the Rocky Foothills showed the lowest species richness. This habitat generally lacks shelter such as rock or tree crevices, and was more recently burnt. The spinifex hummocks were small and did not provide as much shelter as in long-unburnt sites. Similarly, the Ironstone Ridgetop sites sampled in 2011 are relatively exposed and lacking in shelter.



**Plate 14.** *Egernia cygnitos* trapped at WL Site 4 and *Heteronotia spelea*.



Table 9. Reptiles recorded in the Study Area, 2009 - 2019.

Species	Survey, site and habitat												
	2009 <sup>1</sup>	2011 <sup>2</sup>					2019 Apr / Oct						
	All 6 sites and habitats combined	1 - Ironstone Ridge Top	2 - Spinifex Stony Plain	3 - Ironstone Ridge Top	4 - Drainage Line	Opportunistic	1 - Spinifex Stony Plain	2 - Drainage Line	3 - Rocky Foothills	4 - Spinifex Stony Plain	5 - Stony Rise	6 - Drainage Line	Opportunistic
Geckoes													
<i>Nephurus levis</i>								5/2				1/5	
<i>Diplodactylus bilybara</i>								-/2				-/2	
<i>Diplodactylus conspicillatus</i>			1		1		1/-	1/1					
<i>Diplodactylus galaxias</i>										1/-	2/1	1/-	
<i>Diplodactylus laevis</i>												1/-	
<i>Diplodactylus savagei</i>	+	1	1		1								
<i>Lucasium stenodactylum</i>	+		1					-/5	-/2				
<i>Lucasium wombeyi</i>			3		2				1/-	3/1			
<i>Rhynchoedura ornata</i>								3/2					
<i>Oedura fimbria</i>				1									
<i>Gehyra kimberleyi</i>									-/1				
<i>Gehyra pilbara</i>						+							
<i>Gehyra punctata</i>		1	1						1/-	1/-			
<i>Gehyra variegata</i>						+	1/1	1/2					
<i>Heteronotia binoei</i>	+		11	1	11			2/-	1/-	6/3	3/1	4/3	
<i>Heteronotia spelea</i>	+	2											+
<i>Strophurus elderi</i>			1	4	1		1/-				-/1	-/1	
Legless Lizards													
<i>Delma butleri</i>	+												
<i>Delma nasuta</i>	+	4	1	1	1					-/2			
<i>Delma pax</i>	+		1		3						1/-		
<i>Delma tinctoria</i>										-/1			
<i>Lialis burtonis</i>								1/-		1/-			
Dragon Lizards													
<i>Ctenophorus caudicinctus</i>	+		3				-/1	-/1	1/10	4/2	-/1	-/1	
<i>Ctenophorus isolepis</i>							-/4	1/5		-/1	-/2	2/2	
<i>Diporiphora valens</i> <sup>3</sup>													
<i>Pogona minor</i>								1/-				2/-	
<i>Gowidon longirostris</i>	+					+							+
Skink Lizards													
<i>Carlia munda</i>	+				3			-/1					
<i>Carlia triacantha</i>	+	2		1	5				-/1		-/1		
<i>Ctenotus duricola</i>							4/5	1/1		2/-		2/1	



Table 9. (cont.)

Species	Survey, site and habitat												
	2009 <sup>1</sup>	2011 <sup>2</sup>					2019 Apr / Oct						
	All 6 sites and habitats combined	1 - Ironstone Ridge Top	2 - Spinfex Stony Plain	3 - Ironstone Ridge Top	4 - Drainage Line	Opportunistic	1 - Spinfex Stony Plain	2 - Drainage Line	3 - Rocky Foothills	4 - Spinfex Stony Plain	5 - Stony Rise	6 - Drainage Line	Opportunistic
<i>Ctenotus grandis</i>			26				4/7	19/8	1/-		10/3	41/16	
<i>Ctenotus hanloni</i>							-/3	1/1					
<i>Ctenotus helenae</i>							4/-	2/2		1/-		3/-	
<i>Ctenotus leonhardii</i>			2										
<i>Ctenotus pantherinus</i>							3/2	1/-					
<i>Ctenotus rubicundus</i>	+												
<i>Ctenotus saxatilis</i>	+	21	41	15	30		12/4	8/5	5/2	20/13	28/12	10/7	
<i>Cyclodomorphus melanops</i>	+									1/-	1/-		
<i>Egernia cygnitos</i>										1/-			
<i>Egernia epsisolus</i> <sup>4</sup>													
<i>Egernia pilbarensis</i> <sup>4</sup>													
<i>Eremiascincus pallidus</i>													
<i>Lerista bipes</i>								13/29				24/23	
<i>Lerista jacksoni</i>					2		2/1	-/5	-/3		-/3		
<i>Lerista muelleri</i>	+				2								
<i>Menetia greyi</i>								-/2					
<i>Menetia surda</i>							-/1						
<i>Morethia ruficauda</i>	+	2			4		-/3	-/2		-/1	1/-	-/2	
<i>Tiliqua multifasciata</i>			2							1/-			
<b>Goannas</b>													
<i>Varanus acanthurus</i>	+	9	2	4	5			2/-			4/-	1/1	
<i>Varanus brevicauda</i>						+	-/1					-/3	
<i>Varanus eremius</i>								1/-		1/-			
<i>Varanus giganteus</i>	+												+
<i>Varanus gouldii</i>							-/1	3/-			-/1	1/-	
<i>Varanus panoptes</i>	+												+
<i>Varanus pilbarensis</i>													+
<b>Blind Snakes</b>													
<i>Anilius ammodytes</i>							1/1	2/1					
<i>Anilius grypus</i>	+	2	4	9	3		4/-	2/1	2/-		2/-	1/1	
<i>Anilius pilbarensis</i>			1		1								
<b>Pythons</b>													
<i>Antaresia perthensis</i>													+
<i>Antaresia stimpsoni</i>	+	1		1									+
<i>Aspidites melanocephalus</i>													+



Table 9. (cont.)

Species	Survey, site and habitat												
	2009 <sup>1</sup>	2011 <sup>2</sup>					2019 Apr / Oct						
	All 6 sites and habitats combined	1 - Ironstone Ridge Top	2 - Spinifex Stony Plain	3 - Ironstone Ridge Top	4 - Drainage Line	Opportunistic	1 - Spinifex Stony Plain	2 - Drainage Line	3 - Rocky Foothills	4 - Spinifex Stony Plain	5 - Stony Rise	6 - Drainage Line	Opportunistic
Elapid Snakes													
<i>Brachyuropsis approximans</i>					2			1/-		1/-			
<i>Brachyuropsis fasciolatus</i>								-/1					
<i>Demansia psammophis</i>							1/-	1/-					
<i>Demansia rufescens</i>	+				1				2/1		-/1	1/-	
<i>Furina ornata</i>	+											-/1	
<i>Pseudechis australis</i>											1/-		
<i>Pseudonaja mengdeni</i>								-/2					
<i>Pseudonaja modesta</i>	+												
<i>Suta fasciata</i>			1										
Total species:	24	10	18	9	18	4	19	31	12	19	17	21	8
		32					57						

<sup>1</sup> Wodgina DSO (Outback Ecology 2009), <sup>2</sup> Hercules DSO (Outback Ecology (2012), <sup>3</sup>360 Environmental (2017), <sup>4</sup>Stantec (2017).

### 5.2.1 Reptiles of Conservation Significance

There are three reptiles of conservation significance that potentially occur in the Study Area, as listed and discussed below.

#### Threatened Species

##### **Pilbara Olive Python**

*Liasis olivaceus barroni*

This species is listed as Vulnerable under the EPBC Act and Vulnerable under the BC Act.

The **Pilbara Olive Python** is restricted to ranges in the Pilbara and islands in the Dampier Archipelago and is known from relatively few localities. This very large python inhabits rock outcrops, usually close to waterholes, which it uses to hunt. Though not recorded during fauna surveys, there is a single DBCA record of this species within 15km (Figure 13). Although this record falls within the Study Area, it is likely that the true location is outside the Study Area, as the locality information is given as 'Roy Hill Railway'. However, as there are suitable habitats present (e.g. rocky drainage lines, permanent and semi-permanent pools) and the Study Area is within the range of this species, it is considered likely to occur.



**Priority Species****Black-lined Ctenotus**

This species is listed as Priority 1 by DBCA.

*Ctenotus nigrilineatus*

**Gane's Blind Snake**

This species is listed as Priority 1 by DBCA.

*Anilius ganei*

The **Black-lined Skink** was originally collected from Spinifex at the base of a granite outcrop near Woodstock (Wilson and Swan 2017). This species has been recorded within 40km on NatureMap, and is also known from watercourses near Meentheena Conservation Park and Nullagine. This species is known from very few records, so its distribution and habitat requirements are poorly known. It possibly occurs in the Study Area.

The habitat requirements for **Gane's Blind Snake** are poorly known, as this species is known from relatively few records and was only formally described in 1998. It is endemic to the Pilbara, occurring between Newman and Pannawonica. This species is tentatively associated with moist gorges and gullies, though some of the early specimens are from the Newman townsite and Mt Whaleback waste dump (Aplin 1998). The habitats of the Study Area may be suitable for Gane's Blind Snake, and it is likely that the Study Area falls within the range of this species. Therefore, this species possibly occurs in the Study Area.

### 5.3 Birds

There are 140 species of bird that potentially occur in the Study Area, of which 89 species were recorded in the Study Area between 2009 and 2019 (Table 10, Appendix 7). The terrestrial bird fauna of the Pilbara region is thought to be generally uniform, with a higher species richness where there is riparian vegetation such as tall *Eucalyptus* or *Melaleuca* trees (Burbidge *et al.* 2010). Many of the species present are likely to use a range of habitats across the Study Area, although the bird assemblage is likely to vary between more wooded habitats, such as Drainage Lines and open habitats, such as Rocky Foothills.

A total of 76 species were recorded across the two phases of the current survey, with a similar number of species recorded at each trapping site (Table 10). Many species were only represented by one or two records or were only observed opportunistically. Several new records were made for the Study Area during this survey, including the Star Finch (*Neochmia ruficauda*) (Plate 15), Black-shouldered Kite (*Elanus caeruleus*), Australian Ringneck (*Platycercus zonarius*) and Bush Stone-Curlew (*Burhinus grallarius*).

Particularly common in April (occurring at all or most sites) were the Black-faced Cuckoo-shrike (*Coracina novaehollandiae*), Budgerigar (*Melopsittacus undulatus*), Painted Finch (*Emblema pictum*), Rainbow Bee-eater (*Merops ornatus*), Spinifexbird (*Eremiornis carteri*) and Zebra Finch (*Taeniopygia gutatta*). In October, the Budgerigar was absent, but the remaining species remained common.



**Table 10. Birds recorded in the Study Area 2009 - 2019.**

Species	Previous surveys		This survey 2019 Frequency of occurrence (n=6) at each site Apr / Oct						
	2009 <sup>1</sup>	2012 <sup>2</sup>	1 - Spinifex Stony Plain	2 - Drainage Line	3 - Rocky Foothills	4 - Spinifex Stony Plain	5 - Stony Rise	6 - Drainage Line	Opp.
Australasian Grebe		+							+
Australian Bustard				-/1					
Australian Hobby	+								
Australian Kestrel	+	+			-/1	-/1			+
Australian Magpie		+							
Australian Owlet-nightjar	+								+
Australasian Pipit		+			-/2				
Australian Reed-warbler		+							
Australian Ringneck								2/-	
Black-breasted Buzzard <sup>3</sup>									
Black-faced Cuckoo-shrike	+	+	2/1	3/3	2/1	1/2	1/3		
Black-faced Woodswallow	+	+		-/1	-/2		1/1		
Black-fronted Dotterel	+	+							+
Black-necked Stork	+								
Black-shouldered Kite									+
Black Honeyeater	+								
Black Falcon	+								
Black Kite	+			-/1				-/1	
Blue-winged Kookaburra								-/1	
Brown Falcon	+			2/-	2/1				
Brown Goshawk	+		1/1						
Brown Honeyeater	+	+			5/2	1/-	6/6	2/-	
Brown Songlark							5/-		
Budgerigar	+	+	2/-	1/-	2/-	1/-	1/-	1/-	
Bush Stone-curlew									+
Cockatiel	+	+			1/-				
Common Bronzewing									+
Common Sandpiper (Mi)									+
Crested Bellbird				1/-					
Crested Pigeon		+	-/3	-/1				-/1	
Crimson Chat									+
Diamond Dove	+	+	1/3	1/2	-/1	1/-	1/6	-/2	
Eurasian Coot									+
Fairy Martin	+	+		-/1					
Galah	+	+	-/1				-/3	1/-	



Table 10. (cont.)

Species	Previous surveys		This survey 2019 Frequency of occurrence (n=6) at each site Apr / Oct						
	2009 <sup>1</sup>	2012 <sup>2</sup>	1 - Spinifex Stony Plain	2 - Drainage Line	3 - Rocky Foothills	4 - Spinifex Stony Plain	5 - Stony Rise	6 - Drainage Line	Opp.
Grey Butcherbird						-/2			
Grey Shrike-thrush	+	+			1/-	-/1			
Grey Teal									+
Grey-crowned Babbler								-/1	
Grey-headed Honeyeater	+	+	2/3		2/4	5/5	3/6		
Grey-fronted Honeyeater		+							
Hardhead									+
Horsfield's Bronze-cuckoo			1/-					1/-	
Little Button-quail	+	+	1/-						
Little Corella	+						-/1	-/1	
Little Crow			1/-						
Little Woodswallow	+	+							+
Magpie-lark	+	+		2/-	1/-		1/-	2/-	
Pacific Black Duck									+
Painted Finch	+	+	1/-		4/6	5/2	5/1	3/1	
Pallid Cuckoo	+								
Peaceful Dove									+
Pied Butcherbird	+	+			3/1	1/1	-/3	1/-	
Pied Honeyeater	+						1/-		
Purple Swamphen									+
Rainbow Bee-eater	+	+	1/-	4/1	3/1	1/-	6/2	-/2	
Red-backed Kingfisher									+
Red-browed Pardalote			1/-	1/2			2/1		
Rufous Songlark		+		1/-	-/1		1/-		
Rufous Whistler			-/1				3/1	-/1	
Sacred Kingfisher	+								
Singing Honeyeater	+	+	2/-	1/1	1/1	-/1		3/1	
Spinifex Pigeon	+	+	-/1	1/-	1/5	5/1	-/1	1/1	
Spinifexbird	+	+	5/4	2/3	3/4	5/6	2/2	2/5	
Spiny-cheeked Honeyeater								1/-	
Spotted Harrier			-/1						
Spotted Nightjar	+	+	1/-						
Southern Boobook <sup>3</sup>									
Star Finch									+
Striated Grasswren	+	+							+



**Table 10. (cont.)**

Species	Previous surveys		This survey 2019 Frequency of occurrence (n=6) at each site Apr / Oct						
	2009 <sup>1</sup>	2012 <sup>2</sup>	1 - Spinifex Stony Plain	2 - Drainage Line	3 - Rocky Foothills	4 - Spinifex Stony Plain	5 - Stony Rise	6 - Drainage Line	Opp.
Striated Pardalote	+								
Tawny Frogmouth									+
Torresian Crow	+	+	1/1	1/7	2/-	1/-		-/1	
Tree Martin	+	+					-/1		
Variegated Fairy-wren	+	+	3/-	2/2		1/-	-/1	3/3	
Wedge-tailed Eagle				-/1			-/1	-/1	
Welcome Swallow		+							
Western Bowerbird	+	+							+
Western Gerygone <sup>4</sup>									
Whistling Kite		+		-/2				-/2	
White-faced Heron									+
White-necked Heron									+
White-plumed Honeyeater			2/-				3/4	4/-	
White-winged Fairy-wren								-/1	
White-winged Triller	+			-/1	-/5		1/-		
Willie Wagtail	+	+		1/-	4/-	4/-	-/1		
Wood Sandpiper (Mi)									+
Yellow-throated Miner	+	+	-/1	1/3	4/3		-/1	3/-	
Zebra Finch	+	+	5/-	4/1	5/2	4/2	6/3	5/2	
<b>Total species:</b>	<b>44</b>	<b>39</b>	<b>24</b>	<b>25</b>	<b>24</b>	<b>18</b>	<b>27</b>	<b>28</b>	<b>24</b>
			<b>75</b>						

<sup>1</sup> Wodgina DSO (Outback Ecology 2009), <sup>2</sup> Hercules DSO (Outback Ecology (2012), <sup>3</sup>Stantec (2018b), <sup>4</sup>360 Environmental (2017a).

The bird assemblage is likely to include a core suite of species that are resident in the Study Area, a second group that makes regular or nomadic movements into and through the Study Area and a third group of vagrants that may occur in the Study Area on occasion. Resident species include many of the small insectivores such as fairywrens, whistlers and robins. Resident species are present all year, though their populations may fluctuate in response to rainfall and fire.



Birds that make regular seasonal movements include the Rainbow Bee-eater (*Merops ornatus*), cuckoos and some birds of prey. Honeyeaters are also likely to make seasonal or nomadic movements to take advantage of flowering events. Although not present all year, these species are likely to use the Study Area for foraging, breeding or shelter on a seasonal basis or when conditions are suitable.

Wetland dependent bird species, (e.g. ducks, swans, herons, grebes and migratory shorebirds), are also likely to occur as visitors to the Study Area. Several species were recorded during the current survey, but as the habitat available is limited, only a few individuals are likely to be present at any time.



**Plate 15. Star Finches recorded in the Study Area, October 2019.**

### 5.3.1 Birds of Conservation Significance

Three terrestrial birds listed as Migratory under the EPBC Act were listed on databases for the area; the Barn Swallow (*Hirundo rustica*), Grey Wagtail (*Motacilla cinerea*) and Yellow Wagtail (*Motacilla flava*). These species are considered unlikely to occur except as occasional vagrants. They occur around wetlands and are generally recorded in the north of the State (Johnstone and Storr 2004, DoE 2015). They are not included in the list in Appendix 7 and are not discussed further. Five wetland birds listed as Migratory were also listed on databases for the area; the Curlew Sandpiper (*Calidris ferruginea*), Sharp-tailed Sandpiper (*Calidris acuminata*), Pectoral Sandpiper (*Calidris melanotos*), Eastern Curlew (*Numenius madagascariensis*) and Australian Painted Snipe (*Rostratula australis*). These species require wetland habitats that are absent from the Study Area and are not included in the list in Appendix 7, nor are they discussed further.

There are seven birds of conservation significance that have been recorded or potentially occur in the Study Area, two threatened species, one specially protected species and four Migratory species. Each species is listed in the boxes below, and discussed.



**Threatened Species****Grey Falcon***Falco hypoleucos*

This species is listed as Vulnerable under the BC Act.

**Night Parrot***Pezoporus occidentalis*

This species is listed as Endangered under the EPBC Act and as Critically Endangered fauna under the BC Act.

The **Grey Falcon** may number fewer than 1000 individuals, though it occurs across a large portion of arid and semi-arid Australia with its distribution centered on inland drainages (Garnett *et al.* 2011). It forages over timbered plains, including *Acacia* shrublands, also ranging out onto treeless plains. The Grey Falcon nests in tall trees on watercourses (Garnett *et al.* 2011) and occasionally on man-made structures such as transmission line towers (pers. obs.). Threats to this species are unknown, but may include habitat degradation due to overgrazing or clearing and provision of water in arid areas favouring the closely related Peregrine Falcon (Garnett *et al.* 2011). The Study Area lacks suitable breeding habitat for this species, though potential breeding habitat occurs nearby on the Turner River. The Grey Falcon has been recorded nearby on DBCA's Threatened and Priority Fauna Database (Figure 13) and is likely to occur as a foraging visitor to the Study Area.

Historically, the **Night Parrot** was recorded across a large range in the arid and semi-arid interior of Australia (Garnett *et al.* 2011). In recent times however, there are very few verified records of the species. Reliable records in recent times are from two main areas, one in western Queensland and one Western Australia (TSSC 2016b). Western Australia records are from Lake Gregory in the north, a site near Wiluna and near the Fortescue Marsh in the Pilbara (NPRT 2019, Davis and Metcalf 2008). The key habitats for the Night Parrot are thought to be chenopod shrublands and Spinifex grasslands, with the chenopod shrublands a refuge during dry conditions (Garnett *et al.* 2011). Nesting sites are in mature Spinifex, often large ring-forming clumps (DPAW 2017). Foraging habitats are likely to vary across Australia, but include herbs, grasses, grass-like plants, *Sclerolaena spp.* and other chenopods (DPAW 2017). With the reasons for its decline unknown, potential threats to the species remain unconfirmed (TSSC 2016b). Possible threats include predation by feral cats or foxes, human-induced fire and degradation of soil around watering points (TSSC 2016b). Knowledge about the current distribution and habitat requirements of the Night Parrot in Western Australia is based on very few records. Therefore, there is considerable uncertainty when assessing the likelihood of occurrence of this species. The survey with passive acoustic detectors across six sites on this survey and two sites by Stantec (2018b) failed to detect the Night Parrot. Although long-unburnt spinifex is present, much of this is more heavily wooded than at known Night Parrot sites. Therefore, this species is considered unlikely to occur.

**Specially Protected Species****Peregrine Falcon***Falco peregrinus*

This falcon is listed as Other Specially Protected Fauna under the BC Act.



The **Peregrine Falcon** is a widespread bird of prey that globally has a very large range and a very large population that appears to be secure (BirdLife International 2018). In Western Australia the population is secure, though this species may experience reductions at a local level due to human disturbance at nesting sites (Debus 1998). The Peregrine Falcon nests mainly on ledges on cliffs or rocky outcrops, and it may also use tall trees (Johnstone and Storr 1998). This species often takes advantage of man-made structures such as abandoned open pits or quarries. The species has been recorded nearby on DBCA's Threatened and Priority Fauna Database (Figure 13). The Peregrine Falcon is considered likely to occur and may breed on the Rocky Ridge and Gorge habitat, or forage in the Study Area if breeding nearby.

#### **Migratory Species**

##### **Oriental Plover**

*Charadrius veredus*

This species is listed as migratory under the EPBC Act and migratory under the BC Act.

##### **Wood Sandpiper**

*Tringa glareola*

This species is listed as migratory under the EPBC Act and migratory under the BC Act.

##### **Common Sandpiper**

*Tringa hypoleucos*

This species is listed as migratory under the EPBC Act and migratory under the BC Act.

##### **Fork-tailed Swift**

*Apus pacificus*

This species is listed as migratory under the EPBC Act and migratory under the BC Act.

The **Oriental Plover**, **Wood Sandpiper** and **Common Sandpiper** are migratory shorebirds that occur on inland waterbodies, as well as in coastal habitats. The Oriental Plover favours dry grasslands and open plains, including recently burnt areas (Geering *et al.* 2007). These species are non-breeding summer visitors to Australia, migrating from Siberia and east China through the East Asian-Australasian Flyway (Geering *et al.* 2007). The Study Area is only likely to be an internationally significant site for these species if it supports 20,000 birds or 1% or more of the flyway population of a species, or a nationally significant site if it supports 2,000 birds or 0.1% or more of the flyway population of a species (DoEE 2017). This equates to 230 Oriental Plover, 190 Common Sandpiper and 130 Wood Sandpiper to be nationally significant (Hansen *et al.* 2016). Single individual Common Sandpipers and Wood Sandpipers were recorded at Wodgina in October 2019. The Study Area is only likely to support one or two birds on an irregular basis and is not considered important habitat for migratory shorebirds.

The **Fork-tailed Swift** is a non-breeding visitor to Australia between September and April (Boehm 1962, Johnstone and Storr 1998). The bird is primarily observed foraging for insects in proximity to cyclonic weather (Boehm 1962). Although a migratory species, the Fork-tailed Swift has a large range and a large population that appears to be stable (BirdLife International 2019). This species was recorded nearby on DBCA's Threatened and Priority Fauna Database (Figure 13), and is considered likely to occur in the Study Area. The Fork-tailed Swift is a largely aerial species and is unlikely to be affected by changes to the Study Area.



## 5.4 Mammals

There are 41 species of mammal that have the potential to occur in the Study Area, of which 33 are native and eight introduced (Appendix 8). A total of 31 species were recorded from the Study Area between 2009 and 2019, of which 25 are native and six are introduced. The mammal assemblage is likely to be relatively intact, with the exception of species that are extinct in the Bioregion. Australia has a history of mammal extinctions since European settlement, most likely due to changed fire regimes and the impacts of feral Cats and Foxes (Woinarski *et al.* 2015). Of the mammals known from the Bioregion, 15% are now extinct (McKenzie *et al.* 2009).

Twenty-five mammal species (21 native) were recorded during the current survey. Between one and five species were recorded in trapping grids, but most species were recorded by other methods including targeted quoll trapping, camera trapping, bat call records and opportunistic observation (Table 11, Plates 16 and 17).

A small suite of species favour rocky habitats, including Woolley's False Antechinus (*Pseudantechinus woolleyae*), Long-tailed Dunnart (*Sminthopsis longicaudata*), Common Rock-rat (*Zyzomys argurus*), Rothschild's Rock-wallaby (*Petrogale rothschildi*) and Northern Quoll (*Dasyurus hallucatus*) (Plates 16 and 17). These species are strongly associated with rocky habitats in the Pilbara region, and the Rocky Ridge and Gorge habitat in the Study Area is likely to provide important habitat for these species. Many bats also roost in caves and rock crevices, though they may forage more widely at night. Species that favour sandier habitats are generally absent, though some, such as the Spinifex Hopping Mouse (*Notomys alexis*) occur on the sandier soils along the Drainage Line habitat.



**Plate 16. Woolley's False Antechinus and Northern Quoll recorded on camera trap.**

Although the mammal fauna of the Pilbara is relatively well-studied, there are still taxonomic issues to be resolved, for example there are several undescribed species of *Planigale* present (Westerman *et al.* 2016). Although this example does not impact the outcomes of this survey, it provides an indication that despite the many surveys that are undertaken in the region, there are still knowledge gaps.



Table 11. Mammals recorded in the Study Area 2009 - 2019.

Species	Survey, site and habitat											
	2009 <sup>1</sup>	2011 <sup>2</sup>					2019 Apr / Oct					
	All 6 sites and habitats combined	1 - Ironstone Ridge Top	2 - Spinifex Stony Plain	3 - Ironstone Ridge Top	4 - Drainage Line	Opportunistic	1 - Spinifex Stony Plain	2 - Drainage Line	3 - Rocky Foothills	4 - Spinifex Stony Plain	5 - Stony Rise	6 - Drainage Line Opportunistic
<b>Echidnas</b>												
<i>Tachyglossus aculeata</i>												+
<b>Dasyurid marsupials</b>												
<i>Dasyurus hallucatus</i>	+	1										+
<i>Dasykaluta rosamondae</i>							23/12			1/-		1/2
<i>Ningauai timealeyi</i>										1/-	1/-	2/-
<i>Planigale sp. 1</i>	+	3	1		2				-/3		3/2	
<i>Pseudantechinus woolleyae</i>	+											+
<i>Sminthopsis longicaudata</i> (P4)	+											
<i>Sminthopsis macroura</i> <sup>3</sup>												
<b>Kangaroos</b>												
<i>Lagorchestes conspicillatus</i> (P4) <sup>4</sup>												
<i>Osphranter robustus</i>	+					+						+
<i>Petrogale rothschildi</i>	+											+
<b>Bats</b>												
<i>Austronomus australis</i>	+											+
<i>Chaerephon jobensis</i>	+											+
<i>Chalinolobus gouldii</i>	+					+						+
<i>Macroderma gigas</i>	+					+						
<i>Rhinonictis aurantia</i>	+					+						+
<i>Saccolaimus flaviventris</i>	+					+						+
<i>Scotorepens greyii</i>	+					+						+
<i>Taphozous georgianus</i>	+					+						+
<i>Vespadelus findlaysoni</i>	+					+						+
<b>Rodents</b>												
<i>Notomys alexis</i>												1/-
<i>Pseudomys chapmani</i> (P4)	+					+						+
<i>Pseudomys desertor</i>								2/-				-/1
<i>Pseudomys hermannsburgensis</i>							3/3	1/-		-/2	1/-	2/3
<i>Zyzomys argurus</i>	+											+



Table 11 (cont.)

Species	Survey, site and habitat												
	2009 <sup>1</sup>	2011 <sup>2</sup>					2019 Apr / Oct						
	All 6 sites and habitats combined	1 - Ironstone Ridge Top	2 - Spinifex Stony Plain	3 - Ironstone Ridge Top	4 - Drainage Line	Opportunistic	1 - Spinifex Stony Plain	2 - Drainage Line	3 - Rocky Foothills	4 - Spinifex Stony Plain	5 - Stony Rise	6 - Drainage Line	Opportunistic
Introduced species													
<i>Mus musculus</i>							1/-	10/1					
<i>Felis catus</i>	+						1/1						
<i>Vulpes vulpes</i> <sup>3</sup>													
<i>Canis familiaris dingo</i>													+
<i>Equus caballus</i> <sup>5</sup>													
<i>Bos taurus</i>	+					+							+
Total species:	19	2	1	0	1		4	3	1	3	3	5	
		12					25						

<sup>1</sup> Wodgina DSO (Outback Ecology 2009), <sup>2</sup> Hercules DSO (Outback Ecology (2012), <sup>3</sup>Stantec (2018b), <sup>4</sup>Biologic (2018a), <sup>5</sup>360 Environmental (2017).

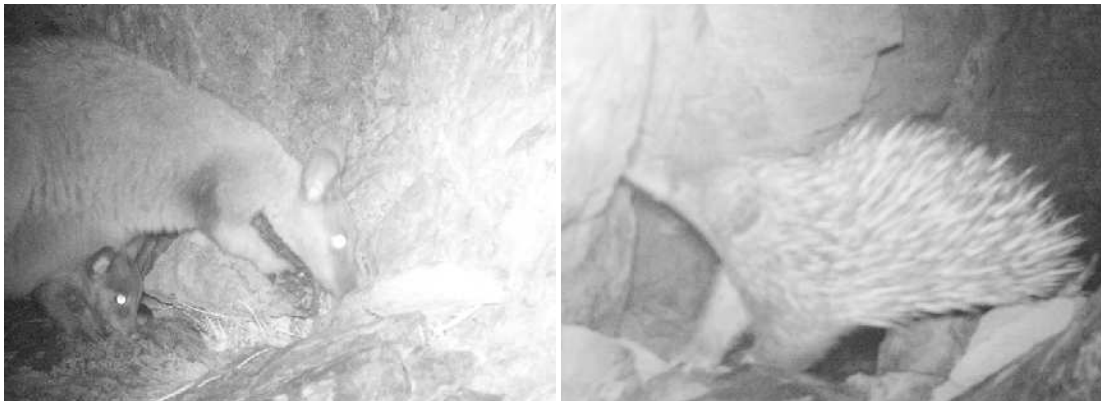


Plate 17. Rothschild's Rock-wallaby and Echidna recorded on camera trap.

#### 5.4.1 Mammals of Conservation Significance

There are seven mammals of conservation significance that may occur in the Study Area. Each species is listed and discussed below. Two species are known to occur in the surrounding area, but have been excluded from the list based on the habitats available in the study area. Both the Bilby (*Macrotis lagotis*, Vulnerable) and Brush-tailed Mulgara (*Dasycercus blythi*, Priority 4) favour sandplain habitats that are absent from the Study Area. These species have been excluded from the list in Appendix 8 and are not discussed further.



**Threatened Species****Northern Quoll**

This species is listed as Endangered under the EPBC Act and the BC Act.

*Dasyurus hallucatus*

**Pilbara Leaf-nosed Bat**

This species is listed as Vulnerable under the EPBC Act and the BC Act.

*Rhinonicteris aurantia*

**Ghost Bat**

This species is listed as Vulnerable under the EPBC Act and the BC Act.

*Macroderma gigas*

The **Northern Quoll** was recorded in the Study Area on the first phase (April 2019) of this survey and on previous surveys between 2009 and 2018 (Figure 14, Plate 16). The Northern Quoll occurs in a variety of habitats across its range, but in the Pilbara favours dissected rocky escarpments (Hill and Ward 2010, Van Dyck and Strahan 2008). Where shelter habitat occurs within the Northern Quolls predicted range, it is considered 'habitat critical to the survival of the species' (Commonwealth of Australia 2016). In the Pilbara, shelter and denning habitat consists of rocky habitats such as ranges, escarpments, mesas, gorges, breakaways, boulder fields and major drainage lines (Commonwealth of Australia 2016). In the Study Area, shelter habitat is primarily the Rocky Ridge and Gorge habitat (Figure 15).

Little is known about Northern Quoll foraging and dispersal habitats, However, the EPBC Act referral guidelines recognise that all native vegetation within 1km of shelter habitat or Northern Quoll records may be considered foraging and dispersal habitat (Commonwealth of Australia 2016). In the Study Area the Drainage Line habitat may also be important for foraging and dispersal, as it contains shelter such as tree hollows and is likely to be a higher productivity foraging environment. Despite the lack of data on usage of dispersal and foraging habitat, it is known that the Northern Quoll is highly mobile and capable of dispersing over long distances. For example, 2.5km in one day (Schmitt *et al.* 1989), 3.5km in seven days (King 1989), 2 – 3km at Poondano (Process Minerals International, unpublished data) and 2km at the Buckland Project (Phoenix Environmental Sciences 2012).

The Northern Quoll was recorded on three of the 82 camera traps deployed in April and October 2019. The two April 2019 quoll trapping sites only resulted in a single capture of a male quoll. The Northern Quoll has been subject to monitoring at eight sites across the western portion of the Study Area by Stantec (2017) since 2010 (see Figure 7 for site locations). Although initially relatively abundant (14 captures of eleven females and three males), the number of quolls caught during annual monitoring dropped significantly after widespread bushfires in 2014 and 2016 (Stantec 2017, MWH 2014). Low capture rates were experienced in 2016 and 2015 and only a single female was trapping in 2017. In 2018, Northern Quoll numbers appeared to be increasing again, with seven individuals captured (Biologic 2018a).

The presence of females in the population indicate that the Rocky Ridge and Gorge habitat in the Study Area support a breeding population of Northern Quoll. Though impacted by bushfire, Stantec (2017) concluded that the quoll population had not been significantly impacted by mining of iron ore at the Wodgina DSO Project. It appears that quolls are still present throughout the area and there are contemporary records of this species throughout the rocky range (Figure 14).



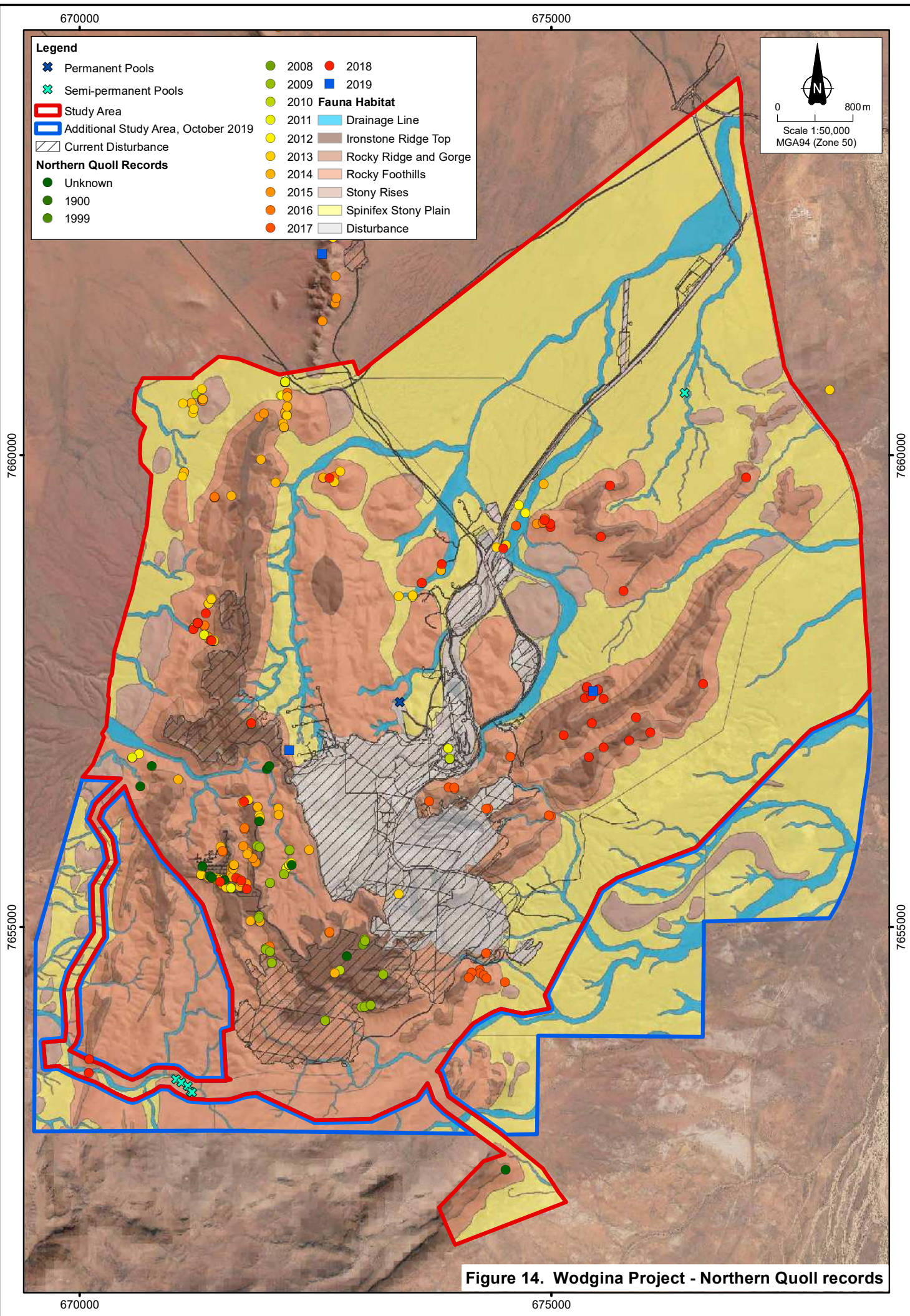


Figure 14. Wodgina Project - Northern Quoll records



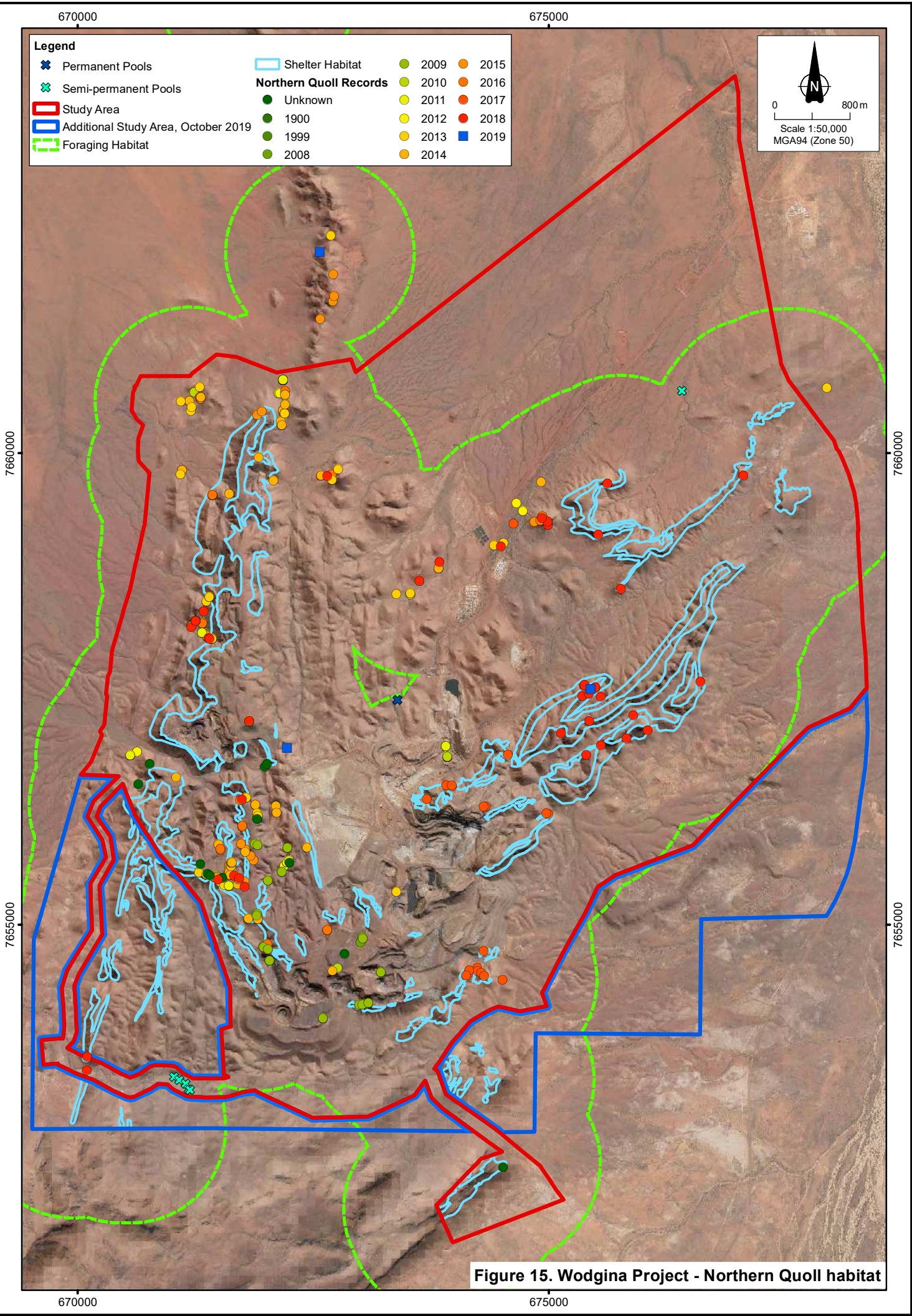


Figure 15. Wodgina Project - Northern Quoll habitat



The **Pilbara Leaf-nosed Bat** requires warm, humid daytime roost sites and forages in gorges, along watercourses and over low Spinifex-covered hills (TSSC 2016c). This species has been recorded on this and previous fauna surveys in the Study Area (Figure 16), and has been subject to targeted surveys. The Pilbara Leaf-nosed Bat is likely to forage throughout the study areas, particularly along major creeklines. When foraging it typically flies very low to the ground, so it is vulnerable to road mortalities (Van Dyck and Strahan 2008). Shallow caves and simple vertical shafts are unlikely roost sites, as they are restricted to sites that maintain warm, humid conditions all year, usually deep within a mine or cave structure, and often over pools of water (Armstrong 2001).

No permanent diurnal roosts are known from the Study Area (Stantec 2018b). Three permanent diurnal roosts are located about 25km from the Study Area; the East Turner River Roost to the northeast, the Yule River Roost to the West and the Glacier Valley Roost to the southeast (Stantec 2018b). A transitory diurnal roost (a roost used for daytime roosting for part of the year only) is located in the Study Area on the western part of the range (Figure 17). Transitory diurnal roosts potentially support long-distance dispersal and are critical habitat for this species. Several nocturnal refuges have also been identified across the survey area. These are used for feeding at night and are not considered critical habitat.

The **Ghost Bat** is a large carnivorous bat that occurs across northern Australia. Though not recorded during the current survey, this species has been recorded across the Study Area on previous surveys (Figure 18). The Pilbara population has been estimated at up to 2000 individuals, with the Chichester subpopulation (of which the colony in the Study Area is a part) comprising 1500 individuals (TSSC 2016a), though this species also occurs across north and north-east Australia with the total population estimated at about 10,000 individuals (Woinarski *et al.* 2014, TSSC 2016a).

Ghost Bats roost in both natural structures (such as caves), and old mine shafts. Intermittent roosts used by a few individuals, and may be relatively shallow caves, rock crevices or smaller mines (Armstrong and Anstee 2000, Woinarski *et al.* 2014). Maternity roosts are situated in caves with a high relative humidity, often with a small entrance opening into a larger chamber. Deep mines are also known to be maternity roosts, including those at Bamboo Creek Mine in the Marble Bar shire (Armstrong and Anstee 2000).

Ghost Bats are threatened by loss of roosting habitat (mostly in the Pilbara), disturbance at roost sites, degradation of foraging habitat, mortality on barbed wire fences near roost sites and poisoning by Cane Toads (Woinarski *et al.* 2014, TSSC 2016a).



The Ghost Bat uses the Study Area for foraging and roosting. Outback Ecology (2009) conducted an aerial search for caves identifying several diurnal roosts and Biologic (2018b) identified several caves that may be maternity roosts (Figure 19). The numbers of bats recorded has generally been low (Stantec 2018b). However, the colony of bats that uses the Study Area is likely to move between caves both inside and outside the Study Area, according to prevailing weather conditions, and significant numbers of bats have been recorded on occasion. For example, a roost of 65 bats with young was recorded at cave C2 in 2012, 23 bats in cave C1 in 2014 and 14 bats at cave C7a in 2017. Additionally, 60 bats were recorded at both caves C5 and AC-80 in 2009, caves 4km to the south of the Study Area (Figure 19). Roosts of this size represent a large proportion of the known population in the Chichester region. A small roost of 2 bats was recorded in the eastern range at cave SC-10 in 2009 (Outback Ecology 2009). When revisited in October 2019, it was determined that cave SC-10 was not a significant roost as the cave was relatively shallow and only likely to be used by small numbers of bats on occasion. Several nocturnal refuges have also been identified, and these are not considered critical habitat.

#### **Priority Species**

##### **Long-tailed Dunnart**

This species is listed as Priority 4 by DBCA.

*Sminthopsis longicaudata*

##### **Spectacled Hare-Wallaby**

This species is listed as Priority 4 by DBCA.

*Lagorchestes conspicillatus*

##### **Lakeland Downs Mouse**

This species is listed as Priority 4 by DBCA.

*Leggadina lakedownensis*

##### **Western Pebble-mound Mouse**

This species is listed as Priority 4 by DBCA.

*Pseudomys chapmani*

The **Long-tailed Dunnart** is associated with breakaways and scree slopes, but also occurs on gravel or stony plains (Van Dyck and Strahan 2008). Although not recorded during the current survey, this species was trapped in Rocky Foothill habitat at Wodgina in 2009 (Outback Ecology 2009), so is known to occur in the Study Area (Figure 20). This species is likely to favour the Rocky Ridge and Gorge habitat, but may also occur in the Rocky Foothills, Stony Rise and Spinifex Stony Plain habitats throughout the Study Area.

The mainland form of the **Spectacled Hare Wallaby** occurs across northern Australia, with an isolated population in the Pilbara (Van Dyck and Strahan 2008). The Pilbara population has declined significantly, possibly due to frequent fires preventing large Spinifex clumps from forming, as well as predation by foxes (Van Dyck and Strahan 2008). The mainland form of the Spectacled Hare-Wallaby is listed as 'Near Threatened' in the Action Plan for Australian Mammals 2012 (Woinarski *et al.* 2014). There are DBCA Threatened and Priority Fauna Database records of this species nearby (Figure 13), and a single dead individual was recorded in the Study Area in 2018 (Biologic 2018a) (Figure 20). This species is likely to occur in low densities in the Spinifex Stony Plain habitat, particularly where there are large long-unburnt spinifex hummocks in which to shelter.



The **Lakeland Downs Mouse** favours cracking and gilgaied clays (Gibson and McKenzie 2009), but it also occurs in a range of other habitats, including spinifex grasslands and stony ranges (Van Dyck and Strahan 2008). The Lakeland Downs Mouse has not been recorded in the Study Area and there are no nearby records on DBCA's Threatened and Priority Fauna Database (Figure 13). However, it has been recorded on NatureMap within 40km of the Study Area and populations of this species can fluctuate dramatically (Van Dyck and Strahan 2008), so it may be common in one year and virtually absent in another. The Lakeland Downs Mouse may occur in the Study Area.

The **Western Pebble-Mound Mouse** occurs in the ranges of the central and southern Pilbara, and the smaller ranges of the Little Sandy Desert. It inhabits gentle stony slopes where it constructs its pebble mounds, often situating them near *Acacia*-lined minor drainages (Van Dyck and Strahan 2008). This species has disappeared from parts of its range along the Pilbara coast, Murchison and Gascoyne, possibly due to the fox and introduced herbivores (Van Dyck and Strahan 2008). Despite this, mining is not considered to be a threatening process for this species, as its habitat is relatively widespread (Woinarski *et al.* 2014). Both active and inactive mounds of this species were found on spinifex stony plains in the study areas (Figure 20, Plate 18). The Western Pebble-mound Mouse is likely to occur throughout the Spinifex Stony Plain habitat of the Study Area and in the wider region.



**Plate 18. Active Western Pebble-mound Mouse mound.**

#### **5.4.2 Feral Mammals**

Six feral mammal species were recorded in the Study Area (Table 11, Appendix 8). Evidence of cows (livestock) was common, particularly in the Drainage Line habitat. Cats (*Felis catus*) were recorded on camera traps at eight of the 40 locations in April and four of the 42 locations in October 2019 (Plate 19), and Dogs/Dingo (*Canis familiaris*) were recorded on a single camera trap in April 2019.



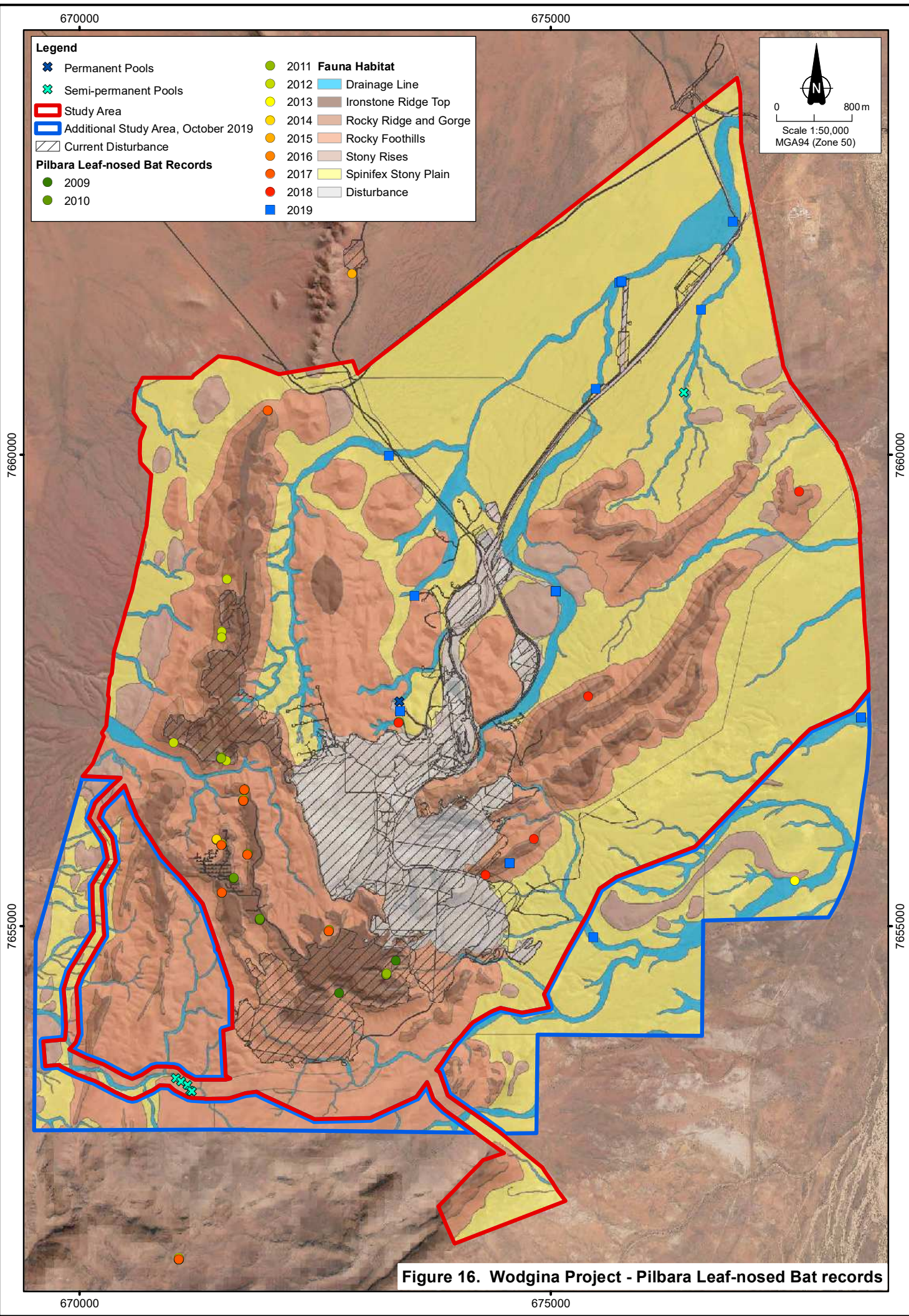
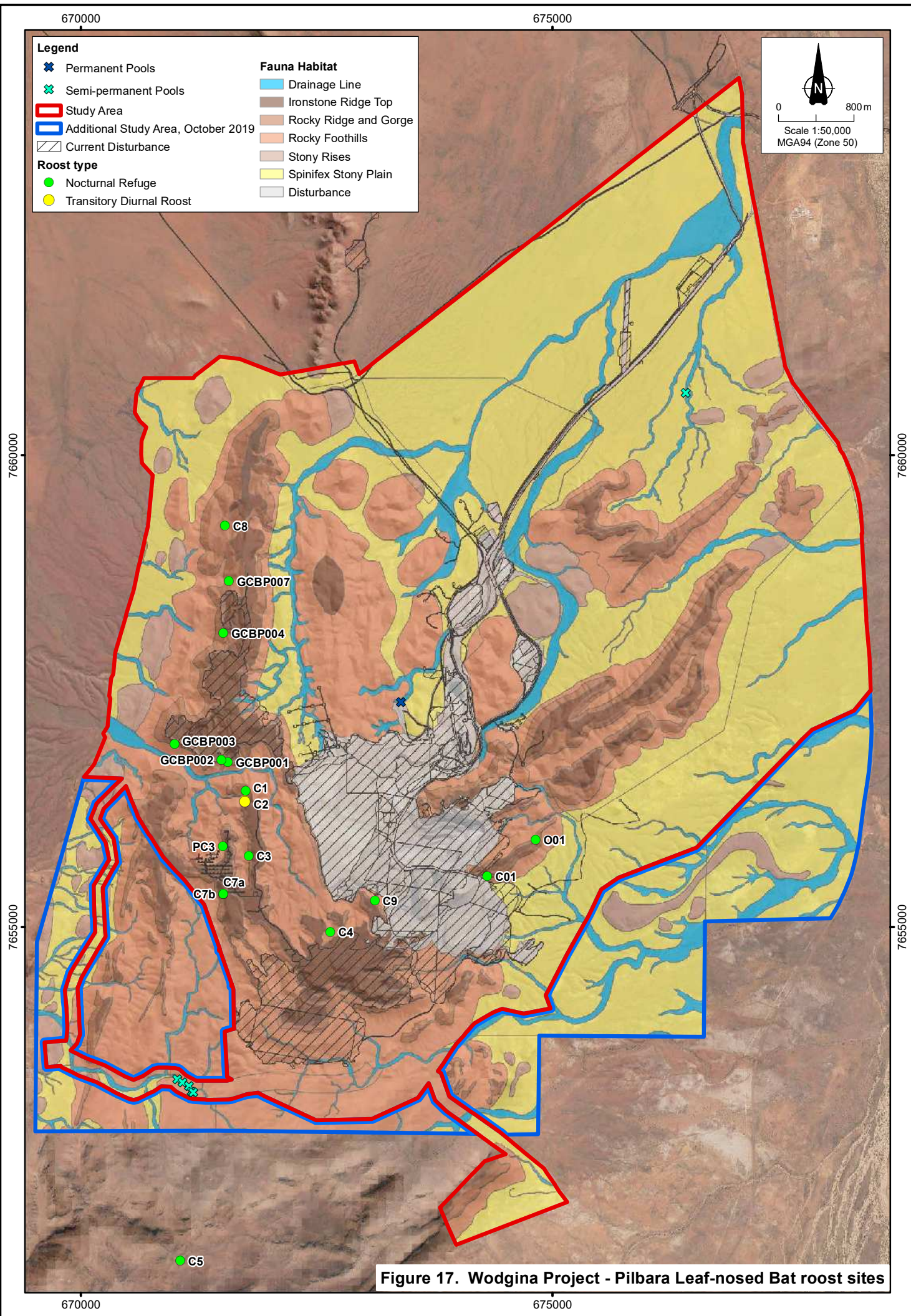
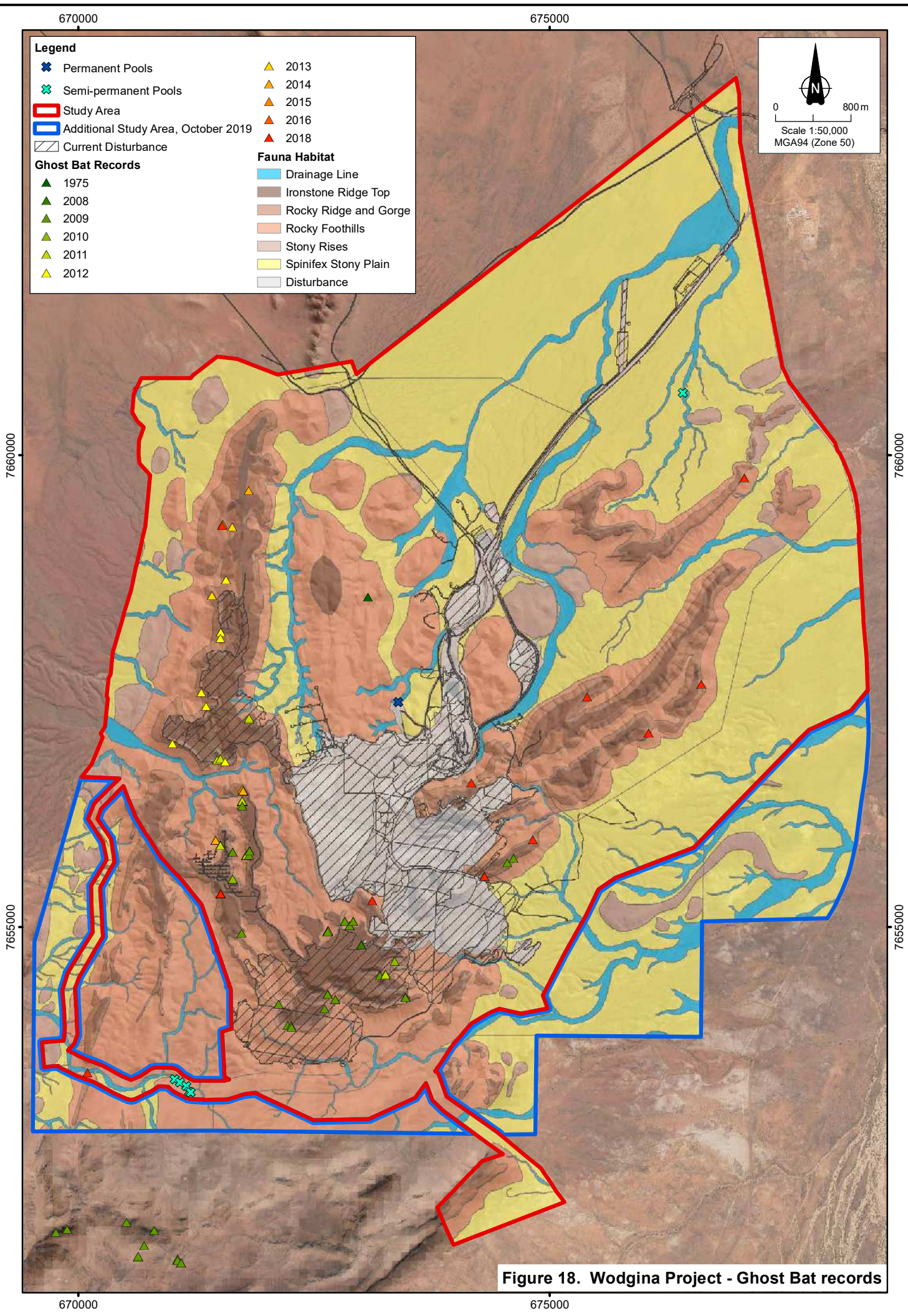


Figure 16. Wodgina Project - Pilbara Leaf-nosed Bat records











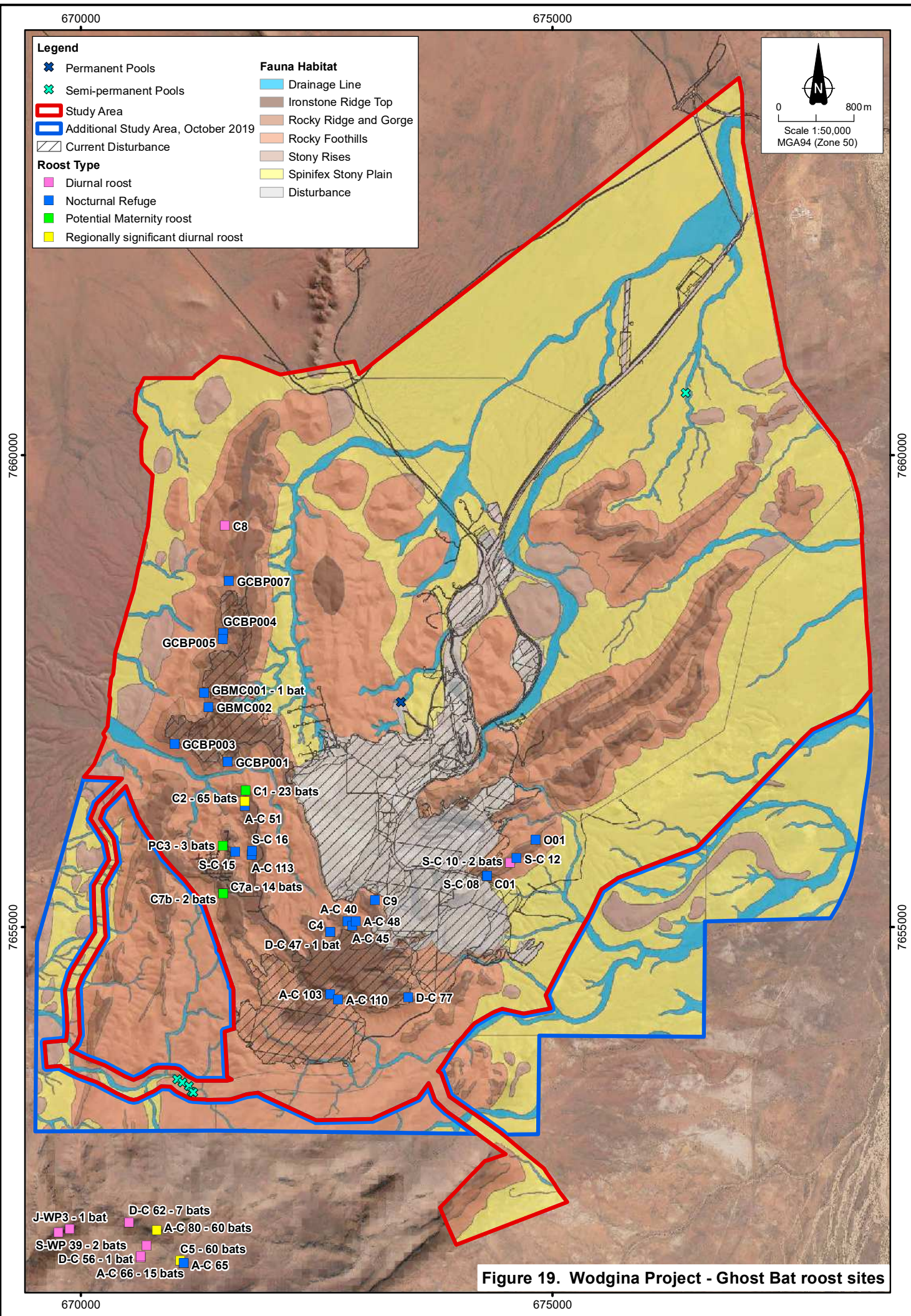
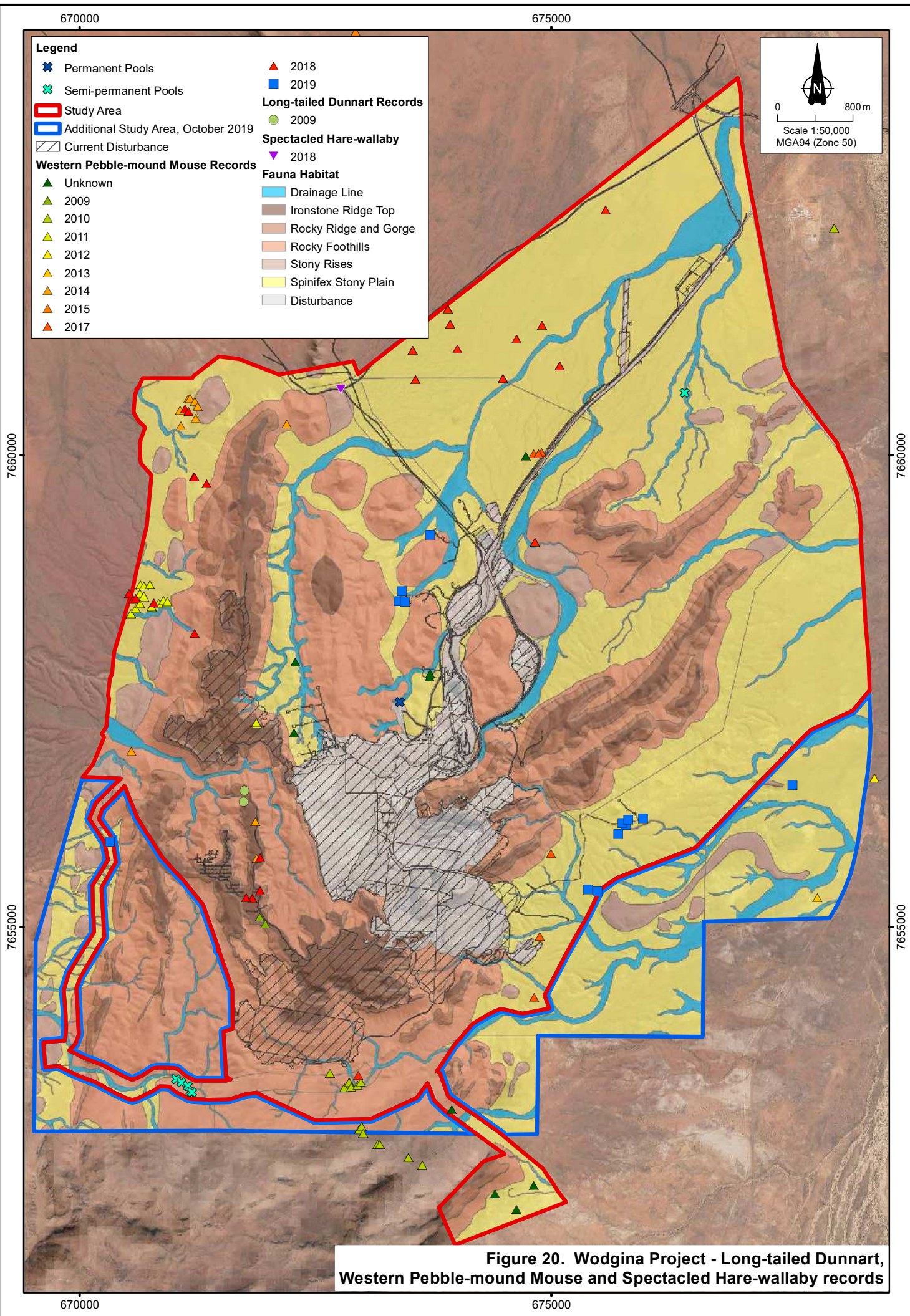


Figure 19. Wodgina Project - Ghost Bat roost sites





**Figure 20. Wodgina Project - Long-tailed Dunnart, Western Pebble-mound Mouse and Spectacled Hare-wallaby records**





**Plate 19. Feral Cats on camera traps in the Study Area.**

The Cat (*Felis catus*), Fox (*Vulpes vulpes*) and Wild Dog (*Canis familiaris*) are feral predators known to prey on native fauna species. 'Predation by Feral Cats' and 'Predation by the European Red Fox' are listed as a key threatening processes under the EPBC Act. Foxes prey on 'critical weight range' mammals (i.e. those between 35g and 5.5kg) and ground-nesting birds (Commonwealth of Australia 2008). Feral Cats have contributed to the extinction of many small to medium sized native mammals and ground-nesting birds in the arid zone (Commonwealth of Australia 2015a). Though mammals tend to be the dominant prey (Commonwealth of Australia 2015a), each Feral Cat in natural environments kills on average 225 reptiles per year, with cats in arid areas taking even more, equating to the predation of about 1.8 million reptiles per day (Woinarski *et al.* 2018).

The relationships between feral predators are complex, as they may compete for prey, prey on each other or kill to remove a competitor. The presence of one predator, such as a wild dog or dingo, may affect the behaviour or suppress the abundance of smaller species, such as Cats (Commonwealth of Australia 2015b). Also, the presence of feral prey species such as Rabbits (*Oryctolagus cuniculus*) can support Fox populations (Commonwealth of Australia 2008). These complex interactions mean that control of these species is not straightforward, as reducing the population of one species may result in the increase in another.

## 5.5 Freshwater Fish

The freshwater fish fauna of the interior Pilbara region is not diverse. Only eight species are expected to occur in the vicinity of the Study Area (Appendix 9), though most of these are likely to be restricted to the larger rivers (i.e. the Turner River) and any permanent river pools. The species listed in Appendix 9 have mainly been recorded in the Turner River, of which the drainage lines in the Study Area are tributaries, by Morgan and Gill (2004). No freshwater fish were recorded in the Study Area.



## 6. Survey Adequacy

### 6.1 Species Accumulation Curves

Species accumulation curves were calculated for reptiles (Figure 19), mammals (Figure 20) and birds (Figure 21) in each habitat. For reptiles and small terrestrial mammals, data from both this survey and the Hercules DSO Project (Outback Ecology 2012) were used, with the number of captures combined for each habitat type. Data from the Wodgina DSO survey (Outback Ecology 2009) was not used, as the data for each habitat were not available. For birds, only the data from this survey was used, and combined for all sites. Raw bird data for previous surveys were not available.

Estimates of species richness for reptiles and mammals are given in Table 12, using the Chao1 estimator for abundance-based trapping data. Species richness estimates for birds in each habitat are given in Table 13, using the ICE estimator for incidence-based bird survey data. These are good indicators of the lower bound of the total species richness with small sample sizes. However, the number of singletons in many samples is high, indicating that the sample size is low and the accuracy of these estimates is likely to be poor. This is a common feature of all Level 2 fauna surveys, with many species represented by a single capture, and is ameliorated by using other survey techniques to increase the number of species recorded across the Study Area as a whole.

When interpreting species accumulation curves and estimators of species richness in the context of a Level 2 fauna survey, it is vital to remember that the data collected is influenced by the sampling methods. All sampling methods have inherent biases that favour the detection of some species over others, i.e. some species will be readily trapped and others may be trapped rarely or not at all. Thus the species accumulation curves and estimates of species richness are that of the 'trappable' component of the fauna only. Species may not be trappable if they are temporarily absent from the site (e.g. migratory, nomadic species or irruptive species), are too large to be targeted by standard trapping techniques (e.g. kangaroos) or are shy of entering traps. Fauna may also be patchy in their distribution within a habitat, and may only be trapped if the trapping site intersects their home-range.

In addition, the trappable component of the fauna is likely to vary due to the prevailing conditions, e.g. frogs may be trappable after heavy rains, but virtually impossible to sample in dry conditions. Long-term drought conditions may reduce some species to undetectable levels, or cool conditions may result in reptiles being inactive.

For both reptiles and mammals, the species accumulation curve did not reach asymptote, suggesting that if trapping had continued, more species would have been recorded in each habitat. However, the level of trapping was consistent with guidance for fauna surveys (EPA and DEC 2010). For mammals, the estimate of species richness for each habitat was only slightly higher than the observed species richness, suggesting few species remained unrecorded. The sample sizes for mammal captures were very low, with most mammals on this survey recorded through other methods such as bat call recording and camera traps.



For birds, the species accumulation curves did not reach asymptote, although it should be noted that many species were observed outside of systematic bird surveys. The estimated species richness was 72.7 species (Table 13) and 76 species were recorded on the current survey (Table 10). Birds are generally more mobile than reptiles and mammals and most species are likely to occur across several habitats.

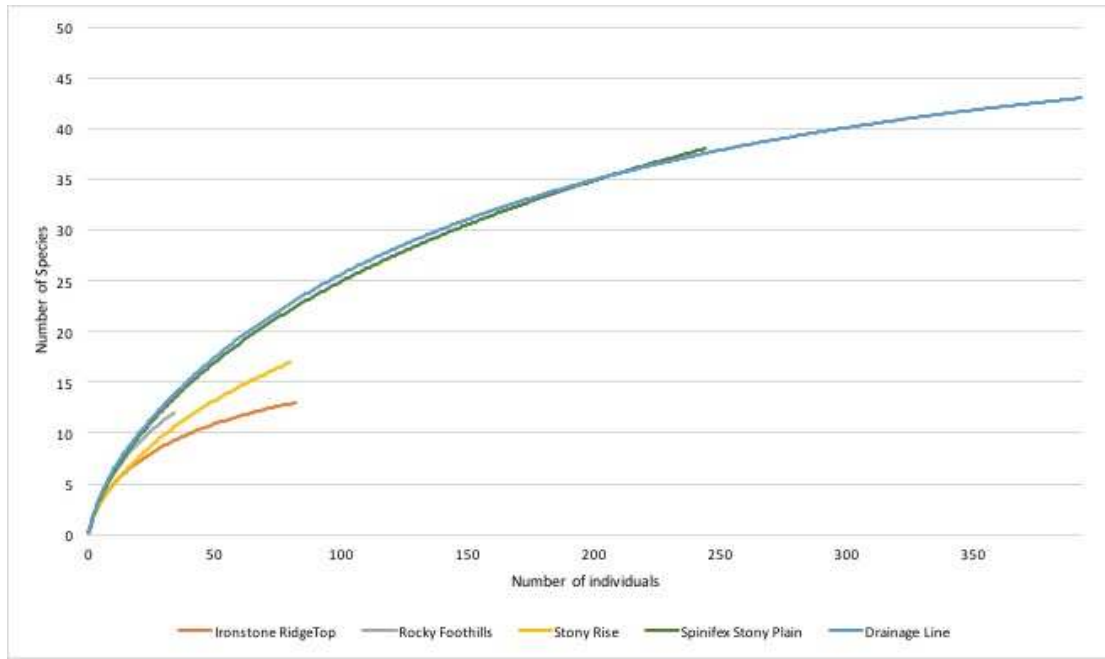


Figure 21. Species accumulation curves for reptiles in each habitat.

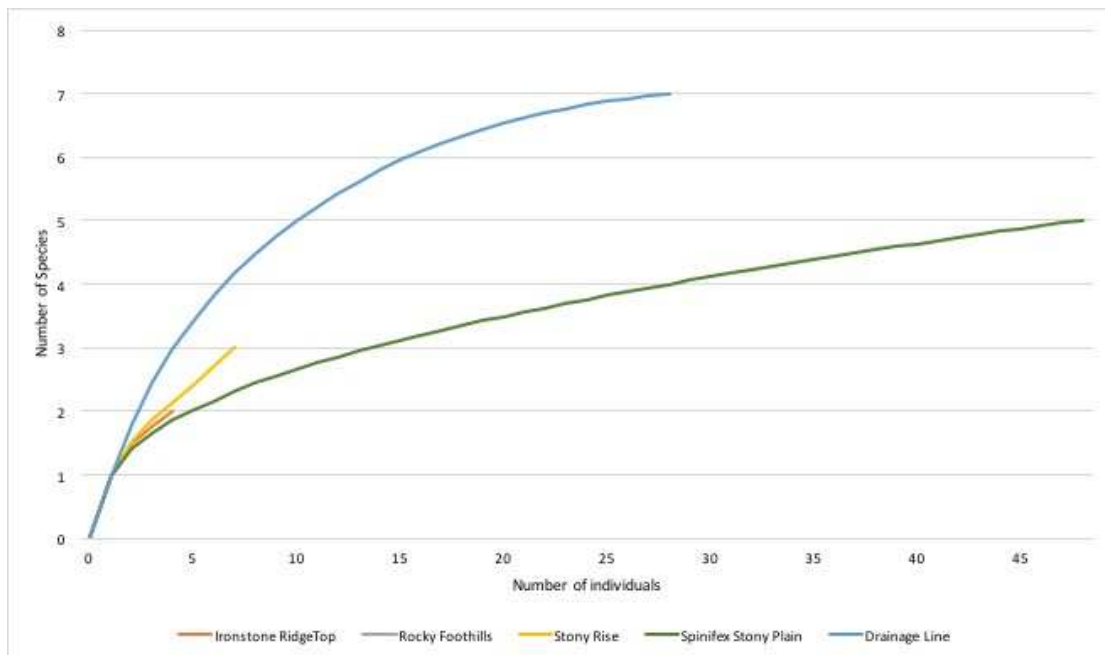
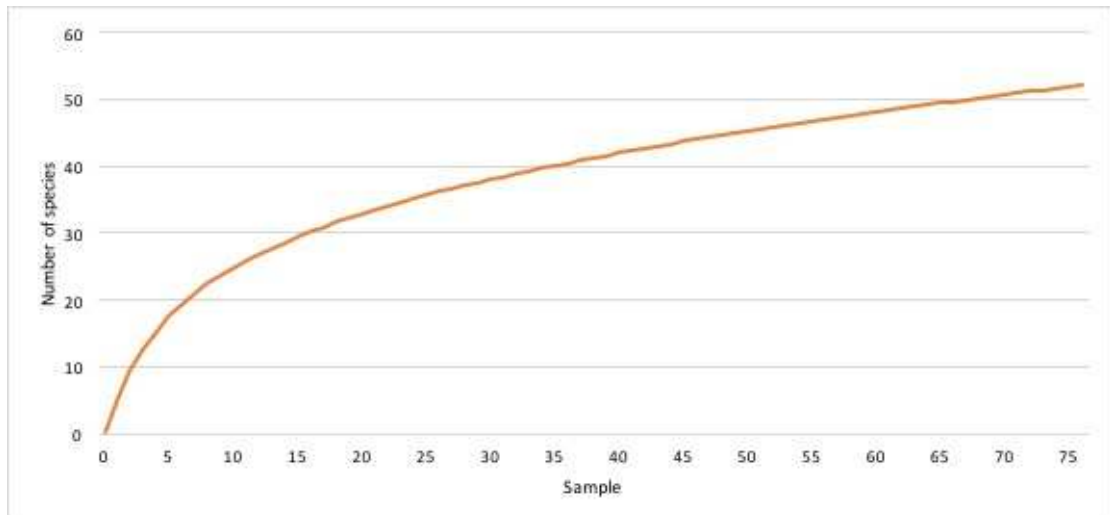


Figure 22. Species accumulation curves for mammals in each habitat.





**Figure 23. Species accumulation curve for birds in all habitats.**

It is important to note that although each habitat supports its own faunal assemblage, individual species can occur across more than one assemblage. This is particularly the case for habitats with similar substrates such as stony plains, stony rises and rocky foothills. Therefore, even if a species has not been recorded in a particular habitat, it may have been recorded in a similar habitat and still be a part of the overall species inventory for the Study Area.

**Table 12. Estimated species richness for reptiles and mammals in each habitat.**

Species Group	Habitat	Observed species richness	Sample Size (number of individuals)	Number of singletons in the sample	Chao1 Estimate of species richness ( $\pm$ SD)
Reptiles	Ironstone Ridgetop	13	82	4	14.48 $\pm$ 2.21
	Rocky Foothills	12	34	6	16.85 $\pm$ 5.39
	Stony Rise	17	80	9	28.85 $\pm$ 10.65
	Spinifex Stony Plain	38	224	16	52.93 $\pm$ 9.94
	Drainage Line	43	393	10	47.98 $\pm$ 4.30
Mammals	Ironstone Ridgetop	2	4	1	2.00 $\pm$ 0.46
	Rocky Foothills	1	3	0	-
	Stony Rise	3	7	2	3.85 $\pm$ 1.84
	Spinifex Stony Plain	5	48	2	5.48 $\pm$ 1.27
	Drainage Line	7	28	1	7.00 $\pm$ 0.16



**Table 13. Estimated species richness for birds in all habitats.**

Species Group	Habitat	Observed species richness	Sample Size (number of records)	Number of uniques in the sample	ICE Estimate of species richness ( $\pm$ SD)
Birds	All	52	418	17	72.77 $\pm$ 0.01

## 6.2 Proportion of the Fauna Identified

Species accumulation curves are not the complete picture, as they are based only on the systematically collected trapping and bird survey data. Many species are observed opportunistically or through targeted surveys, and these records often add considerably to the total species inventory of a particular site. The total number of species observed can be compared to the number of species potentially occurring on the site. A total of ten frogs, 108 reptiles, 140 birds, 33 native mammals and eight introduced mammals potentially occur, based on the literature review (Table 7, Appendices 5 - 8). Of these, 50.0% of frogs, 65.7% of reptiles, 63.6% of birds, 75.8% of native mammals and 75.0% of exotic mammals were recorded in the Study Area between 2009 and 2019.

For each species group, at least half the expected species were recorded. As the list of potentially occurring species in Appendices 5 to 8 is relatively conservative, it is quite likely that some of the unrecorded species, though known from the region, do not in fact occur in the Study Area. Bird populations in arid areas are likely to fluctuate markedly in response to local and regional climatic conditions. Potentially occurring species that remain unrecorded include 20 waterbird species and terrestrial species that may move into the area from coastal regions after summer rains or during flowering events.

Of the reptiles that remain unrecorded, many are species that are on the edge of their known range in the Study Area, and it is probable that for at least some of these species, their range does not extend into the Study Area.

It is likely that further work in the Study Area will result in more species being recorded. This is the case with all Level 1 and Level 2 fauna surveys, as the short survey periods only provide a 'snapshot' of the fauna occurring in the Study Area. However, the addition of the current survey to the data collected on previous surveys has resulted in a significant proportion of the fauna being recorded, and field data are supported by a review of the relevant literature.



## 7. Conclusions

### 7.1 Faunal Assemblage

The faunal assemblage of the Study Area is likely to be diverse, though many of the species that occur are widely distributed through arid Australia. The predicted faunal assemblage includes up to ten frogs, 108 reptiles, 140 birds, 33 native mammals and eight introduced mammals. The observed assemblage thus far includes five frogs, 71 reptiles, 89 birds, 25 native mammals and six introduced mammals.

### 7.2 Conservation Significant Fauna

Seventeen conservation significant fauna have been recorded or potentially occur in the Study Area, as summarised in Table 14. The species have been grouped into their conservation significance categories and discussed below.

#### 1. Threatened species.

Six threatened species potentially occur in the Study Area, of which three have been recorded on the current or previous surveys:

- Pilbara Olive Python (*Liasis olivaceus barroni*)
- Grey Falcon (*Falco hypoleucos*)
- Night Parrot (*Pezoporus occidentalis*)
- Northern Quoll (*Dasyurus hallucatus*) - **Recorded**
- Pilbara Leaf-nosed Bat (*Rhinonictis aurantia*) - **Recorded**
- Ghost Bat (*Macroderma gigas*) - **Recorded**

Threatened species are those that are considered in danger of extinction as their populations have declined and/or are still declining, and their total population size is small and/or fragmented or geographically restricted. Sites that support these species may be important for their long-term conservation, particularly if the site supports a resident breeding population.

The Northern Quoll, Pilbara Leaf-nosed Bat and Ghost Bat are all known to occur in the Study Area.

The Northern Quoll is likely to be a resident breeding species, albeit one that is less numerous than in previous years, probably due to the impact of bushfires in 2014 and 2016 (Stantec 2017).

The Pilbara Leaf-nosed Bat is known to forage in the Study Area, particularly in the Drainage Line habitat. No permanent diurnal roosts are present or thought likely to be present, though a transitory diurnal roost and nocturnal refuges have been recorded in the western part of the Study Area.



Similarly, the Ghost Bat is likely to forage across the Study Area, with both diurnal roosts and potential maternity roosts recorded in the Study Area. Significant numbers of Ghost Bats (up to 65 bats) have been recorded on occasion.

The status of the Night Parrot in the Study Area is difficult to assess, as this species is represented by very few records in the region and/or very few records overall, so its pattern of distribution and abundance are not clear. The Night Parrot was not recorded during the survey, the Study Area lacks the *Triodia longiceps* habitats that this species is associated with at occupied sites and areas with large spinifex hummocks are more wooded than at sites where this species is known to occur.

The Grey Falcon is unlikely to breed in the Study Area but is potentially a foraging visitor if breeding nearby.

## **2. Migratory species.**

Four Migratory species potentially occur in the Study Area, of which none have been recorded in the Study Area:

- Oriental Plover (*Charadrius veredus*)
- Wood Sandpiper (*Tringa glareola*) - **Recorded**
- Common Sandpiper (*Tringa hypoleucos*) - **Recorded**
- Fork-tailed Swift (*Apus pacificus*)

Migratory species are not always present at a site, but a particular site may have significance as a seasonal or ephemeral foraging, breeding or shelter area. Impacts to these sites may then impact the population both within the site and further afield. It is unlikely that the Study Area provides important habitat for migratory species, although low numbers of individuals may occur at times. Both Common and Wood Sandpipers were recorded as individual birds in the Study Area in October 2019.

## **3. Specially Protected species.**

A single Specially Protected species potentially occurs in the Study Area:

- Peregrine Falcon (*Falco peregrinus*)

The Peregrine Falcon potentially occurs as a breeding species or a foraging visitor. Although the Study Area provides habitat for this species, its population is large and secure.



#### 4. Priority species

Six Priority species potentially occur in the Study Area, of which three have been recorded on the current or previous surveys:

- Black-striped Ctenotus (*Ctenotus nigrilineatus*)
- Gane's Blind Snake (*Anilius ganei*)
- Long-tailed Dunnart (*Sminthopsis longicaudata*) – **Recorded**
- Spectacled Hare-wallaby (*Lagorchestes conspicillatus*) – **Recorded**
- Lakeland Downs Mouse (*Leggadina lakedownensis*)
- Western Pebble-mound Mouse (*Pseudomys chapmani*) – **Recorded**

The Black-striped Ctenotus and Gane's Blind Snake are data deficient and known from only a few locations. They have not been recorded in the Study Area, but the habitats present may support these species.

The Long-tailed Dunnart was recorded in 2009 and is likely to be restricted to rocky habitats. The Western Pebble-mound Mouse is likely to be common and widespread within its habitat of Spinifex Stony Plains. The Spectacled Hare-wallaby was recorded in 2018 (Biologic 2018a) and is likely to occur on the Spinifex Stony Plain, favouring long-unburnt areas. Although unrecorded thus far, the Lakeland Downs Mouse may occur, as the Study Area is within its range and potentially suitable habitats are present.

#### 5. Locally Significant Fauna

No locally significant fauna were identified on this survey.

### 7.3 Important Habitats

All habitats have some importance in that they support native fauna, however, habitats may be of particular importance if they:

- support very diverse or unique faunal assemblages
- are restricted or rare in the region (and thus the faunal assemblages are restricted or rare)
- are refugia (e.g. from drought or fire)
- provide ecological linkage
- support conservation significant fauna

Of the habitats in the Study Area, the Rocky Ridge and Gorge habitat is considered the most important as it provides habitat for several Threatened and Priority fauna species and is limited in extent in the region compared with habitats such as stony plains or sandplain. This habitat provides caves, cracks and crevices for shelter, breeding and roosting sites for a range of native fauna.



The Drainage Line habitat is also important, as though it is widespread in the region, it is likely to support greater abundance and diversity of fauna than surrounding habitats and may provide a corridor for fauna movement. Permanent and semi-permanent pools are likely to provide water for fauna in an otherwise relatively dry landscape.



**Table 14. Summary of conservation significant fauna.**

Key to status: Cr = Critically Endangered, En = Endangered, Vu = Vulnerable, Mi = Migratory, Sp = Specially Protected, P1 – P4 = Priority 1 – 4, LS = Locally Significant.

Species	Conservation Status				Recorded in Study Area 2009 - 2019	Likelihood of Occurrence	Potential habitat use in the Study Area					
	EPBC Act	BC Act	DBCA Priority	Locally significant			Ironstone Ridgetop	Rocky Ridge and Gorge	Rocky Foothills	Stony Rise	Spinifex Stony Plain	Drainage Line
Threatened Species												
<i>Pezoporus occidentalis</i> Night Parrot	En	Cr			-	Low (?)					?	
<i>Dasyurus hallucatus</i> Northern Quoll	En	En			Yes	Known to occur		+				+
<i>Rhinonictis aurantia</i> Pilbara Leaf-nosed Bat	Vu	Vu			Yes	Known to occur		+				+
<i>Macroderma gigas</i> Ghost Bat	Vu	Vu			Yes	Known to occur		+				
<i>Liasis olivaceus barroni</i> Pilbara Olive Python	Vu	Vu			-	High		+				+
<i>Falco hypoleucos</i> Grey Falcon		Vu			-	High	+		+	+	+	+
Migratory Species												
<i>Charadrius veredus</i> Oriental Plover	Mi	Mi			-	Moderate (non-breeding only)						+
<i>Tringa glareola</i> Wood Sandpiper	Mi	Mi			Yes	Known to occur (non-breeding only)						+
<i>Tringa hypoleucos</i> Common Sandpiper	Mi	Mi			Yes	Known to occur (non-breeding only)						+
<i>Apus pacificus</i> Fork-tailed Swift	Mi	Mi			-	High						+
Specially Protected												
<i>Falco peregrinus</i> Peregrine Falcon		Sp			-	High	+	+	+	+	+	+
Priority Species												
<i>Ctenotus nigrilineatus</i> Black-lined Ctenotus			P1		-	Moderate					?	
<i>Anilius ganei</i> Gane’s Blind Snake			P1		-	Moderate		?	?			



**Table 14. (cont.)**

Species	Conservation Status				Recorded in Study Area 2009 - 2019	Likelihood of Occurrence	Potential habitat use in the Study Area					
	EPBC Act	BC Act	DBCA Priority	Locally significant			Ironstone Ridgeline	Rocky Ridge and Gorge	Rocky Foothills	Stony Rise	Spinifex Stony Plain	Drainage Line
<i>Lagorchestes conspicillatus</i> <b>Spectacled Hare-wallaby</b>			P4		Yes	Known to occur					+	
<i>Sminthopsis longicaudata</i> <b>Long-tailed Dunnart</b>			P4		Yes	Known to occur	+	+	+	+	+	
<i>Leggadina lakedownensis</i> <b>Lakeland Downs Mouse</b>			P4		-	Moderate					+	+
<i>Pseudomys chapmani</i> <b>Western Pebble-mound Mouse</b>			P4		Yes	Known to occur	+				+	



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## Appendices.

### Appendix 1. Daily weather observations before and during each survey period.

Data after BOM (2019).

Month	Date	Survey Period	Daily Temperature (°C)		Rainfall (mm)
			Minimum	Maximum	
March 2019	20 – 03 – 19		25.5	41	0
	21 – 03 – 19		26.8	37.7	0
	22 – 03 – 19		28	37	0
	23 – 03 – 19		26.8	33.1	0
	24 – 03 – 19		24.9	26.1	16.2
	25 – 03 – 19		22.5	28.2	138
	26 – 03 – 19		22.9	34.2	26.8
	27 – 03 – 19		24.2	36.5	0
	28 – 03 – 19		26	38.6	0
	29 – 03 – 19		27.4	40.2	0
	30 – 03 – 19		26.9	37.8	0
	31 – 03 – 19		22.8	38.3	0
April 2019	1 – 04 – 19		20.7	38.2	0
	2 – 04 – 19		20.5	38.5	0
	3 – 04 – 19		21.4	37.5	0
	4 – 04 – 19		19.1	37.6	0
	5 – 04 – 19		19.4	38	0
	6 – 04 – 19		19.1	38.7	0
	7 – 04 – 19		20.3	39.3	0
	8 – 04 – 19	✓	23.1	37.8	0
	9 – 04 – 19	✓	27.2	36.8	0
	10 – 04 – 19	✓	26.2	38.7	0
	11 – 04 – 19	✓	26.7	38.4	0
	12 – 04 – 19	✓	24.6	31.6	0.4
	13 – 04 – 19	✓	24.6	36.1	0.2
	14 – 04 – 19	✓	26	35.5	0
	15 – 04 – 19	✓	24.9	35.9	0
	16 – 04 – 19	✓	25.8	36.7	0
	17 – 04 – 19	✓	25	37.6	0
	18 – 04 – 19	✓	25.6	39	0
	19 – 04 – 19	✓	24.3	38.2	0



**Appendix 1. (cont.)**

Month	Date	Survey Period	Daily Temperature (°C)		Rainfall (mm)
			Minimum	Maximum	
September 2019	23 – 03 – 19		17.5	32.7	0
	24 – 03 – 19		16.8	30.7	0
	25 – 03 – 19		14.1	34.1	0
	26 – 03 – 19		16.3	36.8	0
	27 – 03 – 19		17.5	36.0	0
	28 – 03 – 19		16.3	37.1	0
	29 – 03 – 19		16.5	39.0	0
	30 – 03 – 19		18.8	39.9	0
October 2019	1 – 04 – 19		24	41.8	0
	2 – 04 – 19		24.9	42.8	0
	3 – 04 – 19		27.3	42.3	0
	4 – 04 – 19		27.2	42.3	0
	5 – 04 – 19		26.6	40.4	0
	6 – 04 – 19		19.8	41.8	0
	7 – 04 – 19		20.4	42.1	0
	8 – 04 – 19		23.1	42.1	0
	9 – 04 – 19		20.9	42.6	0
	10 – 04 – 19		20.8	42.2	0
	11 – 04 – 19		21.8	43.2	0
	12 – 04 – 19		19.7	42.8	0
	13 – 04 – 19		19.4	39.4	0
	14 – 04 – 19		19.6	38.6	0
	15 – 04 – 19		18.4	38.9	0
	16 – 04 – 19	✓	20.6	40.6	0
	17 – 04 – 19	✓	20.9	40.6	0
	18 – 04 – 19	✓	24.0	42.3	0
	19 – 04 – 19	✓	21.6	42.5	0
	20 – 04 – 19	✓	25.2	42.7	0
	21 – 04 – 19	✓	24.9	42.3	0
	22 – 04 – 19	✓	26.4	42.0	0
	23 – 04 – 19	✓	25.6	42.4	0
	24 – 04 – 19	✓	26.7	42.2	0
	25 – 04 – 19	✓	22.7	41.6	0
	26 – 04 – 19	✓	22.4	40.6	0



## Appendix 2. SM4 passive acoustic detector locations.

Site	Zone	Easting	Northing	Start Date	Stop Date	Nights Recording
SM4-01-13-04-19	50	675661	7661841	13/04/2019	18/04/2019	5
SM4-02-13-04-19	50	677061	7656504	13/04/2019	18/04/2019	5
SM4-03-13-04-19	50	674831	7652239	13/04/2019	19/04/2019	6
SM4-04-13-04-19	50	678209	7658527	13/04/2019	18/04/2019	5
SM4-05-13-04-19	50	675335	7655145	13/04/2019	18/04/2019	5
SM4-06-13-04-19	50	676639	7663342	13/04/2019	18/04/2019	5

## Appendix 3. Anabat bat detector locations.

Site	Zone	Easting	Northing	Start Date	Stop Date	Nights Recording
BAT_450083_13-04-19	50	675753	7661831	13/04/2019	15/04/2019	2
BAT_450091_13-04-19	50	675675	7656084	13/04/2019	14/04/2019	1
BAT_450091_14-04-19	50	675014	7662359	14/04/2019	15/04/2019	1
BAT_450083_15-04-19	50	673590	7658489	15/04/2019	16/04/2019	1
BAT_450083_16-04-19	50	673405	7657272	16/04/2019	18/04/2019	2
BAT_450091_15-04-19	50	675054	7658545	15/04/2019	18/04/2019	3
Bat 450083 12-04-19	50	678294	7657206	12/04/2019	14/04/2019	2
Bat 450083 19-10-19	50	675010	7662387	19/10/2019	20/10/2019	1
Bat 450085 19-10-19	50	675730	7661821	19/10/2019	20/10/2019	1
Bat 450085 20-10-19	50	675057	7658544	20/10/2019	21/10/2019	1
Bat 450083 20-10-19	50	675880	7656138	20/10/2019	21/10/2019	1
Bat 450083 21-10-19	50	678294	7657206	21/10/2019	22/10/2019	1
Bat 450085 21-10-19	50	673559	7658495	21/10/2019	22/10/2019	1
Bat 450085 22-10-19	50	676597	7661533	22/10/2019	23/10/2019	1
Bat 450083 22-10-19	50	674564	7655664	22/10/2019	24/10/2019	2
Bat 450085 23-10-19	50	673286	7659985	23/10/2019	24/10/2019	1
Bat 450085 24-10-19	50	675480	7660695	24/10/2019	25/10/2019	1
Bat 450083 24-10-19	50	675452	7654878	24/10/2019	25/10/2019	1
Bat 450085 25-10-19	50	676934	7662466	25/10/2019	26/10/2019	1
Bat 450083 25-10-19	50	677265	7656436	25/10/2019	26/10/2019	1



**Appendix 4. Camera trap locations.**

Site	Zone	Easting	Northing	Start Date	Stop Date	Habitat	Nights recording
Cam WL40	50	673975	7658159	15/04/2019	19/04/2019	Drainage near camp	4
Cam WL41	50	672227	7656863	15/04/2019	19/04/2019	Gully	4
Cam WL42	50	673400	7657371	15/04/2019	19/04/2019	Breakaway	4
Cam WL43	50	673139	7658456	15/04/2019	19/04/2019	Rockface	4
Cam WL47	50	675071	7658584	15/04/2019	19/04/2019	Drainage Line	4
Cam WL48	50	675092	7658141	15/04/2019	19/04/2019	Drainage Line	4
Cam WL49	50	673414	7657419	15/04/2019	19/04/2019	Gorge/Gully	4
Cam WL19	50	672672	7661573	14/04/2019	18/04/2019	Breakaway	4
Cam WL20	50	672709	7662218	14/04/2019	18/04/2019	Breakaway	4
Cam WL21	50	672573	7662126	14/04/2019	18/04/2019	Breakaway	4
Cam WL22	50	673099	7658414	15/04/2019	19/04/2019	Gully/Breakaway	4
Cam WL23	50	673219	7658555	15/04/2019	19/04/2019	Breakaway	4
Cam WL24	50	672630	7661578	14/04/2019	18/04/2019	Gully	4
Cam WL27	50	672213	7656958	15/04/2019	19/04/2019	Breakaway	4
Cam WL28	50	671916	7664794	14/04/2019	18/04/2019	Breakaway	4
Cam WL29	50	671897	7664826	14/04/2019	18/04/2019	Breakaway	4
Cam WL45	50	673219	7658636	15/04/2019	19/04/2019	Breakaway	4
Cam WL31	50	673441	7659154	14/04/2019	18/04/2019	Rockpile	4
Cam WL02	50	674946	7656138	13/04/2019	18/04/2019	Gorge	5
Cam WL30	50	675007	7656188	13/04/2019	18/04/2019	Gorge	5
Cam WL10	50	675831	7655244	14/04/2019	18/04/2019	Ironstone ridgetop	4
Cam WL09	50	675938	7655243	14/04/2019	18/04/2019	Ironstone ridgetop	4
Cam WL04	50	675260	7655137	14/04/2019	18/04/2019	Drainage line	4
Cam WL06	50	678175	7657194	14/04/2019	18/04/2019	Drainage line	4
Cam WL50	50	674348	7652064	14/04/2019	19/04/2019	Drainage line	5
Cam WL18	50	674026	7652014	14/04/2019	19/04/2019	Rocky hill slope	5
Cam WL44	50	678201	7655881	15/04/2019	19/04/2019	Drainage line	4
Cam WL46	50	676737	7653345	15/04/2019	19/04/2019	Drainage line	4
Cam WL25	50	673526	7652144	15/04/2019	19/04/2019	Rocky hill slope	4
Cam WL15	50	673540	7652415	15/04/2019	19/04/2019	Drainage line	4
Cam WL26	50	677397	7655532	15/04/2019	19/04/2019	Rocky hill slope	4
Cam WL03	50	677279	7656527	13/04/2019	18/04/2019	Rocky Foothills	5
Cam WL07	50	677173	7656569	13/04/2019	18/04/2019	Rocky Foothills	5
Cam WL08	50	675293	7656360	13/04/2019	18/04/2019	Rocky Foothills	5
Cam WL17	50	675333	7656434	13/04/2019	18/04/2019	Rocky Foothills	5
Cam WL35	50	675571	7655103	14/04/2019	18/04/2019	Rocky Foothills	4
Cam WL16	50	677457	7660434	14/04/2019	18/04/2019	Rocky Foothills	4
Cam WL05	50	674408	7652348	14/04/2019	19/04/2019	Rocky Foothills	5
Cam WL13	50	677457	7660434	15/04/2019	19/04/2019	Rocky Foothills	4
Cam WL32	50	677583	7660442	15/04/2019	19/04/2019	Rocky Foothills	4
Cam WL02-2	50	675612	7661748	19/10/2019	24/10/2019	Drainage line	5
Cam WL03-2	50	676804	7662309	19/10/2019	24/10/2019	Drainage line	5
Cam WL06-2	50	673368	7661159	19/10/2019	24/10/2019	Spinifex stony plain	5
Cam WL26-2	50	672360	7660459	19/10/2019	24/10/2019	Rocky outcrop in hills	5
Cam WL28-2	50	673559	7658530	19/10/2019	24/10/2019	Drainage line	5



**Appendix 4. (cont.)**

Site	Zone	Easting	Northing	Start Date	Stop Date	Habitat	Nights recording
Cam WL46-2	50	672472	7660413	19/10/2019	24/10/2019	Rocky outcrop in hills	5
Cam WL08-2	50	673919	7659368	19/10/2019	24/10/2019	Spinifex stony plain	5
Cam WL35-2	50	676704	7663129	19/10/2019	24/10/2019	Spinifex stony plain	5
Cam WLB37	50	677887	7659739	19/10/2019	24/10/2019	Spinifex stony plain	5
Cam WLB41	50	675099	7658579	19/10/2019	24/10/2019	Drainage line	5
Cam WLB43	50	673391	7657393	19/10/2019	24/10/2019	Drainage line	5
Cam WLB44	50	677714	7659621	19/10/2019	24/10/2019	Rocky Ridge	5
Cam WLB48	50	673399	7657404	19/10/2019	24/10/2019	Drainage line	5
Cam WLB50	50	677653	7659621	19/10/2019	24/10/2019	Rocky Ridge	5
Cam WLB27	50	677885	7659739	19/10/2019	24/10/2019	Low spinifex foothills	5
Cam WLB44	50	677704	7659620	19/10/2019	24/10/2019	Rocky hill slope	5
Cam WLB40	50	678097	7655845	19/10/2019	24/10/2019	Drainage line	5
Cam WLB24	50	675495	7656455	19/10/2019	24/10/2019	Rockface	5
CamWL09-2	50	672009	7660459	19/10/2019	24/10/2019	Rocky hilltop	5
CamWL05-2	50	672004	7660496	19/10/2019	24/10/2019	Rocky hilltop	5
Cam WL04-2	50	672920	7658853	20/10/2019	25/10/2019	Rocky gully	5
Cam WL10-2	50	673888	7656621	20/10/2019	25/10/2019	Drainage line	5
Cam WL20-2	50	676027	7661924	20/10/2019	25/10/2019	Drainage line	5
Cam WL21-2	50	673482	7659460	20/10/2019	25/10/2019	Rocky gully	5
Cam WL25-2	50	673301	7659963	20/10/2019	25/10/2019	Rocky Ridge	5
Cam WL30-2	50	673201	7658634	20/10/2019	25/10/2019	Rocky Ridge	5
Cam WL32-2	50	673020	7658957	20/10/2019	25/10/2019	Rocky Ridge	5
Cam WL18-2	50	673419	7659415	20/10/2019	25/10/2019	Rocky gully.	5
Cam WLB13	50	670101	7653442	20/10/2019	25/10/2019	Rocky Ridge	5
Cam WLB16	50	670276	7656033	20/10/2019	25/10/2019	Drainage line	5
Cam WLB22	50	670222	7654373	20/10/2019	25/10/2019	Rocky Ridge	5
Cam WLB23	50	675567	7656644	20/10/2019	25/10/2019	Rocky Ridge	5
Cam WLB31	50	670539	7655945	20/10/2019	25/10/2019	Rocky Ridge	5
Cam WLB45	50	675955	7654785	20/10/2019	25/10/2019	Drainage line	5
Cam WLB17	50	670067	7655823	20/10/2019	25/10/2019	Breakaway	5
Cam WLB15	50	670415	7655690	20/10/2019	25/10/2019	Rocky foothills	5
Cam WLB49	50	675566	7655233	20/10/2019	25/10/2019	Low Breakaway	5
Cam WLB29	50	670102	7654098	20/10/2019	25/10/2019	Rocky Ridge	5
Cam WLB47	50	670070	7653606	20/10/2019	25/10/2019	Rocky Ridge	5
Cam WLB19	50	675262	7655139	20/10/2019	25/10/2019	Drainage line	5
Cam WL07-2	50	674270	7655307	21/10/2019	25/10/2019	Rocky Ridge	4
Cam WL42-2	50	674290	7655340	21/10/2019	25/10/2019	Rocky Ridge	4



## Appendix 5. Amphibians potentially occurring in the Study Area.

### Key to records:

2019 = species recorded in this survey, April or October 2019.

2018 = species recorded on the Level 1 and targeted survey, July 2018 (Stantec 2018b).

2017 = species recorded on the Wodgina Mine/Airstrip Level 1 fauna survey, December 2017 (360 Environmental 2018a).

2011 = species recorded on the Hercules DSO Level 2 fauna survey, March 2011 (Outback Ecology 2012).

2009 = species recorded on the Wodgina DSO Level 2 fauna survey, March 2009 (Outback Ecology 2009).

EPBC = modelled occurrence of species or species habitat in the area on the EPBC Protected Matters Search Tool.

DBCA = species recorded in the area on DBCA's Threatened and Priority Fauna Database.

NatureMap = species recorded within 40km on NatureMap (DBCA 2007-).

Species	Conservation Status	Records						
		At Wodgina					Databases	
		2019	2018	2017	2011	2009	EPBC	NatureMap
<b>Pelodryadidae</b> (tree frogs and water-holding frogs)								
Giant Frog <i>Cyclorana australis</i>								+
Main's Frog <i>Cyclorana maini</i>		+			+	+		+
Desert Tree Frog <i>Litoria rubella</i>		+			+	+		+
<b>Limnodynastidae</b> (burrowing frogs)								
Centralian Burrowing Frog <i>Platyplectrum spenceri</i>								+
Northern Burrowing Frog <i>Neobatrachus aquilonius</i>								+
Shoemaker Frog <i>Neobatrachus sutor</i>								+
Desert Spadefoot <i>Notaden nicholli</i>		+						+
<b>Myobatrachidae</b> (ground frogs)								
Glandular Toadlet <i>Uperoleia glandulosa</i>								+
Pilbara Toadlet <i>Uperoleia saxatilis</i>		+			?	?		+
Ratcheting Toadlet <i>Uperoleia talpa</i>								
# frog species expected:		10						



## Appendix 6. Reptiles potentially occurring in the Study Area.

### Key to records:

2019 = species recorded in this survey, April or October 2019.

2018 = species recorded on the Level 1 and targeted survey, July 2018 (Stantec 2018b).

2017 = species recorded on the Wodgina Mine/Airstrip Level 1 fauna survey, December 2017 (360 Environmental 2018a) or during Wodgina DSO Northern Quoll monitoring (Stantec 2017).

2011 = species recorded on the Hercules DSO Level 2 fauna survey, March 2011 (Outback Ecology 2012).

2009 = species recorded on the Wodgina DSO Level 2 fauna survey, March 2009 (Outback Ecology 2009).

EPBC = modelled occurrence of species or species habitat in the area on the EPBC Protected Matters Search Tool.

DBCA = species recorded in the area on DBCA's Threatened and Priority Fauna Database.

NatureMap = species recorded within 40km on NatureMap (DBCA 2007-).

Species	Conservation Status	Records							
		At Wodgina					Database		
		This survey	2018	2017	2011	2009	EPBC	DBCA	NatureMap
<b>Cheloniidae</b> Flat-shelled Turtle <i>Chelodina steindachneri</i>									+
<b>Carpodactylidae</b> (knob-tailed geckoes) Smooth Knob-tailed Gecko <i>Nephurus levis</i>		+							+
<i>Nephurus wheeleri</i>									+
<b>Diplodactylidae</b> (ground geckoes) Clawless Gecko <i>Crenadactylus pilbarensis</i>									+
Western Fat-tailed Gecko <i>Diplodactylus bilybara</i>		+							
Fat-tailed Gecko <i>Diplodactylus conspicillatus</i>		+		+					+
Northern Pilbara Beak-faced Gecko <i>Diplodactylus galaxias</i>		+							+
Southern Pilbara Beak-faced Gecko <i>Diplodactylus savagei</i>					+	+			+
<i>Lucasium stenodactylum</i>		+			+	+			+
<i>Lucasium wombeyi</i>		+			+				+
Western Marbled Velvet Gecko <i>Oedura fimbria</i>					+				?
Beaked Gecko <i>Rhynchoedura ornata</i>		+							+
Northern Spiny-tailed Gecko <i>Strophurus ciliaris</i>									
Jewelled Gecko <i>Strophurus elderi</i>		+			+				+
<i>Strophurus jeanae</i>									+
<b>Gekkonidae</b> (geckoes) Robust Termitaria Gecko <i>Gehyra kimberleyi</i>		+							
Large Pilbara Rock Gehyra <i>Gehyra macra</i>									
Medium Pilbara Spotted Rock Gehyra <i>Gehyra media</i>									
Small Pilbara Spotted Rock Gehyra <i>Gehyra micra</i>									
Pilbara Dtella <i>Gehyra pilbara</i>					+				+
Spotted Dtella <i>Gehyra punctata</i>		+			+				+
Variegated Dtella <i>Gehyra variegata</i>		+			+	+			+
Bynoe's Gecko <i>Heteronotia binoei</i>		+			+	+			+
Pilbara Cave Gecko <i>Heteronotia spelea</i>		+			+	+			+
Asian House Gecko <i>Hemidactylus frenatus</i>	Int.								



## Appendix 6. (cont.)

Species	Conservation Status	Records							
		At Wodgina					Database		
		2019	2018	2017	2011	2009	EPBC	DBCA	NatureMap
<b>Pygopodidae</b> (legless lizards)									
<i>Delma butleri</i>						+			+
<i>Delma elegans</i>									+
<i>Delma nasuta</i>		+			+	+			+
<i>Delma pax</i>		+			+	+			+
<i>Delma tinctoria</i>		+							+
Burton's Legless Lizard		+							+
Hooded Scaly-foot									+
<b>Agamidae</b> (dragon lizards)									
Western Ring-tailed Dragon		+	+	+	+	+			+
Military Dragon		+	+	+					+
Central Netted Dragon									+
Western Netted Dragon									+
Southern Pilbara Tree Dragon				+					+
Northern Pilbara Tree Dragon									+
Long-nosed Dragon		+		+	+	+			+
Bearded Dragon		+							+
Pebble Dragon									+
<b>Scincidae</b> (skink lizards)									
<i>Carlia munda</i>		+			+	+			+
<i>Carlia triacantha</i>		+			+	+			+
<i>Cryptoblepharus buehneri</i>									+
<i>Cryptoblepharus ustulatus</i>									+
<i>Ctenotus duricola</i>		+							+
<i>Ctenotus grandis</i>		+			+				+
<i>Ctenotus hanloni</i>		+							+
<i>Ctenotus helenae</i>		+							+
<i>Ctenotus leonhardii</i>					+				+
Black-lined Ctenotus	P								+
<i>Ctenotus nigrilineatus</i>									+
<i>Ctenotus pallasotus</i>									+
<i>Ctenotus pantherinus</i>		+							+
<i>Ctenotus piankai</i>									+
<i>Ctenotus rubicundus</i>						+			+
Rock Ctenotus		+		+	+	+			+
<i>Ctenotus saxatilis</i>									+
<i>Ctenotus schomburgkii</i>									+
<i>Ctenotus serventyi</i>									+
Sharp-browed Ctenotus									+



## Appendix 6. (cont.)

Species		Conservation Status	Records							
			At Wodgina					Database		
			This survey	2018	2017	2011	2009	EPBC	DBCA	NatureMap
<b>Scincidae (cont.)</b>										
Slender Blue-tongue	<i>Cyclodomorphus melanops</i>		+				+			+
Western Pilbara Spiny-tailed Skink	<i>Egernia cygnitos</i>		+							+
Eastern Pilbara Spiny-tailed Skink	<i>Egernia ephisolus</i>				+					+
	<i>Egernia formosa</i>									+
Pilbara Skink	<i>Egernia pilbarensis</i>				+					
Western Narrow-banded Skink	<i>Eremiascincus pallidus</i>					?				?
Broad-banded Sand Swimmer	<i>Eremiascincus richardsonii</i>									+
	<i>Lerista bipes</i>		+							+
	<i>Lerista clara</i>									+
	<i>Lerista jacksoni</i>		+			+				+
	<i>Lerista labialis</i>									+
	<i>Lerista muelleri</i>					+	+			+
	<i>Lerista verhmens</i>									+
Night Skink	<i>Liopholis striata</i>									+
Dwarf Skink	<i>Menetia greyii</i>		+							+
	<i>Menetia surda</i>		+							+
	<i>Morethia ruficauda</i>		+	+		+	+			+
	<i>Notoscincus ornatus</i>									+
	<i>Proablepharus reginae</i>									+
Central Blue-tongue	<i>Tiliqua multifasciata</i>		+			+				+
<b>Varanidae</b> (goanna or monitor lizards)										
Spiny-tailed Goanna	<i>Varanus acanthurus</i>		+			+	+			+
Short-tailed Pygmy Goanna	<i>Varanus brevicauda</i>		+			+				+
	<i>Varanus caudolineatus</i>									
Pygmy Desert Goanna	<i>Varanus eremius</i>		+							+
Perentie	<i>Varanus giganteus</i>		+	+	+		+			+
Sand Goanna	<i>Varanus gouldii</i>		+		+					+
	<i>Varanus panoptes</i>		+		+		+			+
Northern Pilbara Rock Monitor	<i>Varanus pilbarensis</i>		+		+					+
Black-tailed Monitor	<i>Varanus tristis</i>									+
<b>Typhlopidae</b> (blind snakes)										
	<i>Anilius ammodytes</i>		+							+
Gane’s Blind Snake	<i>Anilius ganei</i>	P								+
Beaked Blind Snake	<i>Anilius grypus</i>		+			+	+			+
Pilbara Blind Snake	<i>Anilius pilbarensis</i>					+				



## Appendix 6. (cont.)

Species	Conservation Status	Records							
		At Wodgina					Database		
		2019	2018	2017	2011	2009	EPBC	DBCA	NatureMap
<b>Boidae</b> (pythons)									
Pygmy Python <i>Antaresia perthensis</i>		+							+
Stimson's Python <i>Antaresia stimsoni</i>		+			+	+			+
Black-headed Python <i>Aspidites melanocephalus</i>		+							+
Pilbara Olive Python <i>Liasis olivaceus barroni</i>	T						+	+	+
<b>Elapidae</b> (front-fanged snakes)									
Pilbara Death Adder <i>Acanthophis wellsi</i>									+
Northwestern Shovel-nosed Snake <i>Brachyuropsis approximans</i>		+			+				+
Narrow-banded Shovel-nosed Snake <i>Brachyuropsis fasciolatus</i>		+							+
Yellow-faced Whipsnake <i>Demansia psammophis</i>		+							+
Rufous Whipsnake <i>Demansia rufescens</i>		+			+	+			+
Moon Snake <i>Furina ornata</i>		+				+			+
Mulga Snake <i>Pseudechis australis</i>		+		+					+
Ringed Brown Snake <i>Pseudonaja modesta</i>									+
Gwardar <i>Pseudonaja mengdeni</i>		+							+
Rosen's Snake <i>Suta fasciata</i>					+				+
Spotted Snake <i>Suta punctata</i>									+
Pilbara Bandy-bandy <i>Vermicella snelli</i>									+
# reptile species expected:		108 (107 native)							



## Appendix 7. Birds potentially occurring in the Study Area.

### Key to records:

2019 = species recorded in this survey, April and October 2019.  
 2018 = species recorded on the Level 1 and targeted survey, July 2018 (Stantec 2018b).  
 2017 = species recorded on the Wodgina Mine/Airstrip Level 1 fauna survey, December 2017 (360 Environmental 2018a).  
 2011 = species recorded on the Hercules DSO Level 2 fauna survey, March 2011 (Outback Ecology 2012).  
 2009 = species recorded on the Wodgina DSO Level 2 fauna survey, March 2009 (Outback Ecology 2009).  
 EPBC = modelled occurrence of species or species habitat in the area on the EPBC Protected Matters Search Tool.  
 DBCA = species recorded in the area on DBCA's Threatened and Priority Fauna Database.  
 NatureMap = species recorded within 15km on NatureMap (DBCA 2007-).

Species	Conservation Status	Records							
		At Wodgina					Database		
		2019	2018	2017	2011	2009	EPBC	DBCA	NatureMap
<b>Dromaiidae</b> (emus)									
Emu <i>Dromaius novaehollandiae</i>									+
<b>Anatidae</b> (ducks & swans)									
Grey Teal <i>Anas gracilis</i>		+							+
Pacific Black Duck <i>Anas superciliosus</i>		+							+
Hardhead <i>Aythya australis</i>		+							+
Australian Wood Duck <i>Chenonetta jubata</i>									+
<b>Phasianidae</b> (quails)									
Brown Quail <i>Coturnix ypsilophora</i>									+
<b>Pelecanidae</b> (pelicans)									
Australian Pelican <i>Pelecanus conspicillatus</i>									+
<b>Podicipedidae</b> (grebes)									
Hoary-headed Grebe <i>Poliocephalus poliocephalus</i>									+
Australasian Grebe <i>Tachybaptus novaehollandiae</i>		+			+				+
<b>Ciconiidae</b> (storks)									
Black-necked Stork <i>Ephippiorhynchus asiaticus</i>						+			+
<b>Threskiornithidae</b> (ibis & spoonbills)									
Yellow-billed Spoonbill <i>Platalea flavipes</i>									
Royal Spoonbill <i>Platalea regis</i>									+
Australian White Ibis <i>Threskiornis moluccus</i>									+
Straw-necked Ibis <i>Threskiornis spinicollis</i>									+
<b>Ardeidae</b> (herons, egrets, bitterns & night-herons)									
Little Egret <i>Ardea garzetta</i>									+
Eastern Great Egret <i>Ardea modesta</i>									+
White-faced Heron <i>Ardea novaehollandiae</i>									+
White-necked Heron <i>Ardea pacifica</i>		+	+						+
Rufous Night-heron <i>Nycticorax caledonicus</i>									+
<b>Phalacrocoracidae</b> (cormorants)									
Little Black Cormorant <i>Phalacrocorax sulcirostris</i>									+
Little Pied Cormorant <i>Phalacrocorax melanoleucos</i>									+



## Appendix 7. (cont.)

Species	Conservation Status	Records							
		At Wodgina					Database		
		2019	2018	2017	2011	2009	EPBC	DBCA	NatureMap
<b>Anhingidae</b> (darter)									
Australasian Darter <i>Anhinga novaehollandiae</i>									+
<b>Accipitridae</b> (osprey, hawks, eagles & harriers)									
Black-shouldered Kite <i>Elanus caeruleus</i>		+							+
Square-tailed Kite <i>Hamirostra isura</i>									+
Black-breasted Buzzard <i>Hamirostra melanosternon</i>			+						
Black Kite <i>Milvus migrans</i>		+	+			+			+
Whistling Kite <i>Haliastur sphenurus</i>		+	+	+	+				+
Brown Goshawk <i>Accipiter fasciatus</i>		+		+		+			+
Collared Sparrowhawk <i>Accipiter cirrocephalus</i>									+
Little Eagle <i>Hieraaetus morphnoides</i>									+
Wedge-tailed Eagle <i>Aquila audax</i>		+	+						+
Spotted Harrier <i>Circus assimilis</i>		+		+					+
<b>Otididae</b> (bustard)									
Australian Bustard <i>Ardeotis australis</i>		+		+					+
<b>Rallidae</b> (crakes, rails and gallinules)									
Eurasian Coot <i>Fulica atra</i>		+							+
Buff-banded Rail <i>Gallirallus philippensis</i>									+
Purple Swamp Hen <i>Porphyrio porphyrio</i>		+							
Spotless Crake <i>Porzana tabuensis</i>									
Black-tailed Native-hen <i>Tribonyx ventralis</i>									+
<b>Turnicidae</b> (button-quails)									
Little Button-Quail <i>Turnix velox</i>		+	+	+	+	+			+
<b>Burhinidae</b> (stone-curlews)									
Bush Stone-Curlew <i>Burhinus grallarius</i>		+		+					+
<b>Recurvirostridae</b> (stilts & avocets)									
Black-winged Stilt <i>Himantopus himantopus</i>									+
<b>Charadriidae</b> (plovers, dotterels & lapwings)									
Oriental Plover <i>Charadrius veredus</i>	Mi						+		+
Black-fronted Dotterel <i>Elseya melanops</i>		+			+	+			+
Red-kneed Dotterel <i>Erythronyx cinctus</i>									+
<b>Scolopacidae</b> (sandpipers, tattlers, godwits & allies)									
Common Sandpiper <i>Tringa hypoleucos</i>	Mi	+					+		+
Wood Sandpiper <i>Tringa glareola</i>	Mi	+							+
<b>Glareolidae</b> (pratincoles)									
Australian Pratincole <i>Stiltia isabella</i>									+
<b>Laridae</b> (noddies, gulls & terns)									
Whiskered Tern <i>Sterna hybrida</i>									+



## Appendix 7. (cont.)

Species	Conservation Status	Records							
		At Wodgina					Database		
		2019	2018	2017	2011	2009	EPBC	DBCA	NatureMap
<b>Columbidae</b> (pigeons and doves)									
Common Bronzewing <i>Phaps chalcoptera</i>		+							+
Flock Bronzewing <i>Phaps histrionica</i>									+
Crested Pigeon <i>Ocyphaps lophotes</i>		+	+	+	+				+
Spinifex Pigeon <i>Geophaps plumifera</i>		+	+	+	+	+			+
Diamond Dove <i>Geopelia cuneata</i>		+	+	+	+	+			+
Peaceful Dove <i>Geopelia striata</i>		+							+
<b>Cuculidae</b> (cuckoos)									
Pheasant-Coucal <i>Centropus phasianinus</i>									+
Pallid Cuckoo <i>Cacomantis pallidus</i>						+			+
Black-eared Cuckoo <i>Chrysococcyx osculans</i>									
Horsfield's Bronze-Cuckoo <i>Chrysococcyx basalis</i>		+							+
<b>Tytonidae</b> (barn owls)									
Barn Owl <i>Tyto alba</i>									+
<b>Strigidae</b> (hawk owls)									
Barking Owl <i>Ninox connivens</i>									+
Southern Boobook <i>Ninox boobook</i>			+						+
<b>Podargidae</b> (frogmouths)									
Tawny Frogmouth <i>Podargus strigoides</i>		+							+
<b>Caprimulgidae</b> (nightjars)									
Spotted Nightjar <i>Eurostopodus argus</i>		+	+		+	+			+
<b>Aegothelidae</b> (owlet-nightjars)									
Australian Owlet-Nightjar <i>Aegotheles cristatus</i>		+		+		+			+
<b>Apodidae</b> (swifts)									
Fork-tailed Swift <i>Apus pacificus</i>	Mi						+	+	+
<b>Alcedinidae</b> (kingfishers)									
Blue-winged Kookaburra <i>Dacelo leachii</i>		+	+						+
Red-backed Kingfisher <i>Todiramphus pyrrhopygius</i>		+	+	+					+
Sacred Kingfisher <i>Todiramphus sanctus</i>						+			+
<b>Meropidae</b> (bee-eaters)									
Rainbow Bee-eater <i>Merops ornatus</i>		+	+	+	+	+			+
<b>Falconidae</b> (falcons)									
Brown Falcon <i>Falco berigora</i>		+				+			+
Australian Kestrel <i>Falco cenchroides</i>		+	+	+	+	+			+
Australian Hobby <i>Falco longipennis</i>		+		+		+			+
Grey Falcon <i>Falco hypoleucos</i>	T							+	+
Peregrine Falcon <i>Falco peregrinus</i>	OS							+	+
Black Falcon <i>Falco subniger</i>						+			+



## Appendix 7. (cont.)

Species	Conservation Status	Records							
		At Wodgina					Database		
		2019	2018	2017	2011	2009	EPBC	DBCA	NatureMap
<b>Cacatuidae</b> (cockatoos)									
Galah <i>Cacatua roseicapilla</i>		+	+	+	+	+			+
Little Corella <i>Cacatua sanguinea</i>		+	+	+		+			+
Cockatiel <i>Nymphicus hollandicus</i>		+		+	+	+			+
<b>Psittacidae</b> (parrots, lorikeets and rosellas)									
Australian Ringneck <i>Platycercus zonarius</i>		+							+
Budgerigar <i>Melopsittacus undulatus</i>		+	+		+	+			+
Night Parrot <i>Pezoporus occidentalis</i>	T						+		
<b>Ptilonorhynchidae</b> (bowerbirds)									
Western Bowerbird <i>Ptilonorhynchus maculatus guttatus</i>		+			+	+			+
<b>Climacteridae</b> (treecreepers)									
Black-tailed Treecreeper <i>Climacteris melanurus</i>									+
<b>Maluridae</b> (fairy-wrens, grasswrens and emu-wrens)									
Striated Grasswren <i>Amytornis striatus</i>		+			+	+			+
Variiegated Fairy-wren <i>Malurus lamberti</i>		+			+	+			+
White-winged Fairy-wren <i>Malurus leucopterus</i>		+		+					+
Rufous-crowned Emu-wren <i>Stipiturus ruficeps</i>									+
<b>Meliphagidae</b> (honeyeaters and chats)									
Brown Honeyeater <i>Lichmera indistincta</i>		+	+	+	+	+			+
Black Honeyeater <i>Sugomel niger</i>						+			+
Pied Honeyeater <i>Certhionyx variegatus</i>		+				+			+
Singing Honeyeater <i>Gavicalis virescens</i>		+	+	+	+	+			+
Grey Honeyeater <i>Lacustroica whitei</i>						+			
Grey-headed Honeyeater <i>Ptilotula keartlandi</i>		+	+	+	+	+			+
White-plumed Honeyeater <i>Ptilotula penicillata</i>		+	+	+					+
Grey-fronted Honeyeater <i>Ptilotula plumulus</i>					+	+			+
Black-chinned Honeyeater <i>Melithreptus gularis</i>									+
White-fronted Honeyeater <i>Purnella albifrons</i>									
Yellow-throated Miner <i>Manorina flavigula</i>		+	+	+	+	+			+
Spiny-cheeked Honeyeater <i>Acanthagenys rufogularis</i>		+							+
Crimson Chat <i>Epthianura tricolor</i>		+		+					+
<b>Pardalotidae</b> (pardalotes)									
Red-browed Pardalote <i>Pardalotus rubricatus</i>		+							+
Striated Pardalote <i>Pardalotus striatus</i>						+			+
<b>Acanthizidae</b> (thornbills, gerygones & allies)									
Weebill <i>Smicrornis brevirostris</i>									+
Western Gerygone <i>Gerygone fusca</i>				+					+
<b>Pomatostomidae</b> (babblers)									
Grey-crowned Babbler <i>Pomatostomus temporalis</i>		+	+						+



## Appendix 7. (cont.)

Species	Conservation Status	Records						
		At Wodgina					Database	
		2019	2018	2017	2011	2009	EPBC	NatureMap
<b>Artamidae</b> (woodswallows)								
White-breasted Woodswallow <i>Artamus leucorhynchus</i>								+
Masked Woodswallow <i>Artamus personatus</i>								+
Black-faced Woodswallow <i>Artamus cinereus</i>		+	+	+	+	+		+
Little Woodswallow <i>Artamus minor</i>		+		+	+	+		+
<b>Cracticidae</b> (butcherbirds & magpie)								
Grey Butcherbird <i>Cracticus torquatus</i>		+						+
Pied Butcherbird <i>Cracticus nigrogularis</i>		+		+	+	+		+
Australian Magpie <i>Cracticus tibicen</i>					+			+
<b>Campephagidae</b> (cuckoo-shrikes and trillers)								
Ground Cuckoo-shrike <i>Coracina maxima</i>								+
Black-faced Cuckoo-Shrike <i>Coracina novaehollandiae</i>		+	+	+	+	+		+
White-winged Triller <i>Lalage tricolor</i>		+				+		+
<b>Oreoicidae</b> (bellbirds)								
Crested Bellbird <i>Oreoica gutturalis</i>		+						+
<b>Pachycephalidae</b> (shrike-tits, whistlers and allies)								
Rufous Whistler <i>Pachycephala rufiventris</i>		+						+
Grey Shrike-thrush <i>Colluricincla harmonica</i>		+		+	+	+		+
<b>Rhipiduridae</b> (fantails)								
Grey Fantail <i>Rhipidura albiscapa</i>								+
Willie Wagtail <i>Rhipidura leucophrys</i>		+	+	+	+	+		+
<b>Monarchidae</b> (flycatchers, monarchs and magpie-lark)								
Magpie-Lark <i>Grallina cyanoleuca</i>		+	+	+	+	+		+
<b>Corvidae</b> (ravens and crows)								
Torresian Crow <i>Corvus orru</i>		+	+	+	+	+		+
Little Crow <i>Corvus bennetti</i>		+						+
<b>Petroicidae</b> (robins)								
Red-capped Robin <i>Petroica goodenovii</i>								+
Hooded Robin <i>Melanodryas cucullata</i>								+
<b>Alaudidae</b> (larks)								
Horsfield's Bushlark <i>Mirafra javanica</i>								+
<b>Hirundinidae</b> (swallows and martins)								
White-backed Swallow <i>Cheramoeca leucosterna</i>								
Welcome Swallow <i>Hirundo neoxena</i>					+			+
Tree Martin <i>Petrochelidon nigricans</i>		+		+	+	+		+
Fairy Martin <i>Petrochelidon ariel</i>		+			+	+		+
<b>Acrocephalidae</b> (reed warblers)								
Australian Reed Warbler <i>Acrocephalus australis</i>					+			+



## Appendix 7. (cont.)

Species	Conservation Status	Records							
		At Wodgina					Database		
		2019	2018	2017	2011	2009	EPBC	DBCA	NatureMap
<b>Locustellidae</b> (warblers, songlarks and grassbirds)									
Little Grassbird <i>Megalurus gramineus</i>									
Spinifexbird <i>Eremiornis carteri</i>		+	+		+	+			+
Rufous Songlark <i>Megalurus mathewsi</i>		+	+	+	+				+
Brown Songlark <i>Megalurus cruralis</i>		+							+
<b>Dicaeidae</b> (flowerpeckers)									
Mistletoebird <i>Dicaeum hirundinaceum</i>									+
<b>Estrildidae</b> (grassfinches, sparrows and allies)									
Zebra Finch <i>Taeniopygia guttata</i>		+	+	+	+	+			+
Star Finch <i>Neochmia ruficauda</i>		+							+
Painted Finch <i>Emblema pictum</i>		+	+	+	+	+			+
<b>Motacillidae</b> (pipits and wagtails)									
Australian Pipit <i>Anthus australis</i>		+			+				+
# bird species expected:		140							



## Appendix 8. Mammals potentially occurring in the Study Area.

### Key to records:

2019 = species recorded in this survey, April or October 2019.

2018 = species recorded on the Level 1 and targeted survey, July 2018 (Stantec 2018b) or targeted Northern Quoll Monitoring (Biologic 2018a).

2017 = species recorded on the Wodgina Mine/Airstrip Level 1 fauna survey, December 2017 (360 Environmental 2018a).

2011 = species recorded on the Hercules DSO Level 2 fauna survey, March 2011 (Outback Ecology 2012).

2009 = species recorded on the Wodgina DSO Level 2 fauna survey, March 2009 (Outback Ecology 2009).

EPBC = modelled occurrence of species or species habitat in the area on the EPBC Protected Matters Search Tool.

DBCA = species recorded in the area on DBCA's Threatened and Priority Fauna Database.

NatureMap = species recorded within 40km on NatureMap (DBCA 2007-).

Species	Conservation Status	Records							
		At Wodgina					Database		
		2019	2018	2017	2011	2009	EPBC	DBCA	NatureMap
<b>Tachyglossidae</b> (echidnas)									
Echidna <i>Tachyglossus aculeatus</i>		+	+	+					+
<b>Dasyuridae</b> (dasyurid marsupials)									
Little Red Kaluta <i>Dasykaluta rosamondae</i>		+	+						+
Northern Quoll <i>Dasyurus hallucatus</i>	T	+	+	+	+	+	+	+	+
Woolley's Pseudantechinus <i>Pseudantechinus woolleyae</i>		+				+			+
Pilbara Ningui <i>Ningui timealeyi</i>		+							+
Common Planigale <i>Planigale maculata</i>									+
Pilbara Planigale <i>Planigale sp 1</i>		+			?	?			+
Long-tailed Dunnart <i>Sminthopsis longicaudata</i>	P					+		+	+
Striped-faced Dunnart <i>Sminthopsis macroura</i>			+						+
Ooldea Dunnart <i>Sminthopsis ooldea</i>									+
Lesser Hairy-footed Dunnart <i>Sminthopsis youngsoni</i>									+
<b>Macropodidae</b> (kangaroos and wallabies)									
Spectacled Hare-Wallaby <i>Lagorchestes conspicillatus</i>	P		+					+	+
Euro <i>Osphranter robustus</i>		+	+		+	+			+
Red Kangaroo <i>Osphranter rufus</i>									+
Rothschild's Rock-Wallaby <i>Petrogale rothschildi</i>		+	+	+		+			+
<b>Muridae</b> (rats and mice)									
Lakeland Downs Mouse <i>Leggadina lakedownensis</i>	P								+
House Mouse <i>Mus musculus</i>	Int.	+							+
Spinifex Hopping Mouse <i>Notomys alexis</i>		+	+	+					+
Western Pebble-mound Mouse <i>Pseudomys chapmani</i>	P	+	+	+	+	+		+	+
Delicate Mouse <i>Pseudomys delicatulus</i>									+
Desert Mouse <i>Pseudomys desertor</i>		+							+
Sandy Inland Mouse <i>Pseudomys hermannsburgensis</i>		+							+
Common Rock-Rat <i>Zyzomys argurus</i>		+	+	+		+			+



## Appendix 8. (cont.)

Species	Conservation Status	Records							
		At Wodgina					Database		
		2019	2018	2017	2011	2009	EPBC	DBCA	NatureMap
<b>Rhinonictidae</b> (leaf-nosed bats)									
Pilbara Leaf-nosed Bat <i>Rhinonictis aurantia</i> (Pilbara)	T	+	+		+	+	+	+	+
<b>Megadermatidae</b> (ghost bat)									
Ghost Bat <i>Macroderma gigas</i>	T		+		+	+	+	+	+
<b>Emballonuridae</b> (sheathtail bats)									
Yellow-bellied Sheathtail Bat <i>Saccolaimus flaviventris</i>		+			+	+			+
Common Sheathtail Bat <i>Taphozous georgianus</i>		+	+		+	+			+
<b>Molossidae</b> (freetail bats)									
Greater Northern Freetail Bat <i>Chaerephon jobensis</i>		+				+			+
Northern Freetail Bat <i>Ozimops lumsdenae</i>									+
White-striped Freetail Bat <i>Austronomus australis</i>		+	+			+			+
<b>Vespertilionidae</b> (ordinary bats)									
Gould's Wattled Bat <i>Chalinolobus gouldii</i>		+	+		+	+			+
Lesser Long-eared Bat <i>Nyctophilus geoffroyi</i>									+
Little Broad-nosed Bat <i>Scotorepens greyii</i>		+	+		+	+			+
Finlayson's Cave Bat <i>Vespadelus finlaysoni</i>		+	+		+	+			+
<b>Canidae</b> (dogs and foxes)									
Dog / Dingo <i>Canis familiaris</i>	Int.	+	+	+					+
Fox <i>Vulpes vulpes</i>	Int.		+	+					+
<b>Felidae</b> (cats)									
Feral / House Cat <i>Felis catus</i>	Int.	+	+	+		+			+
<b>Equidae</b> (horses)									
Donkey <i>Equus asinus</i>	Int.								+
Horse <i>Equus caballus</i>	Int.			+					+
<b>Camelidae</b> (camels)									
Camel <i>Camelus dromedarius</i>	Int.								+
<b>Bovidae</b> (horned ruminants)									
Cow <i>Bos taurus</i>	Int.	+	+	+	+	+			+
Number of species expected:		41 (33 native)							



## Appendix 9. Freshwater Fish potentially occurring in the Study Area.

### Key to records:

2019 = species recorded in this survey, April and October 2019.  
 2018 = species recorded on the Level 1 and targeted survey, July 2018 (Stantec 2018b).  
 2017 = species recorded on the Wodgina Mine/Airstrip Level 1 fauna survey, December 2017 (360 Environmental 2018a).  
 2011 = species recorded on the Hercules DSO Level 2 fauna survey, March 2011 (Outback Ecology 2012).  
 2009 = species recorded on the Wodgina DSO Level 2 fauna survey, March 2009 (Outback Ecology 2009).  
 EPBC = modelled occurrence of species or species habitat in the area on the EPBC Protected Matters Search Tool.  
 DBCA = species recorded in the area on DBCA's Threatened and Priority Fauna Database.  
 NatureMap = species recorded within 40km on NatureMap (DBCA 2007-).

Species	Conservation Status	Records							
		At Wodgina					Database		
		2019	2018	2017	2011	2009	EPBC	DBCA	NatureMap
<b>Clupidae</b> (herrings) Bony Bream <i>Nematalosa erebi</i>									
<b>Ariidae</b> (fork-tailed catfishes) Lesser Salmon Catfish <i>Arius graeffei</i>									
<b>Plotosidae</b> (eel-tailed catfishes) Hyrtl's Tandan <i>Neosilurus hyrtlii</i>									
<b>Melanotaeniidae</b> (Rainbowfishes) Western Rainbowfish <i>Melanotaenia australis</i>									+
<b>Terapontidae</b> (grunters) Spangled Perch <i>Leiopotherapon unicolor</i>									+
<b>Eleotridae</b> (gudgeons) Empire Gudgeon <i>Hypseleotris compressus</i>									
# fish species expected:		6							



## Appendix 10. EPBC Protected Matters Search Tool results.

Species listed for the area 10km in radius from 21.173°S, 118.680°E on the EPBC Act Protected Matters Search Tool.



Australian Government  
Department of the Environment and Energy

### EPBC Act Protected Matters Report

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

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

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

Report created: 01/04/19 17:28:24

[Summary](#)

[Details](#)

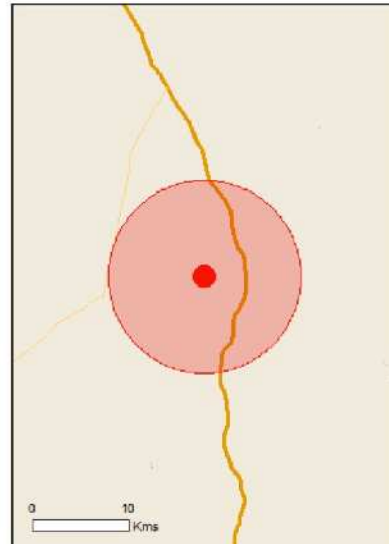
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

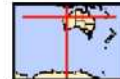
[Acknowledgements](#)



This map may contain data which are  
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[Coordinates](#)

Buffer: 10.0Km





## Summary

### Matters of National Environmental Significance

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

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance:</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	None
<a href="#">Listed Threatened Species:</a>	9
<a href="#">Listed Migratory Species:</a>	11

### Other Matters Protected by the EPBC Act

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

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

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

<a href="#">Commonwealth Land:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	17
<a href="#">Whales and Other Cetaceans:</a>	None
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None

### Extra Information

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

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



## Details

### Matters of National Environmental Significance

Listed Threatened Species		[ Resource Information ]
Name	Status	Type of Presence
<b>Birds</b>		
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Pezoporus occidentalis</a> Night Parrot [59350]	Endangered	Species or species habitat may occur within area
<a href="#">Rostratula australis</a> Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
<b>Mammals</b>		
<a href="#">Dasyurus hallucatus</a> Northern Quoll, Digul [Gogo-Yimdir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
<a href="#">Macroderma gigas</a> Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Macrotis lagotis</a> Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Rhinonictis aurantia (Pilbara form)</a> Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area
<b>Reptiles</b>		
<a href="#">Liasis olivaceus barroni</a> Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat likely to occur within area
Listed Migratory Species		[ Resource Information ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
<b>Migratory Marine Birds</b>		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<b>Migratory Terrestrial Species</b>		



Name	Threatened	Type of Presence
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat may occur within area
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat may occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area
<b>Migratory Wetlands Species</b>		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
<a href="#">Glaucola maldivarum</a> Oriental Pratincole [840]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

## Other Matters Protected by the EPBC Act

Listed Marine Species		[ Resource Information ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
<b>Birds</b>		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat known to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area



Name	Threatened	Type of Presence
<a href="#"><u>Calidris ferruginea</u></a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#"><u>Calidris melanotos</u></a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#"><u>Charadrius veredus</u></a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
<a href="#"><u>Chrysococcyx osculans</u></a> Black-eared Cuckoo [705]		Species or species habitat may occur within area
<a href="#"><u>Glareola maldivarum</u></a> Oriental Pratincole [840]		Species or species habitat may occur within area
<a href="#"><u>Haliaeetus leucogaster</u></a> White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
<a href="#"><u>Hirundo rustica</u></a> Barn Swallow [662]		Species or species habitat may occur within area
<a href="#"><u>Merops ornatus</u></a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#"><u>Motacilla cinerea</u></a> Grey Wagtail [642]		Species or species habitat may occur within area
<a href="#"><u>Motacilla flava</u></a> Yellow Wagtail [644]		Species or species habitat may occur within area
<a href="#"><u>Numenius madagascariensis</u></a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#"><u>Rostratula benghalensis (sensu lato)</u></a> Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

## Extra Information

## Invasive Species

## [ Resource Information ]

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

Name	Status	Type of Presence
<b>Mammals</b>		
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area



## Appendix 11. Conservation Significant Fauna Records in the Study Area.

Zone	Easting	Northing	Species	Site	Status	Record Type	Date
50	672573	7662126	<i>Dasyurus hallucatus</i>	Cam WL21	En	Camera image	14/04/2019
50	671916	7664794	<i>Dasyurus hallucatus</i>	Cam WL28	En	Camera image	14/04/2019
50	672227	7656863	<i>Dasyurus hallucatus</i>	Cam WL41	En	Camera image	14/04/2019
50	675445	7657491	<i>Dasyurus hallucatus</i>	Quoll 2	En	Large Elliott trap	16/04/2019
50	675791	7656078	<i>Pseudomys chapmani</i>	WL Site 04	P4	Active pebble mound	11/04/2019
50	675972	7656149	<i>Pseudomys chapmani</i>	WL Site 04	P4	Inactive pebble mound	11/04/2019
50	646020	7656128	<i>Pseudomys chapmani</i>	WL Site 04	P4	Inactive pebble mound	11/04/2019
50	675754	7656100	<i>Pseudomys chapmani</i>	WL Site 04	P4	Inactive pebble mound	11/04/2019
50	675712	7655984	<i>Pseudomys chapmani</i>	WL Site 04	P4	Inactive pebble mound	12/04/2019
50	675818	7656131	<i>Pseudomys chapmani</i>	WL Site 04	P4	Inactive pebble mound	12/04/2019
50	677558	7656503	<i>Pseudomys chapmani</i>	No Site	P4	Inactive pebble mound	14/04/2019
50	673719	7659154	<i>Pseudomys chapmani</i>	No Site	P4	Inactive pebble mound	14/04/2019
50	673419	7658557	<i>Pseudomys chapmani</i>	No Site	P4	Inactive pebble mound	15/04/2019
50	673386	7658450	<i>Pseudomys chapmani</i>	No Site	P4	Active pebble mound	15/04/2019
50	675492	7655377	<i>Pseudomys chapmani</i>	No Site	P4	Active pebble mound	18/04/2019
50	675389	7655392	<i>Pseudomys chapmani</i>	No Site	P4	Inactive pebble mound	18/04/2019
50	673451	7658444	<i>Pseudomys chapmani</i>	No Site	P4	Inactive pebble mound	19/04/2019
50	678294	7657206	<i>Rhinonictoris aurantia</i>	Bat 450083 12-04-19	Vu	Bat call recording	12/04/2019
50	675753	7661831	<i>Rhinonictoris aurantia</i>	BAT_450083_13-04-19	Vu	Bat call recording	13/04/2019
50	675753	7661831	<i>Rhinonictoris aurantia</i>	BAT_450083_13-04-19	Vu	Bat call recording	14/04/2019
50	675054	7658545	<i>Rhinonictoris aurantia</i>	BAT_450091_15-04-19	Vu	Bat call recording	15/04/2019
50	673405	7657272	<i>Rhinonictoris aurantia</i>	BAT_450083_16-04-19	Vu	Bat call recording	16/04/2019
50	675054	7658545	<i>Rhinonictoris aurantia</i>	BAT_450091_15-04-19	Vu	Bat call recording	16/04/2019
50	673405	7657272	<i>Rhinonictoris aurantia</i>	BAT_450083_16-04-19	Vu	Bat call recording	17/04/2019
50	675054	7658545	<i>Rhinonictoris aurantia</i>	BAT_450091_15-04-19	Vu	Bat call recording	17/04/2019
50	675730	7661821	<i>Rhinonictoris aurantia</i>	Bat 450085 19-10-19	Vu	Bat call recording	19/10/2019
50	675057	7658544	<i>Rhinonictoris aurantia</i>	Bat 450085 20-10-19	Vu	Bat call recording	20/10/2019
50	674564	7655664	<i>Rhinonictoris aurantia</i>	Bat 450083 22-10-19	Vu	Bat call recording	22/10/2019
50	676597	7661533	<i>Rhinonictoris aurantia</i>	Bat 450085 22-10-19	Vu	Bat call recording	22/10/2019
50	674564	7655664	<i>Rhinonictoris aurantia</i>	Bat 450083 22-10-19	Vu	Bat call recording	23/10/2019
50	673286	7659985	<i>Rhinonictoris aurantia</i>	Bat 450085 23-10-19	Vu	Bat call recording	23/10/2019
50	675452	7654878	<i>Rhinonictoris aurantia</i>	Bat 450083 24-10-19	Vu	Bat call recording	24/10/2019
50	675480	7660695	<i>Rhinonictoris aurantia</i>	Bat 450085 24-10-19	Vu	Bat call recording	24/10/2019
50	678294	7657206	<i>Rhinonictoris aurantia</i>	Bat 450083 21-10-19	Vu	Bat call recording	25/10/2019
50	673559	7658495	<i>Rhinonictoris aurantia</i>	Bat 450085 21-10-19	Vu	Bat call recording	25/10/2019
50	676934	7662466	<i>Rhinonictoris aurantia</i>	Bat 450085 25-10-19	Vu	Bat call recording	25/10/2019



## Appendix 12. Bat Call Analysis

	
<b>Bat call identification from Wodgina, Western Australia</b>	
Type:	Acoustic analysis
Prepared for:	Western Wildlife
Date:	6 May 2019
Job No.:	SZ491
Prepared by:	Dr Kyle Armstrong and Yuki Konishi Specialised Zoological ABN 92 265 437 422 Tel 0404 423 264 kyle.n.armstrong@gmail.com http://szool.com.au
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<small>This report should be included as an appendix in any larger submission to Government, and cited as:          Specialised Zoological (2019). Bat call identification from Wodgina, Western Australia. Acoustic analysis.          Unpublished report by Specialised Zoological for Western Wildlife, 6 May 2019, Job number SZ491.</small>	



SZ491: Bat call identification from Wodgina, Western Australia

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### Summary

Bat identifications from acoustic recordings are provided from the Wodgina area, in the Pilbara region of Western Australia. The identification of bat species from full spectrum WAV-format recordings of their echolocation calls was based on measurements of characteristic frequency, observation of pulse shape, and the pattern of harmonics. Eight species of bat were identified unambiguously as being present (Tables 1 and 2). The Pilbara Leaf-nosed Bat *Rhinonycteris aurantia* (Rhinonycteridae) was detected, but the Ghost Bat *Macroderma gigas* (Megadermatidae) was not. Representative echolocation calls for each identification are illustrated (Figure 1), as recommended by the Australasian Bat Society (ABS 2006). Further details are available should verification be required.

### Methods

The data provided were recorded in full spectrum WAV format with Titley Scientific AnaBat Swift bat detectors (sampling rate 500 kHz, set to turn on automatically at sunset and off at sunrise).

A multi-step acoustic analysis procedure developed to process large full spectrum echolocation recording datasets from insectivorous bats (Armstrong and Aplin 2014; Armstrong et al. 2016) was applied to the recordings made on the survey. Firstly, the WAV files were scanned for bat echolocation calls using several parameter sets in the software SCAN'R version 1.8.3 (Binary Acoustic Technology), which also provides measurements (SCAN'R parameters) from each putative bat pulse. The outputs were then used to determine if putative bat pulses measured in SCAN'R could be identified to species. This was done using a custom [R] language script that performed three tasks: 1. undertook a Discriminant Function Analysis on training data from representative calls from the Pilbara; 2. from the measurements of each putative bat pulse from SCAN'R, calculated values for the first two Discriminant Functions that could separate the echolocation call types derived from the analysis of training data, and plotted these resulting coordinates over confidence regions for the defined call types; and 3. facilitated an inspection in a spectrogram of multiple examples of each call type for each recording night by opening the original WAV files containing pulses of interest in Adobe Audition CS6 version 5.0.2. The [R] language script also included a separate process that repeated the above steps using training data that included signals from Pilbara cave roosting bat species to assist with the detection of echolocation calls of the Ghost Bat *Macroderma gigas*.

Species were identified based on information in McKenzie and Bullen (2009) and the author's own unpublished material; and nomenclature follows Jackson and Groves (2015).



## SZ491: Bat call identification from Wodgina, Western Australia

## References

- ABS (2006). Recommendations of the Australasian Bat Society Inc for reporting standards for insectivorous bat surveys using bat detectors. *The Australasian Bat Society Newsletter* 27: 6–9. [ISSN 1448-5877]
- Armstrong, K.N. and Aplin, K.P. (2014). Identifying bats in an unknown acoustic realm using a semi-automated approach to the analysis of large full spectrum datasets. Oral presentation at the 16th Australasian Bat Society Conference 22–25 April 2014, Townsville, Queensland. *The Australasian Bat Society Newsletter* 42: 35–36.
- Armstrong, K.N., Aplin, K.P. and Crotty, S. (2016). A pipeline and app for massive filtering, and assisted inspection of enormous acoustic datasets. Poster presentation at the 17th Australasian Bat Society Conference, 29 March–1 April 2016, Hobart, Tasmania, Australia. *The Australasian Bat Society Newsletter* 46: 51.
- Jackson, S.M. and Groves, C.P. (2015). *Taxonomy of Australian mammals*. CSIRO Publishing, Victoria.
- McKenzie, N.L. and Bullen, R.D. (2009). The echolocation calls, habitat relationships, foraging niches and communities of Pilbara microbats. *Records of the Western Australian Museum Supplement* 78: 123–155.

Table 1. Species identified in the present survey from all sites combined.

RHINONYCTERIDAE	
Pilbara Leaf-nosed Bat	<i>Rhinonycteris aurantia</i>
EMBALLONURIDAE	
Yellow-bellied Sheath-tailed Bat	<i>Saccolaimus flaviventris</i>
Common Sheath-tailed Bat	<i>Taphozous georgianus</i>
VESPERTILIONIDAE	
Gould's Wattled Bat	<i>Chalinolobus gouldii</i>
Little Broad-nosed Bat	<i>Scotorepens greyii</i>
Finlayson's Cave Bat	<i>Vespadelus finlaysoni</i>
MOLOSSIDAE	
White-striped Free-tailed Bat	<i>Austronomus (=Tadarida) australis</i>
Greater Northern Free-tailed Bat	<i>Chaerephon jobensis</i>



## SZ491: Bat call identification from Wodgina, Western Australia

**Table 2.** Species identifications, with the degree of confidence indicated by a code. Date and serial/unit number correlates with site; see Table 1 for full species names.

	A. australis	C. gouldii	C. jobensis	R. aurantia	S. flaviventris	S. greyii	T. georgianus	V. finlaysoni
<b>Swift 450083</b>								
12/04/2019	—	◆	◆	◆	◆	◆	◆	◆
13/04/2019	—	◆	◆	◆	—	◆	—	◆
14/04/2019	—	◆	◆	◆	—	◆	◆	◆
15/04/2019	—	—	◆	—	—	—	◆	◆
16/04/2019	—	◆	—	◆	—	—	◆	◆
17/04/2019	◆	—	◆	◆	—	—	◆	◆
<b>Swift 450091</b>								
13/04/2019	—	—	◆	—	◆	—	◆	◆
14/04/2019	—	◆	◆	—	—	—	◆	—
15/04/2019	—	◆	◆	◆	—	◆	◆	◆
16/04/2019	—	◆	◆	◆	◆	◆	◆	◆
17/04/2019	—	◆	◆	◆	—	◆	◆	◆

**Definition of confidence level codes:**

— Not detected.

◆ Unambiguous identification of the species at the site based on measured call characteristics and comparison with available reference material. Greater confidence in this ID would come only after capture and supported by morphological measurements or a DNA sequence.

**NC Needs Confirmation.** Either call quality was poor, or the species cannot be distinguished reliably from another that makes similar calls. Alternative identifications are indicated in the *Comments on identifications* section of this report. If this is a species of conservation significance, further survey work might be required to confirm the record.

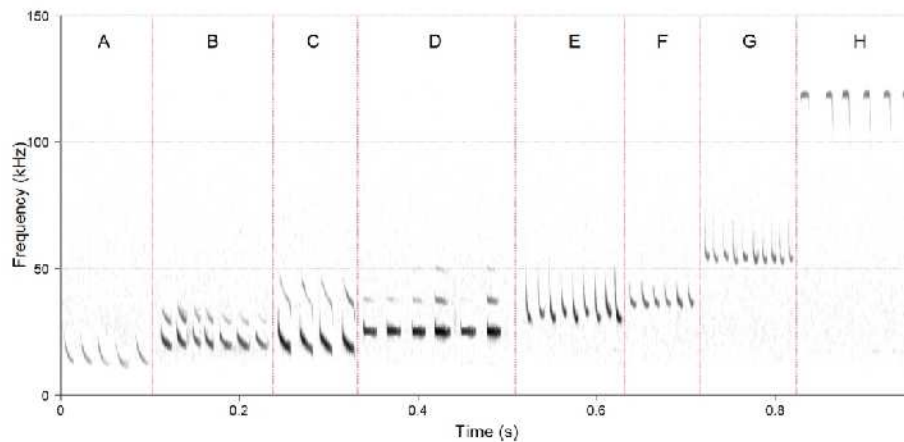


## SZ451: Bat call identification from Wodgina, Western Australia

**Table 2.** Summary of detections of the Pilbara Leaf-nosed Bat (blue shading designates different units for ease of inspection; a 'pass' is one sequence of calls in a single WAV file).

Unit	Night-of date	Sunrise date	Sunset time	Civil twilight end time	Civil twilight start time	Sunrise time	First detection	Time since sunset	Last detection	Time before sunrise	No. passes
450083	12/04/2019	13/04/2019	17:57:48	18:20:07	05:54:45	06:17:08	21:06:31	3H 8M 45S	23:01:53	7H 15M 15S	6
450083	13/04/2019	14/04/2019	17:56:55	18:19:18	05:55:03	06:17:27	18:57:10	1H 0M 15S	00:45:32	5H 31M 55S	7
450083	14/04/2019	15/04/2019	17:56:05	18:18:30	05:55:21	06:17:47	19:02:58	1H 6M 52S	19:02:58	11H 14M 49S	1
450083	16/04/2019	17/04/2019	17:54:28	18:16:56	05:55:57	06:18:26	22:12:38	4H 18M 11S	03:08:07	3H 10M 19S	2
450083	17/04/2019	18/04/2019	17:53:41	18:16:09	05:55:16	06:18:48	19:31:04	1H 37M 23S	20:41:03	9H 37M 43S	2
450091	15/04/2019	16/04/2019	17:55:17	18:17:43	05:55:39	06:18:09	19:26:42	1H 39M 26S	22:22:16	7H 55M 50S	3
450091	16/04/2019	17/04/2019	17:54:28	18:16:58	05:55:57	06:18:28	01:18:12	7H 23M 44S	01:18:12	5H 0M 14S	1
450091	17/04/2019	18/04/2019	17:53:41	18:16:09	05:55:16	06:18:48	23:11:13	5H 17M 32S	23:11:13	7H 7M 33S	1

## SZ451: Bat call identification from Wodgina, Western Australia

**Figure 1.** Representative echolocation call sequence portions of the species identified (A: *Australopus australis*; B: *Saccolaimus flaviventris*; C: *Cheerephon jobensis*; D: *Taphozous georgianus*; E: *Chalinolobus gouldii*; F: *Scotorepens greyii*; G: *Vespadelus finlaysoni*; H: *Rhinonictes auranti*, time between pulses has been compressed).





## Acoustic analysis and bat call identification from Wodgina, Western Australia

Prepared for **Western Wildlife**

Version **16 January 2020**

SZ project reference **SZ509**

Prepared by **Dr Kyle Armstrong and Yuki Konishi**

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Specialised Zoological (2020). Acoustic analysis and bat call identification from Wodgina, Western Australia. Unpublished report by Specialised Zoological for Western Wildlife, 16 January 2020, project reference SZ509.



*SZ509: Acoustic analysis and bat call identification from Wodgina, Western Australia*

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## Summary

Bat identifications from acoustic recordings are provided from Wodgina, in the Pilbara region of Western Australia. The identification of bat species from full spectrum WAV-format recordings of their echolocation calls was based on measurements of characteristic frequency, observation of pulse shape, and the pattern of harmonics. Seven species of bat were identified unambiguously as being present (Tables 1 and 2). The Pilbara Leaf-nosed Bat *Rhinonictis aurantia* (Rhinonycteridae) was detected. Representative echolocation calls for each identification are illustrated (Figure 1), as recommended by the Australasian Bat Society (ABS 2006). Further details are available should verification be required.

## Methods

The data provided were recorded in full spectrum WAV format with Titley Scientific Anabat Swift bat detectors (sampling rate 500 kHz, set to turn on automatically at sunset and off at sunrise).

A multi-step acoustic analysis procedure developed to process large full spectrum echolocation recording datasets from insectivorous bats (Armstrong and Aplin 2014; Armstrong et al. 2016) was applied to the recordings made on the survey. Firstly, the WAV files were scanned for bat echolocation calls using several parameter sets in the software SCAN'R version 1.8.3 (Binary Acoustic Technology), which also provides measurements (SCAN'R parameters) from each putative bat pulse. The outputs were then used to determine if putative bat pulses measured in SCAN'R could be identified to species. This was done using a custom [R] language script that performed three tasks: 1. undertook a Discriminant Function Analysis on training data from representative calls from the Pilbara; 2. from the measurements of each putative bat pulse from SCAN'R, calculated values for the first two Discriminant Functions that could separate the echolocation call types derived from the analysis of training data, and plotted these resulting coordinates over confidence regions for the defined call types; and 3. facilitated an inspection in a spectrogram of multiple examples of each call type for each recording night by opening the original WAV files containing pulses of interest in Adobe Audition CS6 version 5.0.2.

Species were identified based on information in McKenzie and Bullen (2009) and the author's own unpublished material; and nomenclature follows Jackson and Groves (2015).



*SZ509: Acoustic analysis and bat call identification from Wodgina, Western Australia*

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## Limitations

The identifications presented in this report have been made within the following context:

1. The identifications made herein were based on the ultrasonic acoustic data recorded and provided by a 'third party' (the client named on the front of this report).
2. The scope of this report extended to providing information on the identification of bat species in bulk ultrasonic recordings. Further comment on these species and the possible impacts of a planned project on bat species were not part of the scope.
3. In the case of the present report, the recording equipment was set up and supplied by Specialised Zoological. The equipment was operated by the third party during the survey.
4. Other than the general location of the study area, Specialised Zoological has not been provided with detailed information of the survey area, has not made a visit to observe the habitats available for bats, nor have we visited the specific project areas on a previous occasion.
5. Specialised Zoological has had no input into the overall design and timing of this bat survey, recording site placement, nor the degree of recording site replication.
6. While Specialised Zoological has made identifications to the best of our ability given the available materials, and reserves the right to re-examine the data and revise any identification following a query, it is the client's and / or proponent's responsibility to provide supporting evidence for any identification, which might require follow-up trapping effort or non-invasive methods such as video recordings. Specialised Zoological bears no liability for any follow-up work that may be required to support an identification based initially on the analysis of acoustic recordings undertaken and reported on here.
7. There are a variety of factors that affect the 'detectability' of each bat species, given the frequency, power and shape characteristics of their calls. Further information on the analysis and the various factors that can impinge on the reliability of identifications can be provided upon request.
8. The analysis of ultrasonic recordings is one of several methods that can be used to survey for bats, and comprehensive surveys typically employ more than one method. If an identification in the present report is ambiguous or in question, a trapping programme would help to resolve the presence of the possibilities in the project area.



SZ509: Acoustic analysis and bat call identification from Wodgina, Western Australia

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## References

- ABS (2006). Recommendations of the Australasian Bat Society Inc for reporting standards for insectivorous bat surveys using bat detectors. *The Australasian Bat Society Newsletter* 27: 6–9. [ISSN 1448-5877]
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- Armstrong, K.N., Aplin, K.P. and Crotty, S. (2016). A pipeline and app for massive filtering, and assisted inspection of enormous acoustic datasets. Poster presentation at the 17th Australasian Bat Society Conference, 29 March–1 April 2016, Hobart, Tasmania, Australia. *The Australasian Bat Society Newsletter* 46: 51.
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- McKenzie, N.L. and Bullen, R.D. (2009). The echolocation calls, habitat relationships, foraging niches and communities of Pilbara microbats. *Records of the Western Australian Museum Supplement* 78: 123–155.



## SZ509: Acoustic analysis and bat call identification from Wodgina, Western Australia

**Table 1.** Species identified in the present survey from all sites combined.

<b>RHINONYCTERIDAE</b>	
Pilbara Leaf-nosed Bat	<i>Rhinonycteris aurantia</i>
<b>EMBALLONURIDAE</b>	
Yellow-bellied Sheath-tailed Bat	<i>Saccolaimus flaviventris</i>
Common Sheath-tailed Bat	<i>Taphozous georgianus</i>
<b>VESPERTILIONIDAE</b>	
Gould's Wattled Bat	<i>Chalinolobus gouldii</i>
Little Broad-nosed Bat	<i>Scotorepens greyii</i>
Finlayson's Cave Bat	<i>Vespadelus finlaysoni</i>
<b>MOLOSSIDAE</b>	
Greater Northern Free-tailed Bat	<i>Chaerephon jobensis</i>

**Table 2.** Species identifications, with the degree of confidence indicated by a code. Date and recording unit number correlates with site; see Table 1 for full species names.

	<i>C. gouldii</i>	<i>C. jobensis</i>	<i>R. aurantia</i>	<i>S. flaviventris</i>	<i>S. greyii</i>	<i>T. georgianus</i>	<i>V. finlaysoni</i>
<b>Swift 450083</b>							
19/10/2019	—	◆	—	—	—	◆	—
20/10/2019	—	◆	—	—	—	—	◆
21/10/2019	—	—	◆	◆	◆	—	◆
22/10/2019	—	◆	◆	—	—	◆	◆
23/10/2019	—	◆	◆	—	—	◆	◆
24/10/2019	◆	—	◆	—	—	—	◆
25/10/2019	—	—	—	—	◆	—	—
<b>Swift 450085</b>							
19/10/2019	—	◆	◆	—	◆	—	◆
20/10/2019	—	◆	◆	—	—	◆	◆
21/10/2019	◆	◆	◆	—	—	◆	—
22/10/2019	—	—	◆	◆	◆	—	—
23/10/2019	—	◆	◆	—	—	◆	◆
24/10/2019	—	◆	◆	—	—	—	◆
25/10/2019	—	◆	◆	◆	◆	—	◆

**Definition of confidence level codes**

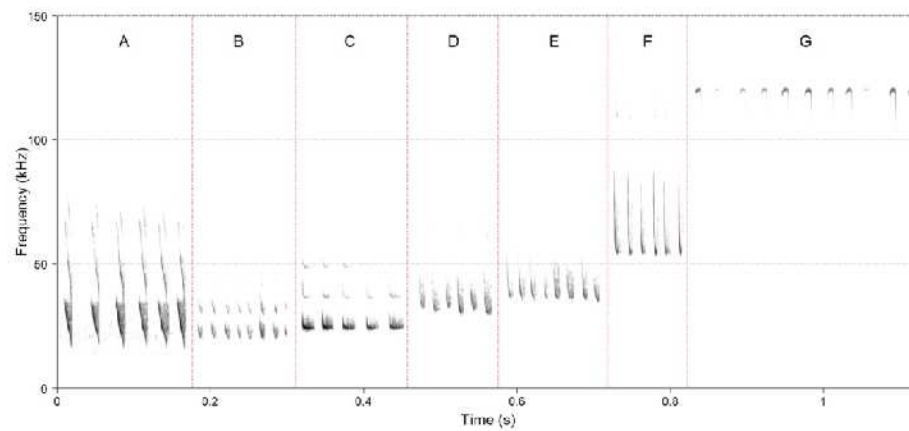
— Not detected.

◆ Unambiguous identification of the species at the site based on measured call characteristics and comparison with available reference material. Greater confidence in this ID would come only after capture and supported by morphological measurements or a DNA sequence.

**NC Needs Confirmation.** Either call quality was poor, or the species cannot be distinguished reliably from another that makes similar calls. Alternative identifications are indicated in the *Comments on identifications* section of this report. If this is a species of conservation significance, further survey work might be required to confirm the record.



SZ509: Acoustic analysis and bat call identification from Wodgina, Western Australia



**Figure 1.** Representative echolocation call sequence portions of the species identified (A: *Chaerephon jobensis*, B: *Saccoleimus flaviventris*, C: *Taphozous georgianus*, D: *Chalinolobus gouldii*, E: *Scotorepens greyii*, F: *Vespertilio fuscus*, G: *Rhinonictis aurantia*, time between pulses has been compressed).



## **ATTACHMENT 6 - MEMO REPORT: WODGINA – TARGETED SIGNIFICANT FAUNA SURVEY (STANTEC JUNE 2022)**



8 June 2022

MARBL Lithium Operations Pty Ltd  
1 Sleat Road, Applecross WA 6153  
Attn: Kim Dennison  
Senior Environmental Advisor

## **Memo Report: Wodgina – Targeted Significant Fauna Survey**

### **Introduction and Objectives**

MARBL Lithium Operations Pty Ltd (MARBL) seeks to expand the Wodgina Lithium Project (the Project) located approximately 95 km south of Port Hedland in the Pilbara region of Western Australia. The future development envelope encompasses an area of approximately 316.7 ha comprising a southern and northern area collectively referred to as the Survey Area. Previous fauna survey work and habitat mapping identified the Rocky Ridge and Gorge habitat (~27.6 ha) present in the Survey Area as having potential to support significant species.

Stantec Australia Pty Ltd (Stantec) was appointed by MARBL to undertake a targeted significant fauna survey within Rocky Ridge and Gorge habitat to inform an impact assessment for the Project. The following significant species were recorded in the Survey Area in 2018 and were targeted during this survey to obtain a current understanding of utilisation:

- Northern Quoll (*Dasyurus hallucatus*, EN; EN);
- Ghost Bat (*Macroderma gigas*, VU; VU);
- Pilbara Leaf-nosed Bat (*Rhinioncteris aurantius* Pilbara form; PLNB, VU; VU);
- Western Pebble-mound Mouse (*Pseudomys chapmani*, P4).

The overarching objective of this work was to determine the presence of significant fauna within the Rocky Ridge and Gorge habitat of the Survey Area. Specifically, this involved the deployment of baited motion cameras to detect the presence of Northern Quolls and echolocation recording units to detect the presence of the Ghost Bat and PLNB. The Western Pebble-mound Mouse was detected opportunistically when traversing the Survey Area by recording the species conspicuous mounds. The objectives and methods used in the survey were aligned with the following guidelines:

- Technical Guidance: Terrestrial Fauna Surveys for Environmental Impact Assessment (EPA, 2020);
- Environmental Factor Guideline – Terrestrial Fauna (EPA, 2016);
- EPBC Act Referral Guideline for the Endangered Northern Quoll (DoE, 2016);
- Survey Guidelines for Australia's Threatened Mammals (DSEWPoC, 2011);
- Survey Guidelines for Australia's Threatened Bats (DEWHA, 2010).

### **Methodology**

The targeted significant fauna survey was conducted from the 5<sup>th</sup> to the 6<sup>th</sup> of April 2022. Field work was conducted by experienced Stantec ecologist Jasmine Wynn-Gaugg with assistance from MARBL Environmental Advisor Alysha Abbott. Jasmine has experience undertaking surveys for Northern Quoll and significant bat species in the Pilbara region. All units were retrieved on the 13<sup>th</sup> of April 2022 by MARBL personnel.

The targeted search area comprised the Rocky Ridge and Gorge habitat which was identified during a previous habitat mapping and consolidation exercise of the Survey Area (Stantec, 2018a) (Figure 1). The following works were undertaken:

- ten motion cameras and six echolocation units were deployed for a minimum of seven nights at locations most likely to be used by the target species;
- motion cameras were baited with universal bait (peanut butter, oats, sardines);



- a microhabitat assessment was performed for all caves in which echolocation recorders were deployed;
- any signs of significant species (e.g., scats, pebble mounds) observed while traveling through the Survey Area were recorded.

While units were deployed to achieve appropriate geographical coverage of the search area, it was not possible to survey all areas of suitable habitat within the Survey Area. Primarily this was due to time constraints and the steep nature of the terrain. For example, field personnel were unable to deploy echolocation units in caves which had previously recorded bat calls (Stantec, 2018b) due to safety considerations. However, although not all areas of the Survey Area could be accessed, the coverage was considered sufficient to inform the utilisation of the Survey Area by significant species. For example, Northern Quolls would have been attracted to the baited cameras from surrounding suitable habitats and both bat species visit a number of caves in an area when foraging. Echolocation recordings were analysed by bat specialist Robert Bullen of Bat Call WA. Motion Cameras were analysed internally by a Stantec zoologist.

## Results and conclusions

### Northern Quoll

Northern Quoll were detected on six separate instances across four of the 10 motion cameras (Table 1; Figure 2). It is difficult to determine the number of individuals this represents as spot patterns were not clearly visible in most photos. It is likely there are at least two individuals given that the REC45 site is separated from the other motion camera sites by a large patch of disturbed area (Figure 1). Guidelines outlined by (DotE, 2016) state that Northern Quoll populations can be deemed high density (numerous camera triggers of multiple individuals) or low density (infrequent camera triggers of one to two individuals). The survey detection rate was six Northern Quoll per 72 trap nights (8.3%), suggesting the Northern Quoll population in the Survey Area is likely low density.

The Rocky Ridge and Gorge habitat contains many alcoves and outcrops which provide suitable habitat for Northern Quoll (Stantec, 2018a). Previous targeted Northern Quoll surveys in and adjacent to the Survey Area indicate that the species was locally abundant but declined in 2015, possibly due to a large-scale fire (A. Stantec, 2017). The most recent basic fauna survey by Stantec (2018a), recorded Northern Quoll scat at 13 locations and recorded individuals on motion cameras at six locations. Similarly, Northern Quoll were recorded on 24 occasions (two motion camera and 22 scat records) across both of 360 Environmental's 2018 surveys (2018a, 2018b). There was a similar number of camera detections across the present survey and the 2018 surveys, suggesting the Northern Quoll population may be recovering post-fire. No scats were detected during the current survey, however this is difficult to compare as searches were limited by access and available time.

Table 1: Northern Quoll detections on motion cameras deployed during the survey.

Site	Trap night (Date)							
	Night 1 (Apr 5)	Night 2 (Apr 6)	Night 3 (Apr 7)	Night 4 (Apr 8)	Night 5 (Apr 9)	Night 6 (Apr 10)	Night 7 (Apr 11)	Night 8 (Apr 12)
REC06	-	x	x	x	x	x	x	x
REC10	-	x	x	x	x	x	x	x
REC23	-	x	x	x	x	x	x	x
REC26	x	x	x	x	x	x	x	x
REC32	-	x	x	x	x	✓	x	✓ (twice)
REC37	x	x	✓	x	x	x	x	x
REC41	-	x	x	x	x	x	x	✓
REC42	-	x	x	x	x	x	x	x
REC44	-	x	x	x	x	x	x	x
REC45	-	✓	x	x	x	x	✓	x



## Ghost Bat and Pilbara Leaf-nosed Bat

Ghost Bats and PLNB were recorded in low numbers at one and two sites respectively (Table 2; Figure 2). Calls were infrequent and the timing was consistent with foraging rather than roosting. No scats from either species were recorded during the survey.

All caves assessed during this survey were either shallow, medium to small caves, or large overhangs which are not optimal for roosting (Armstrong & Anstee, 2000; Bat Call, 2021a, 2021b); Table 3). PLNB have strict microclimate requirements for diurnal roosting but may use smaller caves for resting or feeding while foraging at night (Armstrong, 2001). Similarly, Ghost Bats may use shallow caves opportunistically to rest or take refuge while foraging, however this is not considered critical habitat (Bat Call, 2021a). The microhabitat assessments were supported by the echolocation recordings which indicated the sites were either not visited by these species or were used infrequently while foraging in low numbers. Additionally, these results align with a previous survey of the Rocky Ridge and Gorge habitat which also failed to identify suitable roosting habitat and only recorded Ghost Bats and PLNB foraging in low numbers (Stantec, 2018b).

Table 2: PLNB and Ghost bat calls.

Site	Unit	Dates of recording	Pilbara Leaf-nosed Bat	Ghost Bat
WOG-CA-04	Bat02	6-12 April	No calls	No calls
WOG-CA-02	Bat03	5-12 April	April 7: 4 calls at 04:42	April 6: 2 calls at 19:21
WOG-CA-05	Bat22	6-12 April	April 7: 1 call at 04:42 April 10: 1 call at 21:45	No calls
WOG-CA-03	Bat24	6-12 April	No calls	No calls
WOG-OH-01	Bat27	6-12 April	No calls	No calls
WOG-CA-01	Bat28	5-12 April	No calls	No calls

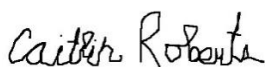
## Other significant fauna

No Western Pebble-mound Mouse mounds were observed during fieldwork and no mice were recorded on the motion cameras. This is likely because the species requires stony plain habitat containing pebbles of the appropriate size to construct their mounds. While there are many Western Pebble-mound Mouse records in and surrounding the Survey Area, most occur in Spinifex Stony Plain habitat and very few exist on the margins of Rocky Ridge and Gorge habitat (Stantec, 2018a). No other significant fauna was recorded during the survey.

## Limitations

The Rocky Ridge and Gorge habitat was difficult to traverse due to its steep and rocky nature. Field personnel deemed some areas unsafe to access and instead placed echolocation units on the boundary of Rocky Ridge and Gorge, and Rocky Foothill habitat. This is not believed to have affected survey results as many previous Ghost Bat, Northern Quoll and PLNB records are from this transitional zone. Additionally, previous surveys have not identified any permanent diurnal roosts for either species in the Survey Area, and they are not expected to occur (Stantec, 2017, 2018a). Due to time constraints, no additional targeted searches for secondary signs (scats, mounds, tracks) were conducted during the survey.

Yours sincerely,



Caitlin Roberts

**Graduate Zoologist**

**Stantec Australia Pty Ltd**

Reviewed by:

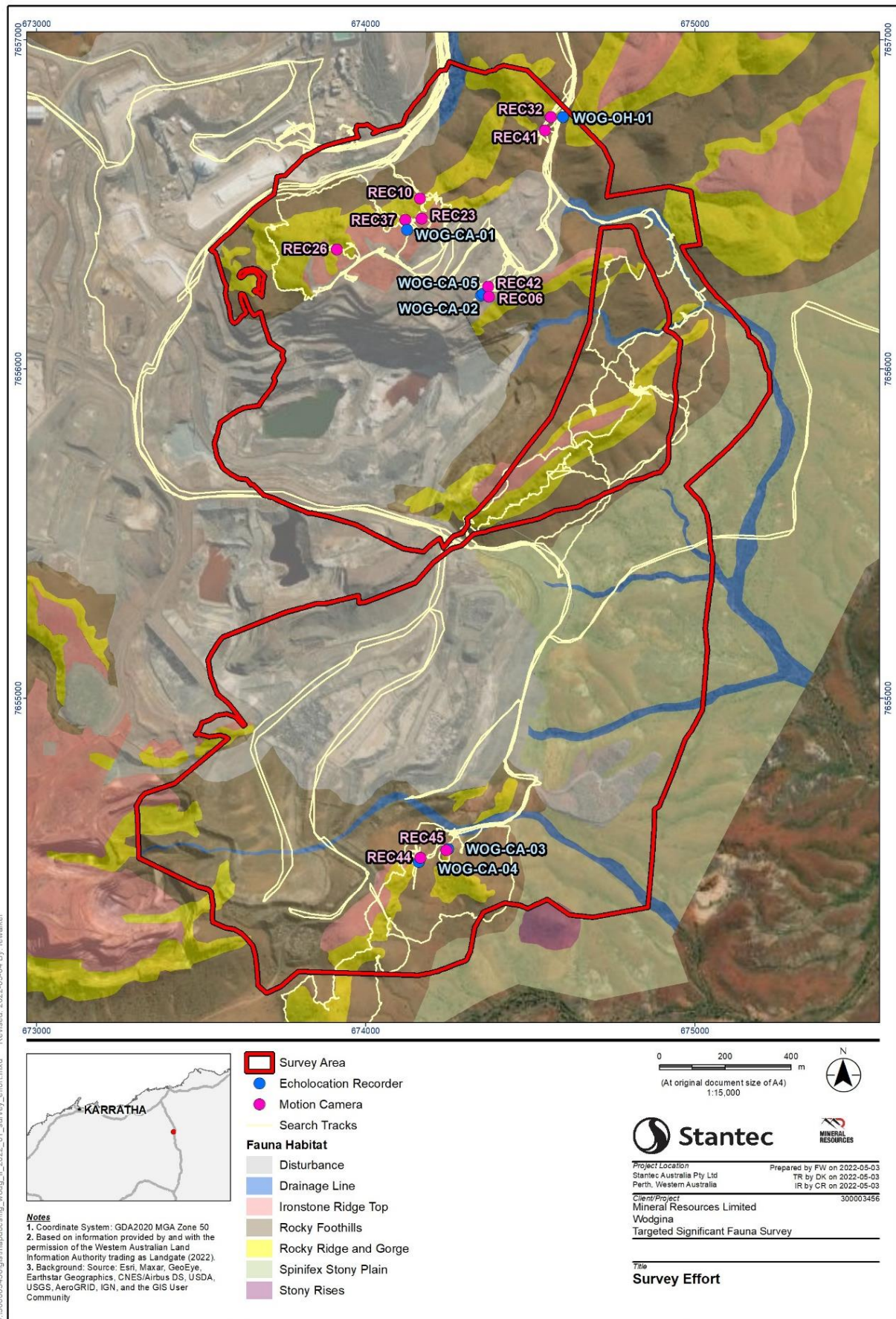


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Figure 1: Survey effort and locations of echolocation units and motion camera sites within the Survey Area.



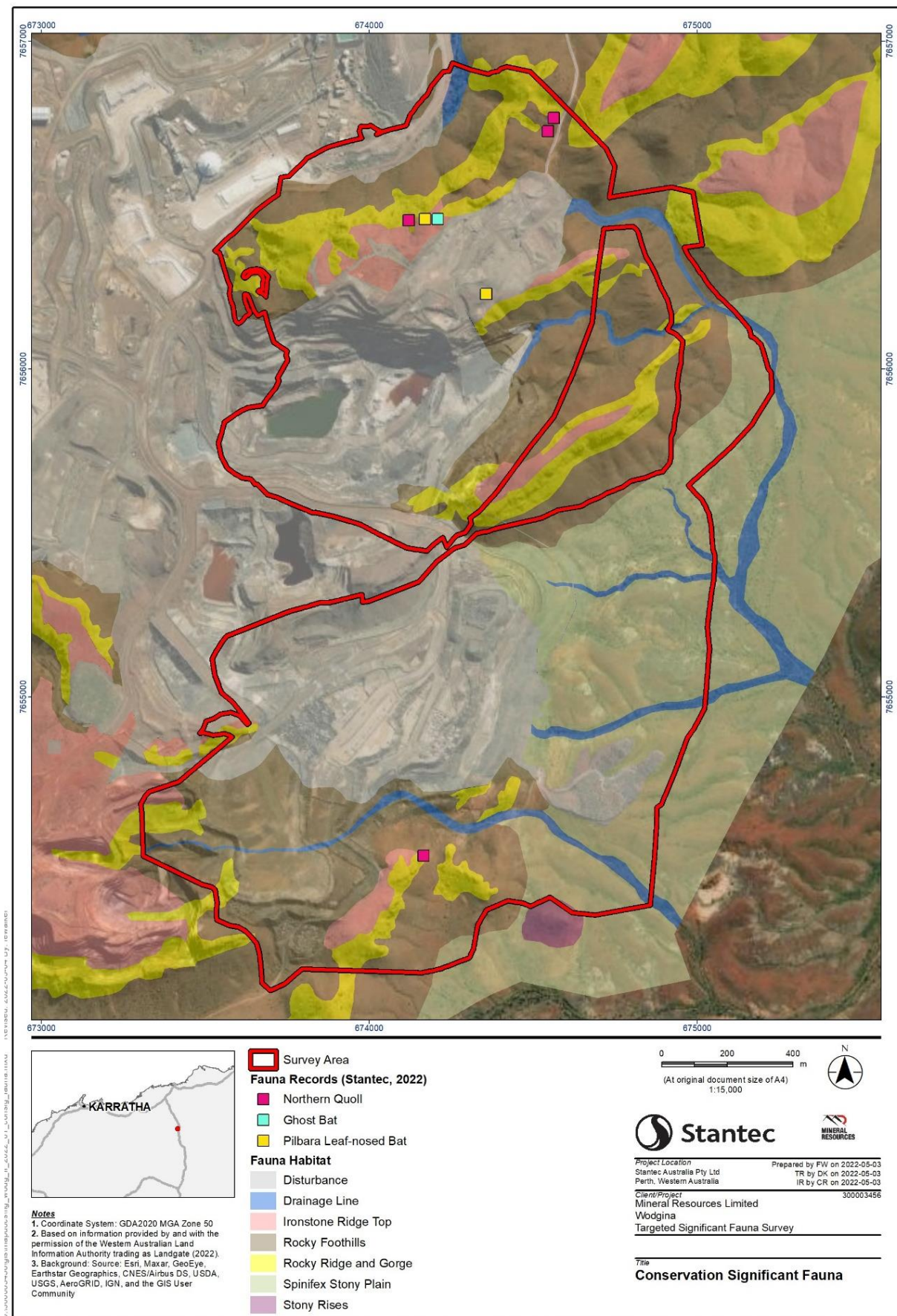








Figure 2: Locations of significant fauna recorded in the Survey Area.



Table 3: Cave and overhang microhabitat assessments.

Site	Description and notes	Reference photograph
WOG-CA-01	Small, shallow cave.	
WOG-CA-02	Large, shallow cave.	
WOG-CA-03	Small, shallow cave with small entrance.	



Site	Description and notes	Reference photograph
WOG-CA-04	Medium shallow cave.	
WOG-CA-05	Medium, shallow cave.	
WOG-OH-01	Medium overhang.	



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## **ATTACHMENT 7 - FLORA, VEGETATION AND FAUNA IMPACT ASSESSMENT (UMWELT OCTOBER 2022)**



**FLORA, VEGETATION AND FAUNA  
IMPACT ASSESSMENT**

Wodgina Lithium Project

**FINAL**

October 2022





MARBL Lithium Operations Pty Ltd

## **FLORA, VEGETATION AND FAUNA IMPACT ASSESSMENT**

Wodgina Lithium Project

### **FINAL**

Prepared by  
**Umwelt (Australia) Pty Limited**  
on behalf of  
**MARBL Lithium Operations Pty Ltd**

Project Director: Greg Woodman  
Project Manager: Greg Woodman  
Report No. 22031/R04  
Date: October 2022



This report was prepared using  
Umwelt's ISO 9001 certified  
Quality Management System.



## Acknowledgement of Country

*Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.*

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## Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
1	Catherine Godden	16 February 2022	Greg Woodman	16 February 2022
2	Catherine Godden / Alison Saligari	06 July 2022	Greg Woodman	06 July 2022
3	Cathy Godden	12 August 2022	Cathy Godden	12 August 2022
4	Stephen Vlahos	6 October 2022	Cathy Godden	6 October 2022



# Executive Summary

MARBL Lithium Operations Pty Ltd (MARBL), a joint venture between Albemarle Lithium Pty Ltd (Albemarle) and Mineral Resources Limited (MRL) propose to expand mining operations associated with the Wodgina Lithium Project (the Proposal), located in the Pilbara region of Western Australia.

The Proposed expansion (the Proposal) is for the 2-year mine expansion which includes a pit and waste dump expansion and associated infrastructure. Clearing of native vegetation is proposed to be authorised pursuant to the proposed Native Vegetation Clearing Permit (NVCP) for the 2-year mine plan.

A previous NVCP application (NVCP CPS 8230/1) was submitted for the Project in 2018 to the Department of Mines, Industry Regulation and Safety (DMIRS) by the previous proponent Wodgina Lithium Pty Ltd (WLPL) a wholly owned subsidiary of MRL. This submission was to support an earlier proposed Project expansion which included a significantly larger footprint compared to the current Proposal. The DMIRS requested additional survey and impact assessment work be completed to support the 2018 submission which was completed and submitted. Due to the Project going into Care and Maintenance in 2019 the NVCP was placed on hold.

Umwelt has been engaged to undertake an Impact Assessment to address the potential impacts of the Proposal on flora, vegetation and fauna. This assessment will address the revised proposal footprint and current conservation status of species as well as previous concerns raised by DMIRS.

## Flora and Vegetation

No Threatened Flora, Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs) will be impacted by the Proposal. The biodiversity of the Flora Study Area is considered similar to those of other surveyed ranges in the Pilbara region.

Three Priority Flora Taxa, as listed by the Department of Biodiversity, Conservation and Attractions (DBCA), will be impacted by the Proposal. There will be a Low local and Low regional significance of impact on *Euphorbia clementii* (P3), *Terminalia supranitifolia* (P3) and *Triodia chichesterensis* (P3) by clearing and other activities associated with the Proposal. Likewise, the significance of cumulative impacts, taking into account historical impacts at Wodgina, for each of these taxa are considered Low.

The potential for significant cumulative impact on all mapped Vegetation Units (VUs) has been ranked Low or Nil.

## Fauna

There are 17 species of conservation significant fauna that have been recorded or potentially occur in the Fauna Study Area. For many species, the scale of the impact at a local level is considered to be Low, Very Low, or Negligible. The scale of impact is not likely to be High or Extreme for any species.

At a local level, the scale of impact for the Proposal is considered to be Moderate for the Northern Quoll, Gane's Blind Snake and Long-tailed Dunnart, as the Proposal will lead to the loss of important habitat, primarily 17.97 ha of Rocky Ridge and Gorge habitat. Although the loss of this habitat is likely to be permanent, the loss is unlikely to lead to the local extinction of these or any species, as sufficient habitat area remains in the Fauna Study Area outside the disturbance footprint.



For the Northern Quoll, the implementation of the Proposal is likely to trigger three of the nine significant impact criteria (Department of Environment 2013).

There is unlikely to be an impact on any conservation significant fauna taxa at a regional scale. Although the local population of some species will decrease, none are likely to be lost from the Fauna Study Area and all are likely to persist in the local area in the long-term. Therefore, there is not likely to be a range reduction, loss of an important population or impact on the ability of these species to disperse through the region.



# Abbreviations

Term	Definition
BC Act	<i>Biodiversity Protection Act 2016</i> (State)
Cr	Critically Endangered
DBCA	Department of Biodiversity, Conservation and Attractions
DoE	Department of Environment (now Department of Environment and Energy)
DMIRS	Department of Mines, Industry Regulations and Safety
En	Endangered
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)
EPA	Environmental Protection Authority
EP Act	<i>Environmental Protection Act 1986</i> (WA)
EWL	Eastern Waste Landform
GDV	Groundwater Dependent Vegetation
GIS	Geographic Information System
ha	Hectares
IIAZ	Indirect Impact Assessment Zone
km	Kilometres
MARBL	MARBL Lithium Operations Pty Ltd
Mi	Migratory
MNES	Matters of National Environmental Significance
MP	Mining Proposal
MRL	Mineral Resources Limited
NVCP	Native Vegetation Clearing Permit
OEPA	Office of the Environmental Protection Authority
OS	Other Specially Protected Fauna
P	Priority
PEC	Priority Ecological Community
RFI	Request for Information
TEC	Threatened Ecological Community
TSF4	Tailings Storage Facility 4
VU	Vegetation Unit
Vu	Vulnerable
WLPL	Wodgina Lithium Proprietary Limited



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## Appendices

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Appendix B	Interrogation of Species Profile and Threats (SPRAT) Database using Protected Matters Search Tool. (DAWE 2021)
Appendix C	Conservation Codes for Western Australian Flora and Fauna (DBCA 2019)



# 1.0 Introduction

MARBL Lithium Operations Pty Ltd (MARBL), a joint venture between Albemarle Lithium Pty Ltd (Albemarle) and Mineral Resources Limited (MRL) owns and operates the Wodgina Lithium Project (the Project), located 80 km south-east of Port Hedland in the Pilbara region of Western Australia. MARBL propose to expand mining operations associated with the Project. The Proposed expansion (the Proposal) is for the 2-year mine expansion which includes a pit and waste dump expansion and associated infrastructure.

Umwelt (Australia) Pty Ltd (Umwelt) (formerly Woodman Environmental Consulting Pty Ltd (Woodman Environmental)) has been engaged to undertake an Impact Assessment to address the potential impacts of “the Proposal” on flora, vegetation and fauna. This assessment will address the revised proposal footprint (including where possible, a comparison with the 2018 application) and current conservation status of species as well as previous concerns raised by the Department of Mines, Industry Regulation and Safety (DMIRS).

## 1.1 Regulatory Assessment Context

The Proposal is subject to a Native Vegetation Clearing Permit (NVCP) application that is assessed by the Department of Mines, Industry Regulations and Safety (DMIRS). The proposed NVCP application will be to facilitate the expansion of the pit and waste dump, and associated infrastructure.

The Proposal is also subject to approval under the *Mining Act 1978* (WA).

A previous NVCP application (NVCP CPS 8230/1) was submitted for the Project in 2018 to DMIRS by the previous proponent (Wodgina Lithium Pty Ltd (WLPL)), a wholly owned subsidiary of MRL. This submission was to support an earlier proposed Project expansion which included a larger footprint compared to the current Proposal. The DMIRS requested additional survey and impact assessment work be completed to support the 2018 submission which was completed and submitted; a copy of the Request for Information (RFI) received on 24 January 2019 is included in **Appendix A**. Due to the Project going into Care and Maintenance in 2019 the NVCP was placed on hold.

MARBL engagement with DMIRS on 23 September 2021 to discuss the revised Project expansion occurred via Teams. The outcome of the engagement was that ‘the revised NVCP footprint would be assessed as a new NVCP application however reference should be made to the original submission (NVCP CPS 8230/1)’. The NVCP submission will include, where possible, a comparison between the original 2018 NVCP submission and the new Proposal. Note that direct comparisons are not available with some environmental aspects due to additional survey effort being included in this 2022 EIA.

## 1.2 Purpose and Scope of this Report

This report provides an assessment of the potential direct, indirect and cumulative impacts of the Proposal on flora, vegetation and fauna. The report is intended to inform:

- The assessment of the 2-year Mining Proposal footprint.
- The application to clear native vegetation required for a purpose permit under Part V of the *Environmental Protection Act 1986* (WA) (EP Act) (NVCP application).



This report, including addressing the RFI received on 24 January 2019, is based on:

- The Woodman Environmental (2020) Detailed Flora and Vegetation Assessment, that collated data from desktop and historical field assessments, particularly data collected in 2019 from a detailed vegetation survey and a targeted flora survey.
- The Western Wildlife (2019) Level 2 Fauna Survey undertaken within relevant areas at Wodgina, including the collation of historical fauna data.

For the purposes of this report the following definitions are provided:

- **Direct impacts** are defined as those impacts on environmental values occurring as a result of direct removal of significant flora, vegetation, fauna and fauna habitat components by the Proposal e.g. impacts arising from clearing of native vegetation or removal of fauna habitat such as caves.
- **Indirect impacts** are defined as those impacts on environmental values through indirect pathways as a result of the Proposal, and include causes such as dust emissions, altered hydrological regimes (groundwater drawdown and/or creation of drainage shadow), fragmentation of habitat and/or populations, increased predation, etc.
- **Cumulative impacts** are defined as those impacts on significant flora, vegetation and fauna values as a combination of the Proposal and impacts through historical clearing, as far as they can be assessed.

### 1.3 Assessment Area Definition

The potential impacts are assessed for both the area within the proposed NVCP boundary as well as the proposed disturbance footprint for the Proposal. The proposed NVCP boundary and proposed disturbance footprint are shown in **Figure 1.1**.

The proposed NVCP boundary and proposed disturbance footprint are smaller in extent compared to the 2018 NVCP application CPS 8230/1. The reduction in extent of the proposed NVCP is due to changes in the Project's mine plan and a revised staged approach.

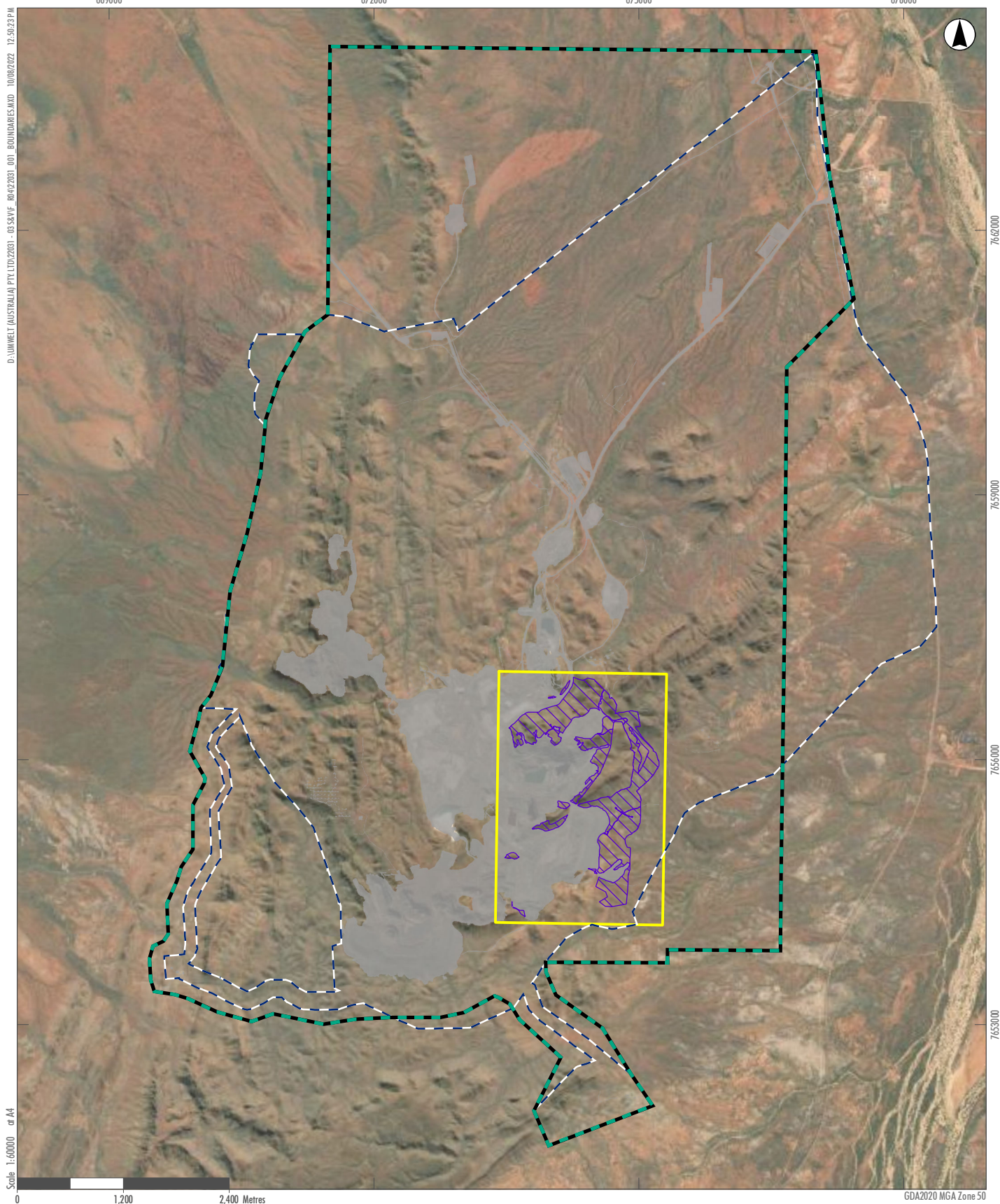
The total area of the proposed NVCP boundary for the NVCP permit application is provided in **Table 1.1**, together with the corresponding proposed disturbance footprint.

MARBL proposes to undertake clearing of native vegetation within the indicative proposed disturbance footprint; however, the distribution of the area to be cleared may be altered within the permit boundary as required. No clearing of native vegetation will occur outside of the approved NVCP boundary.

**Table 1.1 Permit Boundaries and Proposal Footprint**

Project	Proposed NVCP Area (ha)	Proposed Disturbance Footprint Area (ha)	Disturbance Footprint as Percent of NVCP boundary
This Proposal	540.56	113.75	21.04
Previous CPS 8230/1	814.9	569.7	69.9





- Legend**
- Flora Study Area
  - Fauna Study Area
  - Proposed NVCP Boundary
  - Proposed Disturbance Footprint
  - Cleared land

FIGURE 1.1

Biological Study Areas, Proposed NVCP  
Boundary and Proposed Disturbance Footprint



## 1.4 Terminology and Definitions

The terminology used in this report is consistent with the terminology required for a purpose permit under Part V of the *Environmental Protection Act 1986* (WA) (EP Act).

The following definitions apply with reference to the Proposal:

- **Flora Study Area:** the area within which baseline flora and vegetation surveys have been conducted at Wodgina (based on Woodman Environmental 2020). The Flora Study Area has a total area of approximately 6,745.11 ha. Note that survey for significant flora populations extended outside of this study area in some locations where either suitable habitat for such flora was identified, or where populations of significant flora extended outside of the Flora Study Area.
- **Vegetation Study Area:** the area within which baseline vegetation surveys have been conducted at Wodgina (based on Woodman Environmental 2020). The Vegetation Study Area has a total area of approximately 6,745.11 ha. The Vegetation Study Area is equivalent to the extent of the Flora Study Area.
- **Fauna Study Area:** the area within which baseline fauna surveys and studies have been conducted at Wodgina. The Fauna Study Area has a total area of approximately 5,531.30 ha.
- **NVCP boundary:** the proposed NVCP boundary area within which all clearing activities will be undertaken. The total area of the NVCP boundary for the proposed NVCP is approximately 540.56 ha.
- **Disturbance footprint:** the indicative footprint of area required to be cleared. The total area of the proposed disturbance footprint for the Proposal is approximately 113.75 ha.

The location of the proposed NVCP boundary and proposed disturbance footprint, in relation to the Flora, Vegetation and Fauna Study Areas, are presented in **Figure 1.1**.

The following definitions apply with reference to flora, vegetation and fauna:

- **Significant flora** – refers to flora taxa defined as significant by the Environmental Protection Authority (EPA) (EPA 2016a; b):
  - being identified as threatened or priority species
  - locally endemic or associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems)
  - new species or anomalous features that indicate a potential new species
  - representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range)
  - unusual species, including restricted subspecies, varieties or naturally occurring hybrids
  - relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.



- **Significant vegetation** – refers to vegetation that belongs to one of the following categories as defined by the EPA (EPA 2016a; b):
  - being identified as threatened or priority ecological communities
  - restricted distribution
  - degree of historical impact from threatening processes
  - a role as a refuge
  - providing an important function required to maintain ecological integrity of a Significant ecosystem.
- **Conservation significant fauna** – refers to fauna that belongs to one of the following categories (EPA 2016c):
  - being identified as a threatened or priority species
  - species with restricted distribution
  - degree of historical impact from threatening processes
  - providing an important function required to maintain the ecological integrity of a significant ecosystem.
- **Local** – with regard to the distribution of significant flora taxa and significant vegetation, ‘local’ is defined as the known distribution within the Flora Study Area and locations recorded during surveys for the project immediately outside of this area (for impacts to significant flora taxa) and within the Vegetation Study Area (for impacts to vegetation). With regard to the distribution of conservation significant fauna, ‘local’ is defined as all members of the population within 10 km of the Fauna Study Area.
- **Regional** – with regard to the distribution of significant flora taxa and significant vegetation, ‘regional’ is defined as the total known distribution within Western Australia. Therefore, regional impacts are defined as impacts to significant flora taxa or Vegetation Units (VUs) across their total known distributions. With regard to the distribution of conservation significant fauna, ‘regional’ is defined as the bioregion.
- **Population** – indicative regional populations of the flora taxa assessed have been provided after review of distribution of known locations as presented on NatureMap (Department of Biodiversity, Conservation and Attractions (DBCA) (DBCA 2007-)). Within the Flora Study Area, subpopulations have been defined as those locations (or groups of locations) which are separated by 500 m or more. These subpopulations may in fact represent fewer, larger populations, however additional targeted survey within suitable habitat between them would be required to confirm this.



## 1.5 Background Summary and Sources of Information

### 1.5.1 Flora

Various surveys targeting significant flora have been undertaken at Wodgina since 2000.

In April 2019 Woodman Environmental (2019b) undertook a targeted flora survey of the 2018 proposed NVCP CPS8230/1 boundary (since withdrawn) to adequately survey the impact area and immediate surrounds. In June 2019, Woodman Environmental (2020) undertook further targeted flora survey of areas located immediately adjacent to the original survey area (**Figure 1.1**).

Woodman Environmental reported on the results of initial flora and vegetation assessments conducted for the Project in 2018 and 2019 (Woodman Environmental 2019a, b). These survey reports included vegetation mapping of a portion of the Vegetation Study Area not previously mapped, as well as targeted survey for significant flora taxa over several areas. The Woodman Environmental (2020) report includes all methods and findings from these reports, as well as presenting updated floristic analysis of quadrat data and vegetation mapping and historical surveys. The Woodman Environmental (2020) report is the basis for this assessment on the potential project impacts to flora and vegetation. Note, to reduce the potential for 'double counting' within areas where targeted surveys were conducted (2018 and 2019), historical records were excluded from the analysis.

As a result of the surveys undertaken by Woodman Environmental in 2019, it was resolved by relevant experts at the Western Australian Herbarium (WA Herbarium) that entities originally assigned as *Triodia chichesterensis* (P3) and *Triodia scintillans* represent the same entity at Wodgina (*Triodia chichesterensis* (P3)). Therefore, all historical records of *Triodia scintillans* are henceforth treated as *Triodia chichesterensis* (P3) for this site. Historical records of *Triodia* aff. *basedowii* collected within the Flora Study Area and surrounding regional areas are also considered to be this entity and have been included as such.

Many locations of *Euphorbia clementii* (P3) were recorded during historic targeted flora surveys undertaken by Woodman Environmental (2011b; 2012). This taxon responds to fire and was recorded in areas that had been relatively recently burnt prior to that survey period. Representative locations within the then CPS 8230/1 permit boundary were re-examined during surveys in April 2019; however only limited numbers of individuals were located. Likewise, few records of this taxon were recorded during further surveys in June 2019 (Woodman Environmental 2020). Therefore, survey data showing relatively few new locations for this taxon in 2019 are representative of the lack of recent burns in these areas, rather than this taxon being absent.

Searches of relevant government databases, namely, the DBCA Threatened Flora databases (including the Threatened and Priority Flora (TPFL) database and the Western Australian Herbarium (WAHerb) database) (DBCA 2021a), and the Department of Agriculture, Water and the Environment (DAWE) Species Profile and Threats Database (DAWE 2021) were updated as part of this current impact assessment (**Appendix B**) to identify records of any significant flora taxa that have been added to these databases subsequent to the completion of the most recent baseline surveys in the Flora Study Area. These searches used the Desktop Study Area as presented in Woodman Environmental (2020), which is the Flora Study Area with a buffer of 20 km. No records of any significant taxa additional to those identified as part of the most recent baseline surveys in the Flora Study Area were returned by the updated DBCA database searches (DBCA 2021a). The search of the DAWE Species Profile and Threats Database identified one Threatened taxon, or habitat for the taxon, that is likely to occur within the Desktop Study Area, being *Pityrodia* sp. Marble Bar



(G. Woodman & D. Coultas GWDC Opp 4). This taxon has recently been formally published as *Quoya zonalis* (Shepherd & Hislop 2020); therefore all future references to this taxon in this report, including in **Table 1.2**, use the latter name.

A total of six significant flora taxa are known to occur in the Flora Study Area, of which three are also known to occur within the proposed NVCP boundary area. Of the four remaining taxa, two are considered Unlikely to occur in the proposed NVCP boundary area due to lack of habitat; two further taxa are considered to have Potential of occurrence due to presence of habitat, despite the intense survey undertaken across the disturbance footprint areas (Woodman Environmental 2020).

Based on the review by Woodman Environmental (2020), a further eleven significant flora taxa have the potential to occur within the Flora Study Area. Of these taxa, eight are unlikely to be present as there is no suitable habitat available for these taxa (**Table 1.2**). This includes the Threatened taxon *Quoyazonalis*; although suitable habitat for this taxon is present, the Flora Study Area is outside the known restricted range of this taxon, with the known occurrences approximately 25 km east of the Flora Study Area. Although this taxon was not identified by desktop assessment prior to the most recent targeted surveys in the Flora Study Area being conducted, personnel conducting the surveys were aware of this taxon's occurrence in the wider region and its identifying characteristics, as Woodman Environmental were responsible for facilitating the recognition of this taxon by the WAHerb.

Three further taxa have been assessed as Possibly occurring within the Flora Study Area, due to habitat being present; however, targeted survey has been conducted across these areas at an appropriate time of year, and these taxa were not identified as being present in the area. It is unlikely that these taxa occur in the proposed disturbance footprint based on intensive sampling within the proposed NVCP boundary.

An overview of the known locations of significant flora taxa relative to the permit boundary and disturbance footprint is presented in **Figure 1.2**. None of these significant flora taxa are listed as Threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act; Commonwealth), or the *Biodiversity Conservation Act 2016* (BC Act; State). These taxa are all listed as Priority Flora by the DBCA. The conservation codes used by the DBCA (2019) for flora and fauna in Western Australia are provided in **Appendix C**.



**Table 1.2 Significant Flora Taxa Known or Potentially Occurring in the Flora Study Area**

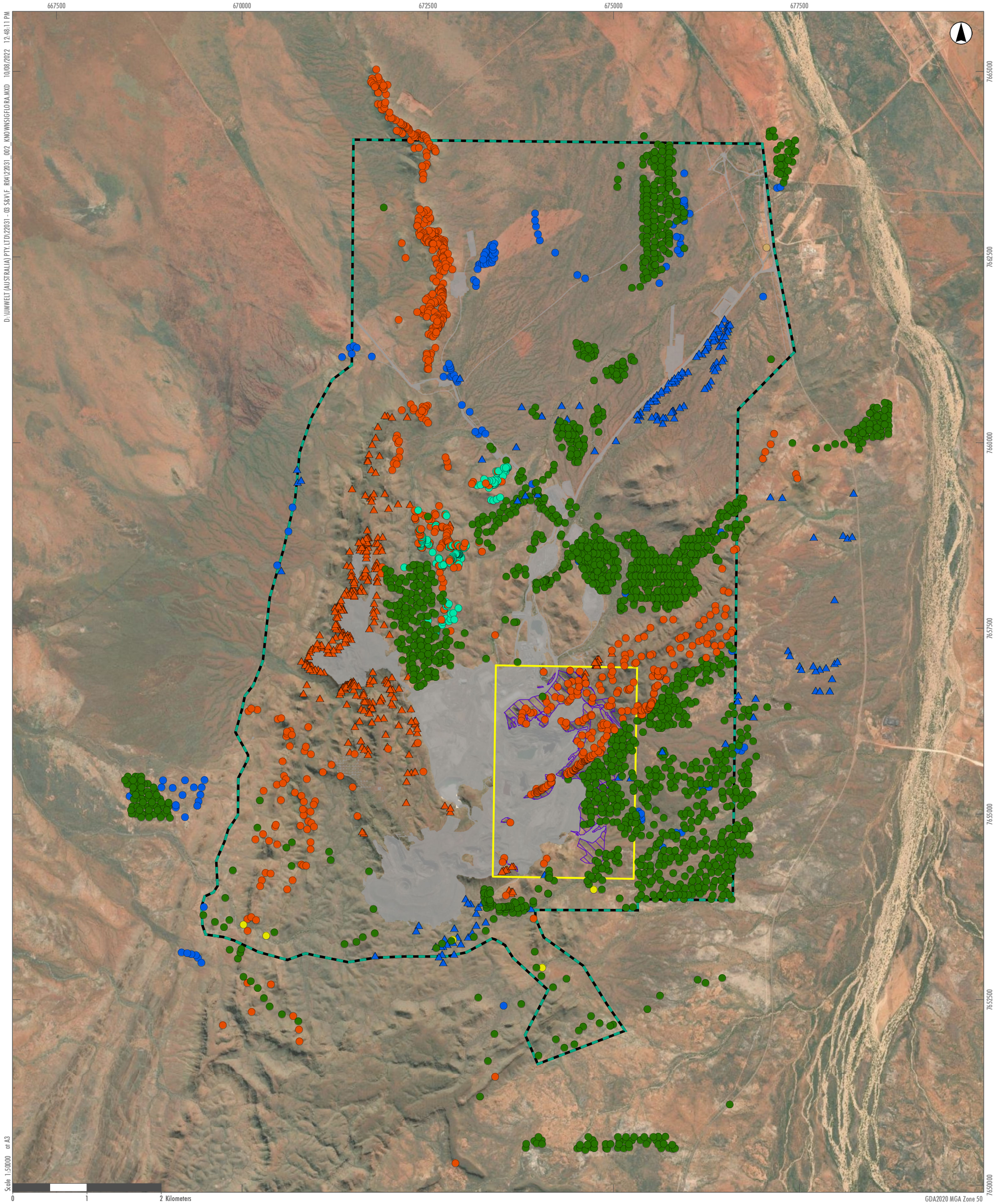
Taxon	Status	VU Occurrence	Likelihood of presence in proposed NVCP boundary area*
<i>Abutilon aff. hannii</i>	Potentially undescribed	9, 14 <sup>^</sup>	Unlikely: potential habitat present, however not recorded during targeted survey.
<i>Acacia leeuweniana</i>	P1	-	Unlikely: habitat not known to be present and not recorded during targeted survey.
<i>Acacia levata</i>	P3	-	Unlikely: habitat not known to be present and not recorded during targeted survey.
<i>Bulbostylis burbridgeae</i>	P4	-	Unlikely: habitat not known to be present and not recorded during targeted survey.
<i>Eragrostis crateriformis</i>	P3	-	Unlikely: habitat not known to be present and not recorded during targeted survey.
<i>Euphorbia clementii</i>	P3	1, 2 <sup>^</sup> , 4, 5, 6, 7, 9 <sup>^</sup> , 10 <sup>^</sup> , 11 <sup>^</sup> , 12, 13, 14	Present.
<i>Gomphrena leptophylla</i>	P3	-	Unlikely: habitat not known to be present and not recorded during targeted survey.
<i>Goodenia nuda</i>	P4	-	Unlikely: habitat not known to be present and not recorded during targeted survey.
<i>Gymnanthera cunninghamii</i>	P3	-	Unlikely: potential habitat not present and not recorded during targeted survey.
<i>Heliotropium muticum</i>	P3	1 <sup>^</sup>	Unlikely: potential habitat present, however, not recorded during targeted surveys.
<i>Nicotiana umbratica</i>	P3	-	Unlikely: potential habitat not present and not recorded during targeted survey.
<i>Phyllanthus hebecarpus</i>	P3	-	Unlikely: potential habitat not present and not recorded during targeted survey.
<i>Quoya zonalis</i>	Threatened	-	Unlikely: potential habitat present, however not recorded during targeted survey. Outside of known range of taxon which is currently very restricted.
<i>Stylidium weeliwolli</i>	P3	-	Unlikely: potential habitat not present and not recorded during targeted survey.
<i>Terminalia supranitifolia</i>	P3	2, 3, 4 <sup>^</sup> , 5, 7, 8, 9 <sup>^</sup> , 14	Present.
<i>Triodia chichesterensis</i>	P3	1, 2, 4 <sup>^</sup> , 5 <sup>^</sup> , 6 <sup>^</sup> , 7 <sup>^</sup> , 8 <sup>^</sup> , 9 <sup>^</sup> , 10, 11, 12 <sup>^</sup> , 13, 14	Present.
<i>Vigna triodiophila</i>	P3	2, 7, 9 <sup>^</sup> , 14	Unlikely: potential habitat present, however not recorded during targeted surveys.

Data from Woodman Environmental (2020).

<sup>^</sup>Designates preferred habitat, based on proportional location representation and landforms/soils.

\*Likelihood of occurrence based on availability of potential habitat in permit boundary and collated records from surveys.





Legend

- Flora Study Area
- Proposed NVCP Boundary
- Proposed Disturbance Footprint
- Cleared land

**Significant Flora**

- |  |   |  |  |
|--|---|--|--|
| <span style="color: blue;">●</span> Ecl  | <i>Euphorbia clementii</i> (P3) – 2018/2019 surveys     | <span style="color: orange;">●</span> Tsu  | <i>Terminalia supranitfolia</i> (P3) – 2018/2019 surveys                         |
| <span style="color: blue;">▲</span> Ecl  | <i>Euphorbia clementii</i> (P3) – previous surveys      | <span style="color: orange;">▲</span> Tsu  | <i>Terminalia supranitfolia</i> (P3) – previous surveys                          |
| <span style="color: brown;">●</span> Hmu | <i>Heliotropium muticum</i> (P3) – 2018/2019 surveys    | <span style="color: cyan;">●</span> Vtr, Y | <i>Vigna triodiophila</i> (P3) – 2018/2019 surveys                               |
| <span style="color: green;">●</span> Tch | <i>Triodia chichesterensis</i> (P3) – 2018/2019 surveys | <span style="color: cyan;">▲</span> Vtr    | <i>Vigna triodiophila</i> (P3) – previous surveys                                |
| <span style="color: green;">▲</span> Tch | <i>Triodia chichesterensis</i> (P3) – previous surveys  | <span style="color: yellow;">●</span> Aah  | <i>Abutilon</i> aff. <i>hannii</i> (potentially undescribed) – 2018/2019 surveys |
|  |   | <span style="color: purple;">●</span> Tsc  | <i>Triodia scintillans</i> (significant range extension) – 2018/2019 surveys     |
|  |   | <span style="color: purple;">▲</span> Tsc  | <i>Triodia scintillans</i> (significant range extension) – previous surveys      |

FIGURE 1.2

Significant Flora Taxa of the Flora Study Area



## 1.5.2 Vegetation

### 1.5.2.1 Regional Area

Searches of relevant government databases (DBCA's Threatened Ecological Community (TEC) and Priority Ecological Community (PEC) database (DBCA 2021b), and the DAWE Species Profile and Threats Database (DAWE 2021) were updated as part of this current impact assessment to identify records of any significant communities that have been added to these databases subsequent to the completion of the most recent baseline surveys in the Vegetation Study Area. These searches used the Desktop Study Area as presented in Woodman Environmental (2020) which is the Vegetation Study Area with a buffer of 20 km. The search of the DAWE Species Profile and Threats Database did not identify any TECs that are likely to occur in the Desktop Study Area.

The search of DBCA's TEC and PEC database (DBCA 2021b) identified one PEC that occurs within the Vegetation Study Area, being the Gregory Land System (P3). This PEC was listed subsequent to the most recent baseline surveys being conducted as shown on **Figure 1.3** relative to the Vegetation Study Area. No known occurrences of this PEC are within the Vegetation Study Area, with the nearest location approximately 8 km west north-west of the Vegetation Study Area. Although areas of vegetation on red sandplains similar to those described as being part of Gregory Land System (Van Vreeswyck *et al.* 2004) were identified and mapped in the Vegetation Study Area as part of VU 10 (Woodman Environmental 2020), the Gregory Land System only includes sandplains that are within the vicinity of linear sand dunes (Van Vreeswyck *et al.* 2004); no such dunes were identified within the Vegetation Study Area. It is therefore considered that this PEC does not occur within the Vegetation Study Area, and consequently, the proposed NVCP boundary area. This PEC is therefore not discussed further.

The proposed NVCP boundary area is located within two vegetation system associations, as defined by Government of Western Australia (2019) (Woodman Environmental 2019a) as presented in **Table 1.3**. These vegetation system associations are widespread and relatively intact, although one vegetation system association is not well-reserved.

**Table 1.3 Vegetation System Associations of the Study Area**

Vegetation System Association/Land System	Extant Area (ha)	Percentage of Pre-European Extent Remaining	Percentage of Current Extent Protected for Conservation
<b>Abydos Plain – Chichester_93</b> Hummock grasslands, shrub steppe; kanji over soft spinifex	2,478,504	99.9	0.5
<b>Abydos Plain – Chichester_626</b> Hummock grasslands, shrub-steppe; kanji over soft spinifex and <i>Triodia brizoides</i>	117,198	99.6	15.6



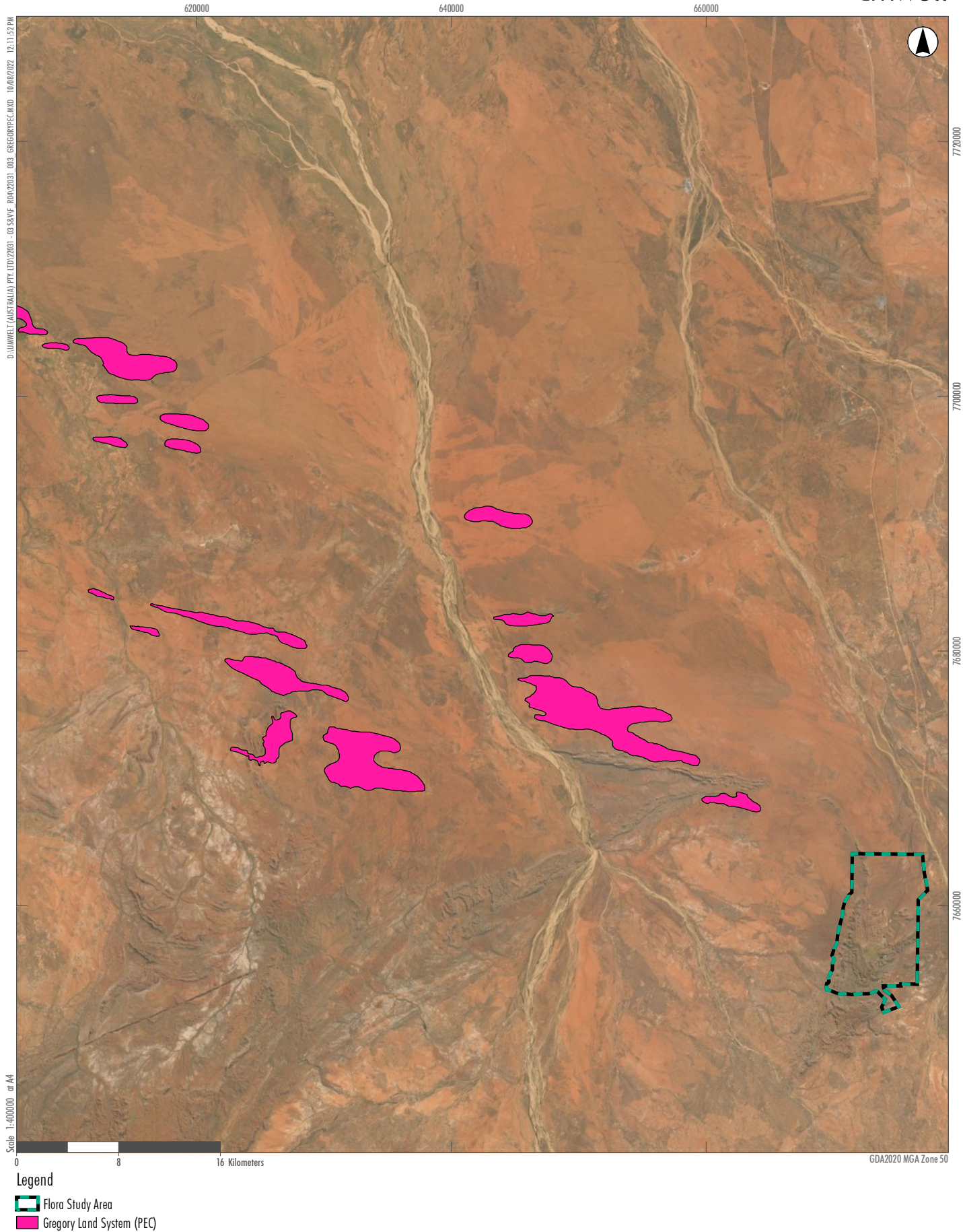


FIGURE 1.3

Gregory Land System PEC in relation to the  
Flora Study Area



### 1.5.2.2 Local Area

A detailed analysis of previous assessments of the VUs of the Vegetation Study Area was undertaken by Woodman Environmental (2020) to provide a comprehensive dataset to support approvals applications and assessment of impacts for the Project.

#### Vegetation Condition

Vegetation condition over the Vegetation Study Area is presented in **Figure 1.4** and summarised in **Table 1.4**. The majority (96.91 %) of the mapped vegetation in the Vegetation Study Area (which comprises equivalent to 87.51 % of the entire Study Area) was rated as 'Excellent'. Cleared areas (includes Completely Degraded, Degraded and areas under rehabilitation) comprised 12.49 % of the Vegetation Study Area.

**Table 1.4 Vegetation Condition within the Vegetation Study Area (data from Woodman Environmental 2020)**

Condition Category	Area (ha)	As % of Vegetation Study Area	As % of Mapped Vegetation
Excellent	5720.07	84.80 %	96.91 %
Excellent / Very Good	15.87	0.24 %	0.27 %
Very Good	43.35	0.64 %	0.73 %
Good	82.12	1.22 %	1.39 %
Good/Poor	21.37	0.32 %	0.36 %
Poor	19.55	0.29 %	0.33 %
Vegetation (Excellent to Poor)	5902.32	87.51 %	-
*Cleared	842.79	12.49 %	-

\*Includes Completely Degraded, Degraded and areas under rehabilitation.

#### Introduced Flora

Introduced flora locations are presented in **Figure 1.4**. A total of nine introduced flora taxa are known from the Study Area (Woodman Environmental 2020). Location information and comments regarding the significance of these taxa, including ecological impact and invasiveness ratings for each introduced taxon under the Invasive Plant Prioritization Process for the DBCA for the Pilbara Region (DBCA 2014) is presented in Table 1.5. Note that *Calotropis procera* is a Declared Pest under the BAM Act (DPIRD 2019). No Weeds of National Significance (WoNS) were recorded in the Study Area.



**Table 1.5 Summary of Introduced Flora Within the Flora Study Area**

Taxon	Common Name	Comments
<i>Aerva javanica</i>	Kapok	Ecological impact rated High, invasiveness rated Rapid (DBCA 2014)
<i>Calotropis procera</i>	Calotrope	Declared Pest (DPIRD 2019); Priority alert weed (DBCA 2014)
<i>Cenchrus ciliaris</i>	Buffel Grass	Considered by the States and Territories of Australia to pose a particularly significant threat to biodiversity (DoEE 2018a); Ecological impact rated High, invasiveness rated Rapid (DBCA 2014)
<i>Cenchrus setiger</i>	Birdwood Grass	Ecological impact rated High, invasiveness rated Rapid (DBCA 2014)
<i>Cynodon dactylon</i> Couch	Couch	Ecological impact rated High, invasiveness rated Rapid (DBCA 2014)
<i>Eragrostis minor</i>	Smaller Stinkgrass	Not rated by DBCA (2014)
<i>Flaveria trinervia</i>	Speedy Weed	Not rated by DBCA (2014)
<i>Passiflora foetida</i> var. <i>hispida</i>	Stinking Passionflower	Ecological impact rated High, invasiveness rated Rapid (DBCA 2014)
<i>Trianthema portulacastrum</i>	Giant Pigweed	Not rated by DBCA (2014)

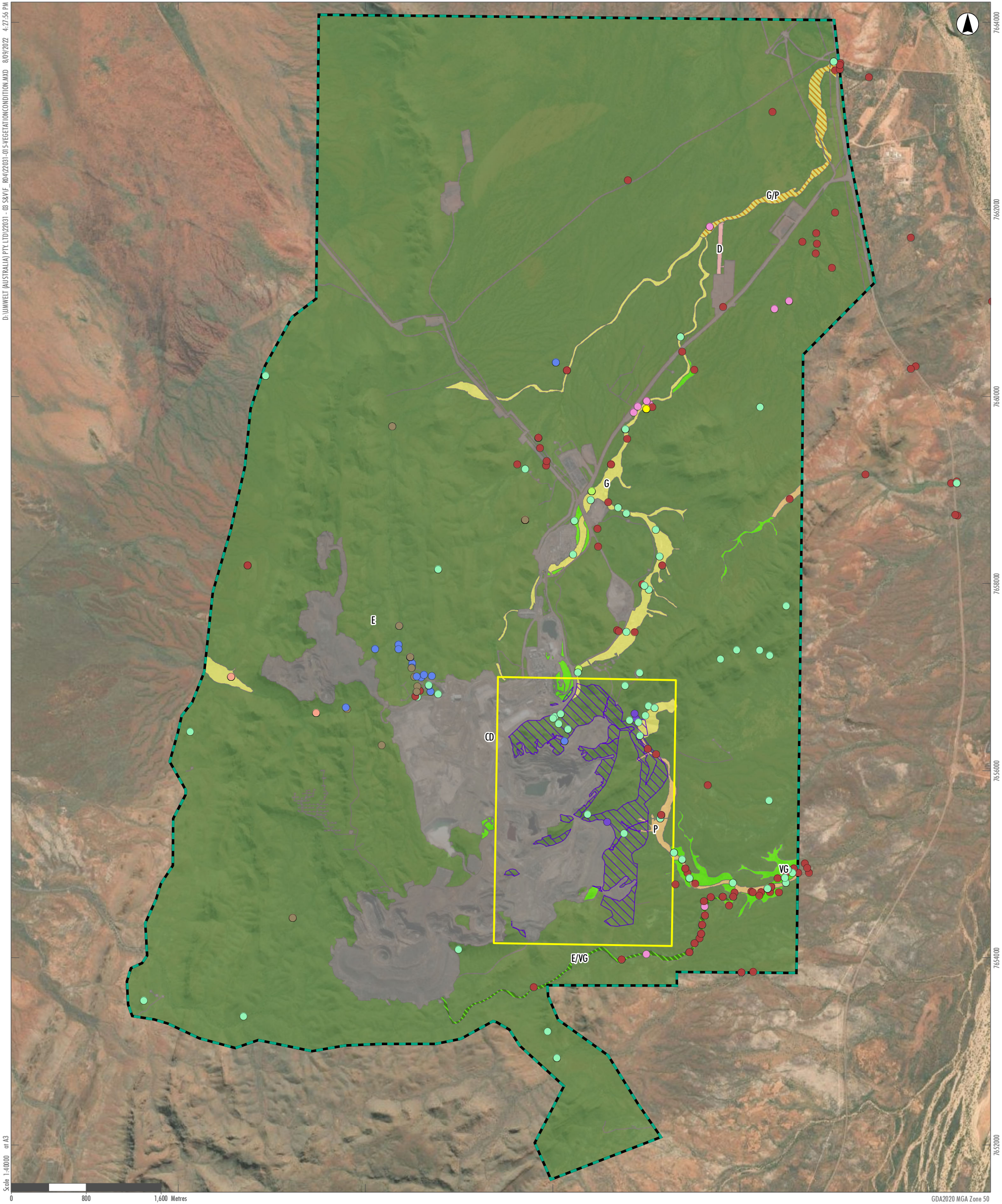
## Vegetation Units

VUs were mapped and defined from a total of 262 quadrats established throughout the Vegetation Study Area, targeting all landform types identified through review of historical study data and aerial photography (Woodman Environmental, 2020).

Several vegetation studies had previously been undertaken in the Vegetation Study Area; however, these focussed on smaller project areas, were undertaken outside of the relevant season for survey, and/or were not undertaken using the methods as detailed in EPA (2016a). As such, assessment of impact on vegetation is undertaken using the VU dataset presented by Woodman Environmental (2020).

The location of the proposed NVCP boundary area and disturbance footprint with the VUs mapped as detailed by Woodman Environmental (2020) within the Vegetation Study Area is presented in **Figure 1.5**.





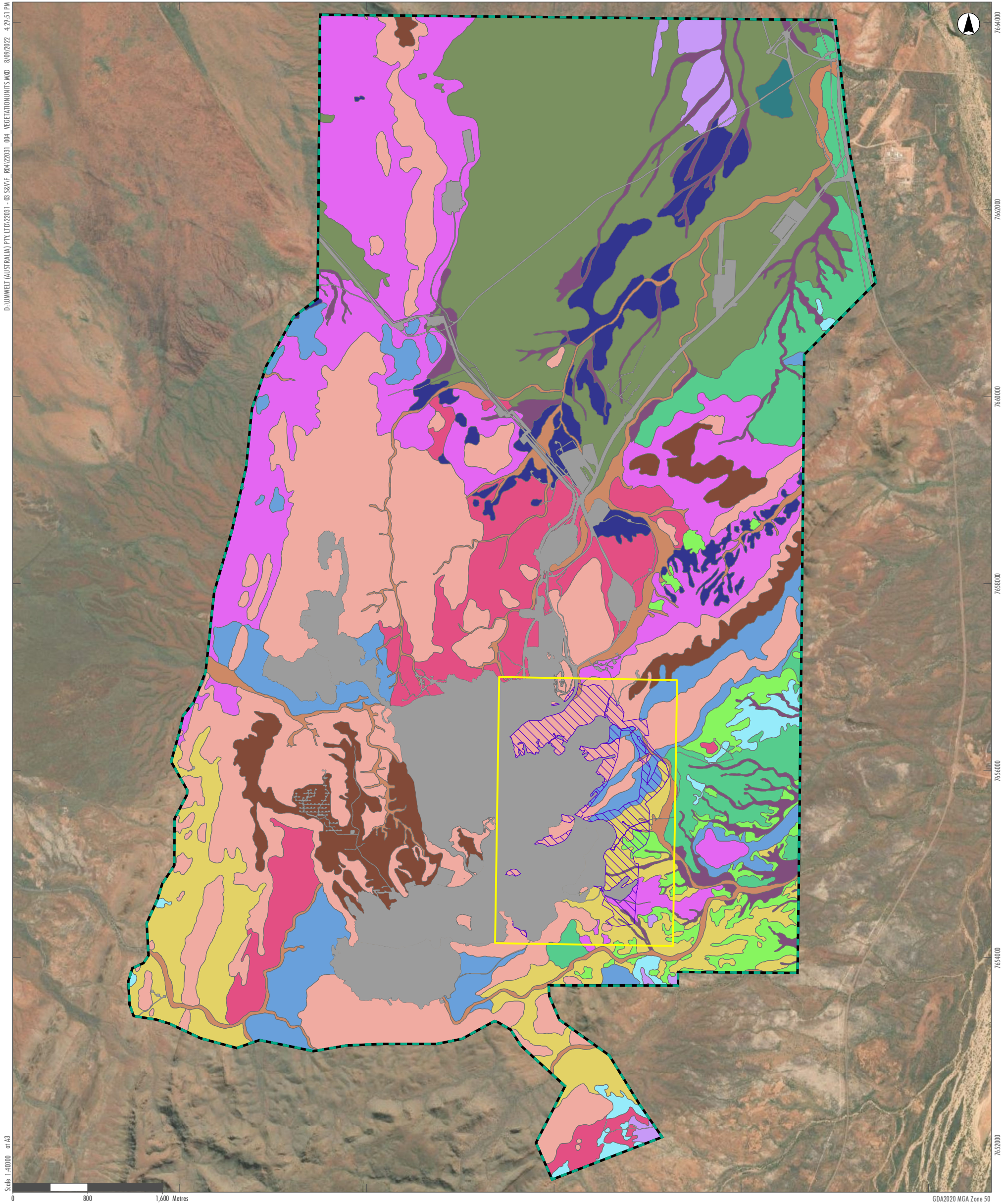
- Legend**
- Flora Study Area
  - Proposed NVCP Boundary
  - Proposed Disturbance Footprint
  - Vegetation Condition**
  - E Excellent
  - E/VG Excellent / Very Good
  - VG Very Good
  - G Good
  - G/P Good/Poor
  - P Poor
  - D Degraded
  - CD Completely Degraded

- Introduced Flora**
- Aej *Aerva javanica*
  - Cap *Calotropis procera*
  - Cec *Cenchrus ciliaris*
  - Cse *Cenchrus setiger*
  - Cyd *Cynodon dactylon*
  - Erm *Eragrostis minor*
  - Flt *Flaveria trinervia*
  - Paf *Passiflora foetida* var. *hispida*
  - Trp *Trianthema portulacastrum*

FIGURE 1.4

Vegetation Condition and Introduced Flora within the Flora Study Area





- Legend**
- Flora Study Area
  - Proposed NVCP Boundary
  - Proposed Disturbance Footprint
- Vegetation Units**
- |   |    |
|---|----|
| 1 | 8  |
| 2 | 9  |
| 3 | 10 |
| 4 | 11 |
| 5 | 12 |
| 6 | 13 |
| 7 | 14 |
|   | 15 |
|   | C  |

FIGURE 1.5

Vegetation Units of the  
Flora Study Area



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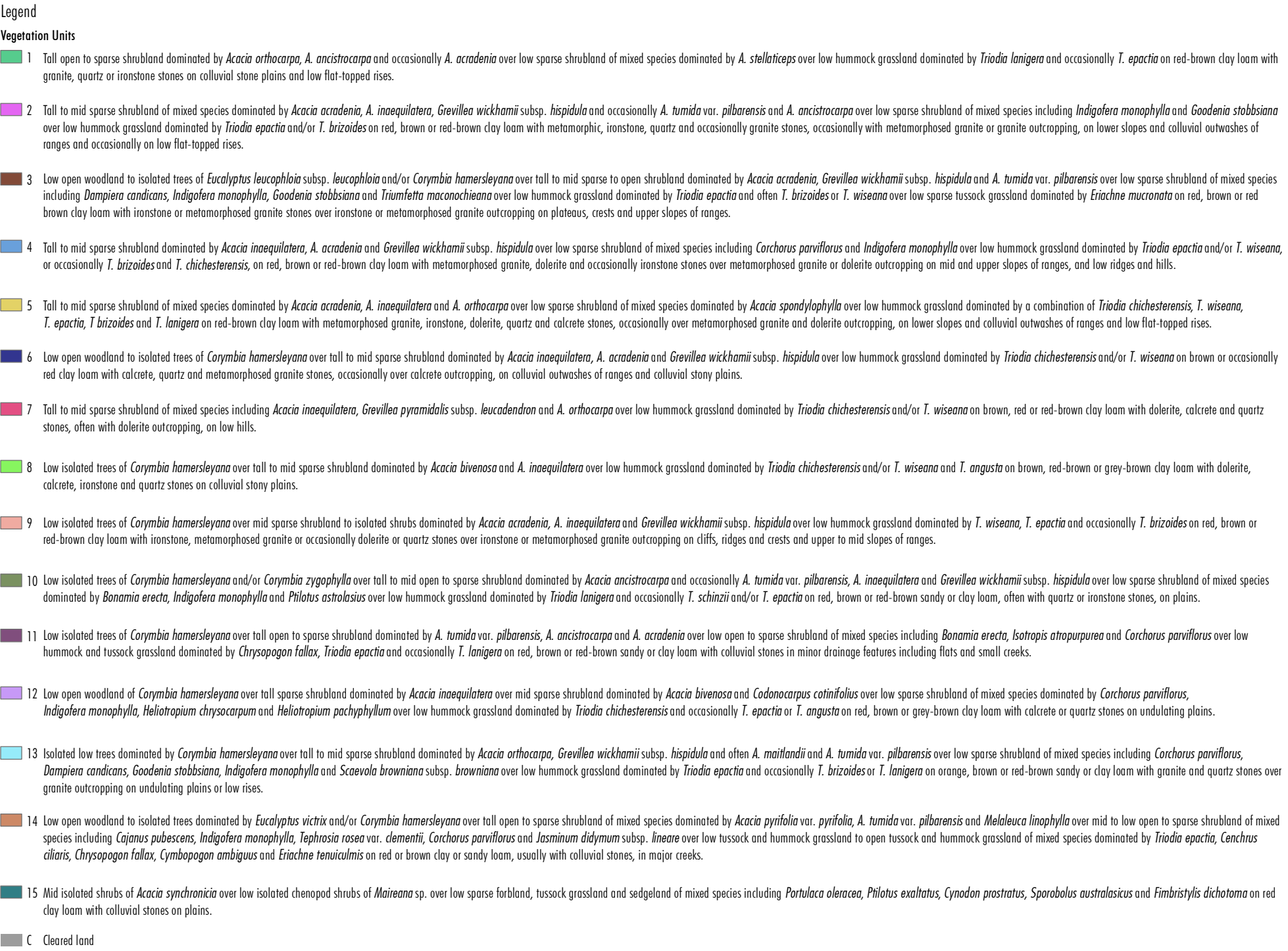


FIGURE 1.5

LEGEND: Vegetation Units of the Flora Study Area



A summary of the extent of VUs mapped by Woodman Environmental (2020) within the Vegetation Study Area is presented in **Table 1.6**. None of these VUs represent State or Commonwealth listed TECs or PECs, listed under the EPBC Act or BC Act. Likewise, none of these communities represent significant vegetation as otherwise defined by the EPA (2016a; b). VUs 12, 13 and 15 were mapped over less than 1 % of the Vegetation Study Area and although not well-represented locally, they are otherwise not of conservation significance.

**Table 1.6 Vegetation Units of the Vegetation Study Area (Woodman Environmental 2020)**

Vegetation Unit	Mapped Extent in Study Area (ha)	Percentage of Study Area (%)
1	297.86	4.42
2	831.05	12.32
3	243.32	3.61
4	325.69	4.83
5	372.96	5.53
6	208.51	3.09
7	362.87	5.38
8	134.04	1.99
9	1,374.81	20.38
10	1,229.57	18.23
11	182.72	2.71
12	59.57	0.88
13	57.11	0.85
14	207.11	3.07
15	15.50	0.23
Cleared*	842.71	12.49
Total area	6,745.42	-

\* Cleared includes areas undergoing rehabilitation.

### 1.5.3 Fauna

Several fauna surveys have been undertaken across the Fauna Study Area between 2008 and 2022 (e.g. Outback Ecology (2009b; 2012); 360 Environmental (2018a; d), Stantec (2018a; b, 2022) and Western Wildlife (2019)). These have included Level 1 and Level 2 fauna surveys, as well as targeted surveys for conservation significant fauna.

Six fauna habitats were identified in the Fauna Study Area (**Table 1.7, Figure 1.6**). Of these, all are widespread in the bioregion except for the Ironstone Ridgetop and Rocky Ridge and Gorge habitats, both of which are limited in extent. The Rocky Ridge and Gorge and the Drainage Line habitat are also regarded as Important habitat. Important Rocky Ridge and Gorge habitat elements are caves that support diurnal (daytime) roosts for significant bat species: For Drainage Line habitat elements are permanent and semi-permanent pools.



**Table 1.7 Fauna Habitats Occurring in the Fauna Study Area (Western Wildlife 2019)**

Habitat	Key Habitat Elements	Extent in the Bioregion	Significance	Area currently remaining (ha)	Proportion of Study Area (%)
Ironstone Ridgetop	Small stones suitable for Western Pebble-mound Mouse.	Limited	<b>Limited:</b> although it provides some habitat for the Western Pebble-mound Mouse, this species uses the widespread Spinifex Stony Plain habitat. Located on the top of ridges, this habitat is relatively exposed and lacks microhabitats such as crevices and caves.	208.2	3.8 %
Rocky Ridge and Gorge	Outcropping rocky areas, fallen boulders, caves, overhangs and rock crevices.	Limited	<b>Important:</b> supports several threatened species, including the Northern Quoll, Pilbara Leaf-nosed Bat and Ghost Bat, is limited in extent and may provide refuge from fire. The cracks, crevices and caves provide shelter for reptiles and mammals, many of which occur only in rocky habitats.	371.3	6.7 %
Rocky Foothills	Occasional rocky outcrops.	Widespread	<b>Limited:</b> this habitat is widespread in the region and lacks microhabitats such as crevices and caves.	1,331.8	24.1 %
Stony Rise	No particular elements identified.	Widespread	<b>Limited:</b> this habitat is widespread in the region and lacks microhabitats such as crevices and caves.	175.2	3.2 %
Spinifex Stony Plain	Many minor drainage lines (not mapped separately) provides shelter for fauna; small stones suitable for Western Pebble-mound Mouse; tree hollows.	Widespread	<b>Limited:</b> although it provides habitat for the Western Pebble-mound Mouse, this habitat is very widespread in the region.	2,339.2	42.3 %
Drainage Line	May function as a corridor for fauna movement; permanent and semi-permanent pools; tree hollows; leaf litter accumulations.	Widespread	<b>Important:</b> this habitat provides foraging habitat for threatened bats, is likely to support a greater diversity and abundance of fauna compared to surrounding habitats and may provide a corridor for fauna movement. Semi-permanent and permanent water pools provide water sources for fauna in surrounding habitats.	330.8	6.0 %
Disturbed areas	-	-	-	774.5	14.0 %



The predicted faunal assemblage for the Fauna Study Area was compiled by Western Wildlife (2019), using the results of previous fauna surveys and a review of the relevant databases. A total of ten frog, 107 reptile, 140 bird, 33 native mammal and eight introduced mammal species potentially occur. More than half of these have been recorded within the Fauna Study Area, with the observed assemblage thus far comprising five frog, 59 reptile, 84 bird, 26 native and eight introduced mammal species. Although diverse, the faunal assemblage is representative of similar sites in the Pilbara Bioregion. A search of the EPBC Act Protected Matters Search Tool identified one change since the Western Wildlife (2019) report that listed the Grey Falcon as Vulnerable (Vu). This species is only listed under the State BC Act as Vulnerable.

Seventeen conservation significant fauna species are known from, or have the potential to occur in, the Fauna Study Area (**Table 1.8**). Of these, six species are known to occur, as they have been recorded during previous fauna surveys (Western Wildlife 2019).

**Table 1.8 Significant Fauna Known or Potentially Occurring in the Fauna Study Area**

Fauna species	Status*			Potential habitat use at Wodgina	Likelihood of occurrence
	EPBC Act	BC Act	DBCA Priority		
<i>Pezoporus occidentalis</i> <b>Night Parrot</b>	En	Cr		<ul style="list-style-type: none"> <li>Spinifex Stony Plain (?)</li> </ul>	Low (?)**
<i>Dasyurus hallucatus</i> <b>Northern Quoll</b>	En	En		<ul style="list-style-type: none"> <li>Rocky Ridge and Gorge</li> <li>Drainage Line</li> </ul>	Known to occur
<i>Rhinonictis aurantia</i> <b>Pilbara Leaf-nosed Bat</b>	Vu	Vu	•	<ul style="list-style-type: none"> <li>Rocky Ridge and Gorge</li> <li>Drainage Line</li> </ul>	Known to occur
<i>Macroderma gigas</i> <b>Ghost Bat</b>	Vu	Vu		<ul style="list-style-type: none"> <li>Rocky Ridge and Gorge</li> <li>Drainage Line</li> </ul>	Known to occur
<i>Liasis olivaceus barroni</i> <b>Pilbara Olive Python</b>	Vu	Vu		<ul style="list-style-type: none"> <li>Rocky Ridge and Gorge</li> <li>Drainage Line</li> </ul>	High
<i>Falco hypoleucos</i> <b>Grey Falcon</b>	Vu	Vu		<ul style="list-style-type: none"> <li>Drainage Line</li> <li>All other habitats (foraging)</li> </ul>	High
<i>Charadrius veredus</i> <b>Oriental Plover</b>	Mi	Mi		<ul style="list-style-type: none"> <li>Drainage Line</li> </ul>	Moderate
<i>Tringa glareola</i> <b>Wood Sandpiper</b>	Mi	Mi		<ul style="list-style-type: none"> <li>Drainage Line</li> </ul>	Moderate
<i>Tringa hypoleucos</i> <b>Common Sandpiper</b>	Mi	Mi		<ul style="list-style-type: none"> <li>Drainage Line</li> </ul>	Moderate
<i>Apus pacificus</i> <b>Fork-tailed Swift</b>	Mi	Mi		<ul style="list-style-type: none"> <li>May overfly any habitat</li> </ul>	High
<i>Falco peregrinus</i> <b>Peregrine Falcon</b>		OS		<ul style="list-style-type: none"> <li>Rocky Ridge and Gorge (potential breeding habitat)</li> <li>All other habitats (foraging)</li> </ul>	High
<i>Ctenotus nigrilineatus</i> <b>Black-lined Ctenotus</b>			P1	<ul style="list-style-type: none"> <li>Rocky Foothills</li> <li>Stony Rise</li> <li>Spinifex Stony Plain</li> </ul>	Moderate

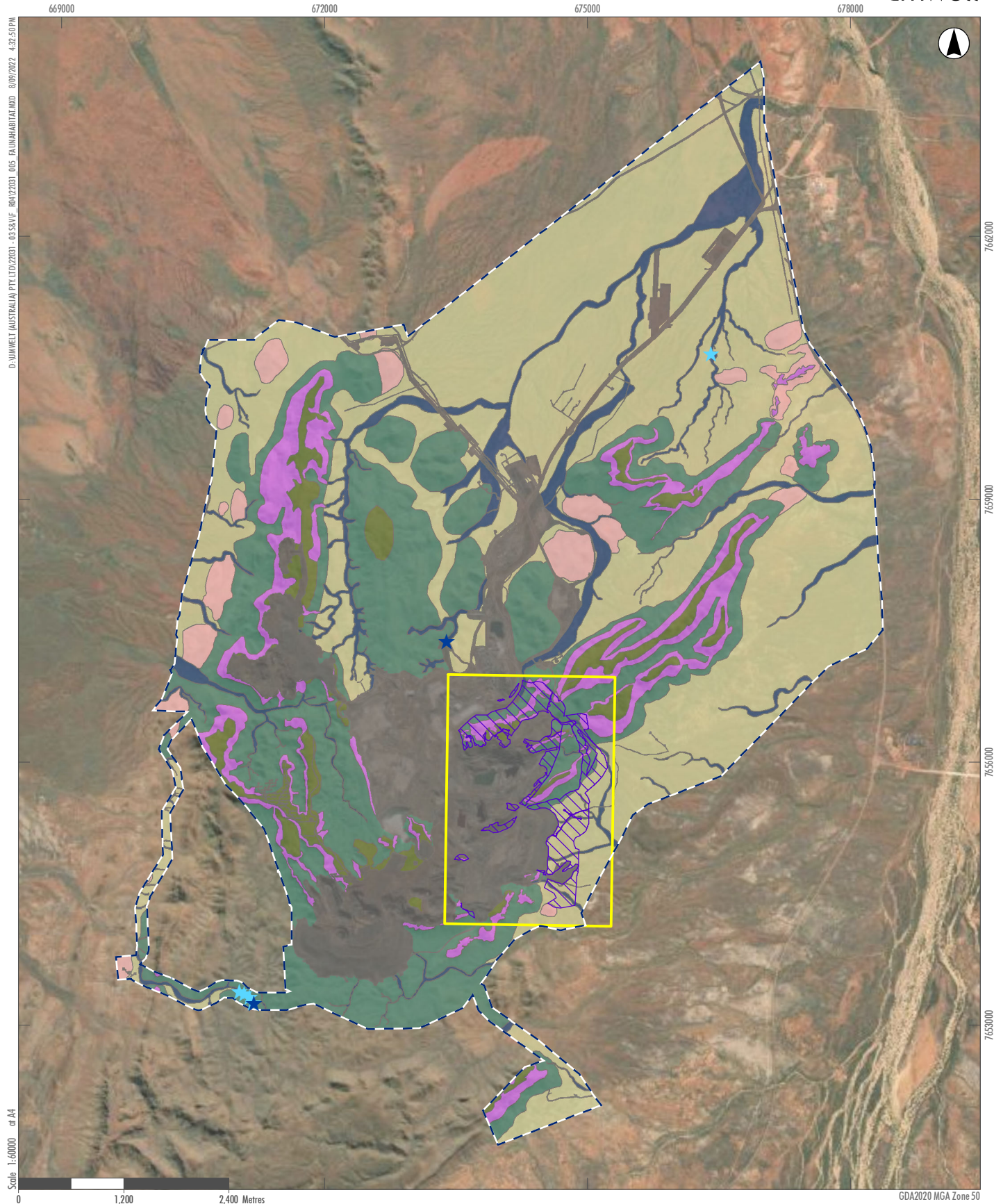


Fauna species	Status*			Potential habitat use at Wodgina	Likelihood of occurrence
	EPBC Act	BC Act	DBCA Priority		
<i>Anilius ganei</i> Gane's Blind Snake			P1	<ul style="list-style-type: none"> <li>Rocky Ridge and Gorge</li> <li>Rocky Foothills</li> </ul>	Moderate
<i>Lagorchestes conspicillatus</i> Spectacled Hare-wallaby			P4	<ul style="list-style-type: none"> <li>Spinifex Stony Plain</li> </ul>	Known to occur
<i>Sminthopsis longicaudata</i> Long-tailed Dunnart			P4	<ul style="list-style-type: none"> <li>Ironstone Ridgetop</li> <li>Rocky Ridge and Gorge</li> <li>Spinifex Stony Plain</li> <li>Stony Rise</li> <li>Rocky Foothills</li> </ul>	Known to occur
<i>Leggadina lakedownensis</i> Lakeland Downs Mouse			P4	<ul style="list-style-type: none"> <li>Spinifex Stony Plain</li> <li>Drainage Line</li> </ul>	Moderate
<i>Pseudomys chapmani</i> Western Pebble-mound Mouse			P4	<ul style="list-style-type: none"> <li>Ironstone Ridgetop</li> <li>Spinifex Stony Plain</li> </ul>	Known to occur

\*Key to status: Cr = Critically Endangered, En = Endangered, Vu = Vulnerable, Mi = Migratory, OS = Other Specially Protected Fauna, P1 – P4 = Priority 1 – 4.

\*\* There are very few records of this species anywhere, thus its habitat requirements and distribution are not well understood.





# Legend

- Fauna Study Area
- Proposed NVCP Boundary
- Proposed Disturbance Footprint
- ★ Permanent Pool
- ★ Semi-Permanent Pool
- Fauna Habitat**
- Disturbance
- Drainage Line
- Ironstone Ridge Top
- Low Vegetation with Ephemeral Areas
- Rocky Foothills
- Rocky Ridge and Gorge
- Shrubland over Spinifex Sandplain
- Spinifex Sandplain
- Spinifex Stony Plain
- Stony Rises

FIGURE 1.6

Fauna Habitats within the Fauna Study Area



## 2.0 Methods – Flora and Vegetation

### 2.1 Identification of Threatening Processes

Direct impacts to flora and vegetation are those attributable to clearing within the disturbance footprint resulting in the removal of vegetation and known flora locations and individuals at these locations.

Indirect impacts to flora and vegetation may occur as a result of processes such as:

- Dust emissions: potential to smother individual plants causing decline in health or death, and potential to reduce the condition of vegetation.
- Water and/or sediment run off (for example, erosion after significant rainfall from waste dumps): potential to smother both individuals of significant flora taxa, and general vegetation resulting in decline in health or death.
- Altered hydrology and drainage shadow: potential for significant reduction or removal of seasonal surface water flow, causing either death or loss of condition to individual plants or vegetation. Drainage shadows are areas with reduced water associated with changes in water movement as a result of drainage.
- Introduction of weeds and pathogens: introduction of weed taxa can lead to competition for available resources with individual plants, and loss of condition of vegetation.
- Changes to groundwater levels on groundwater dependent vegetation (GDV): can lead to death of phreatophytic taxa and change in composition of GDV.
- Fragmentation to local populations of significant flora and vegetation: fragmentation of existing populations or patches of vegetation can lead to decline in health due to decline in quality of populations, or loss of genetic diversity through isolation of segments of a population, leading to reduced genetic fitness of remaining population.

### 2.2 Assessment of Direct Impacts

The assessment of direct impacts is provided by quantification of the project activities in a Geographic Information System (GIS) environment of the known extent and range of significant environmental factors. Impacts have been calculated using the disturbance footprint within the NVCP boundary on such factors.

#### 2.2.1 Flora

The significant flora dataset for Wodgina is based on the report by Woodman Environmental (2020) that has been used to undertake this assessment. Historical locations of significant flora taxa which occur on areas mapped as previously disturbed have been removed from the determination of non-cumulative impact assessment.



The proposed NVCP boundary and the proposed disturbance footprint (provided by MARBL) were overlaid on locations of significant flora in a GIS environment, to determine the potential extent of impact on these locations and associated individual plants. The extent of proposed impact on preferred habitat VUs for each taxon was also calculated to determine the proportional extent to which such habitat for each taxon will be impacted. The assessment of impacts to flora and vegetation has also utilised the proposed NVCP boundary to allow for some flexibility in the proposed disturbance footprint.

The methods for assessing the scale and significance of impact were developed by Woodman Environmental in consultation with the Environmental Protection Authority Services Unit (previously Office of the EPA) and DBCA (previously Department of Environment and Conservation) as part of previous impact assessment projects. A ranking of the scale of potential local impact on each taxon was determined and is presented in **Table 2.1**.

The impact on the number of known individuals has been assessed for taxa where good contextual information regarding the distribution of the taxon in the disturbance footprint is known (i.e. *Terminalia supranitifolia* (P3) and *Triodia chichesterensis* (P3)). The true extent of *Euphorbia clementii* (P3) within the Flora Study Area is unable to be determined due to the taxon's response to fire, and the lack of recently burnt areas. Although some individuals of this taxon have been recorded in areas significantly post-fire (>1 year), the number of plants occurring is significantly less than post-fire. Given this lack of extent of location data, assessment of the impact on potential habitat in terms of VUs has been undertaken to determine the likelihood of risk of significant impact on *Euphorbia clementii* (P3), and also undertaken for the other significant taxa to provide additional context.

Impact on significant flora taxa at regional context cannot be accurately calculated as there is insufficient data available on the numbers of individuals of significant flora taxa known across their ranges. Assessment of impacts at the regional scale utilises the significance of the local subpopulation(s) to the maintenance of taxon throughout its range and scales the proposed impact on local populations to determine the potential impact on the taxon in terms of conservation status across its entire range.

A qualitative assessment, using data from government databases and Umwelt records, of the significance of the local populations of significant flora to the regional conservation status of the taxon is presented in terms of assessing the:

- number and distribution of regional localities and populations
- the location of the Flora Study Area within the range
- the size of regional populations and
- the reservation status of these populations.

The significance of the scale of impact is assessed based on the importance of local populations to their regional conservation (**Table 2.4**).



**Table 2.1 Scale of Potential Local and Regional Impact on Significant Flora Taxa**

Scale of Potential Impact	Level	Description of Impact
Low Impact	Local	<25 % of known local individuals or area of habitat may potentially be impacted.
	Regional	<25 % of known regional populations may potentially be impacted. Local subpopulations are not of particular significance in terms of maintaining the survival of the taxon: taxon has a wide distribution; >10 populations some of which are protected in conservation estate; and the local population is likely to have low significance in maintaining the extent of the taxon, for example being located within the known range and not representing a disjunct population, being located in relatively close proximity to other populations.
Moderate Impact	Local	25–50 % (inclusive) of known local individuals or area of habitat may potentially be impacted.
	Regional	25–50 % of known regional populations may potentially be impacted. Local subpopulations are moderately significant in terms of maintaining the taxon through its range: generally <10 populations, which may include those on conservation estate; the taxon may have a wide distribution however the local population is located on the edge of the range or forms a significant disjunct population in comparison to the other populations; few if any nearby populations.
High Impact	Local	>50 % of known local individuals or area of habitat may potentially be impacted.
	Regional	>50 % of known regional populations may potentially be impacted. Local subpopulations to be impacted are relatively significant in terms of maintaining the taxon through its range: there is limited distribution of the taxon (<40 km); limited numbers of known populations (<5), with no populations being located on conservation estate; and the local population potentially contributes significantly to the maintenance of the taxon through being representative of the edge of the known range, forming a significant disjunct population or representing a significantly large population in comparison to other populations.

## 2.2.2 Vegetation

The proposed disturbance footprint and NVCP boundary were overlaid on VU polygons mapped in the Flora Study Area in a GIS environment, to determine the area of each VU proposed to be impacted.

A ranking of the level of potential local impact on VUs was determined using the scale presented in **Table 2.2**.



**Table 2.2 Level of Potential Local Impact on Vegetation Units**

Ranking of Potential Impact	Description of Impact
Low Impact	<25 % of mapped VU in Study Area may potentially be impacted
Moderate Impact	25 - 50 % of mapped VU in Study Area may potentially be impacted
High Impact	>50 % of mapped VU in Study Area may potentially be impacted

The local conservation significance of each VU mapped in the Vegetation Study Area is defined utilising the scale presented in **Table 2.3**. This allows for the significance of potential local impacts to VUs to be ranked, as a function of the level of potential local impact and the local conservation significance of each VU.

The ranking scale of the significance of potential local impacts to VUs is presented in **Table 2.4**.

**Table 2.3 Descriptions of Local Conservation Significance Rankings of Vegetation Units**

Local Conservation Significance Ranking	Description
1 (low)	<ul style="list-style-type: none"> <li>VU comprises &gt;10 % of the Vegetation Study Area; and</li> <li>Landform/soil type where VU occurs is locally common and widespread.</li> </ul>
2 (Low- Moderate)	<ul style="list-style-type: none"> <li>VU comprises 1-10 % of the Vegetation Study Area; and</li> <li>Landform/soil type where VU occurs is locally common and widespread.</li> </ul>
3 (Moderate)	<ul style="list-style-type: none"> <li>VU comprises 1-10 % of the Vegetation Study Area; and</li> <li>Landform/soil type where VU occurs is locally uncommon and/or restricted.</li> </ul>
4 (Moderate – High)	<ul style="list-style-type: none"> <li>VU comprises &lt; 1 % of the Vegetation Study Area; and</li> <li>Landform/soil type where VU occurs is locally common and widespread.</li> </ul>
5 (High)	<ul style="list-style-type: none"> <li>VU comprises &lt; 1 % of the Vegetation Study Area; and either</li> <li>Landform/soil type where VU occurs is locally uncommon and/or restricted.</li> </ul>

**Table 2.4 Significance of Potential Local Impact on Flora Taxa and Vegetation Units**

		Level of Potential Local Impact		
		Low	Moderate	High
Local Conservation Significance of Flora Taxon/VU	Low 1, 2	Low	Low	Low
	Moderate 3	Low	Moderate	Moderate-High
	High 4, 5	Low	Moderate-High	High



Limited information regarding the regional distribution of VUs is available for the Pilbara Region. Impacts to the pre-European extent of vegetation system associations of the Pilbara (Government of Western Australia 2019) are presented. Although a regional flora and vegetation survey of the Pilbara Region has been undertaken by DBCA (McKenzie *et al.* 2009), no reports describing VUs on a regional scale are available. Vegetation mapping of the Turner River Hub Project (Woodman Environmental 2011a) surveyed a relatively extensive area, however the vegetation study areas was not included as part of this assessment.

## 2.3 Assessment of Indirect Impacts

Indirect impacts to flora and vegetation may occur as a result of the threatening processes as outlined in **Section 2.1**.

Some research has been undertaken at minesites in nearby regions in relation to impact of dust emissions on significant flora taxa. Turner (2013) undertook a study on the effects of mining dust on vegetation health at the Jack Hills. Monitoring by Woodman Environmental (2017) at the Atlas Iron Pty Ltd Pardoo Iron Ore Mine focused on potential impacts to health of flora from dust generated by mining operations including road use, focusing on two ephemeral significant taxa (*Eragrostis crateriformis* (P3) and *Rothia indica* subsp. *australis* (P1)).

There is some evidence to suggest that dust from mining operations can impact flora taxa or vegetation, but the long-term impact is not clear. Turner (2013) did find that heavy dust loading created reduced stomatal conductance on two *Acacia* taxa: likewise, it was observed at sites with heavy dust loads many plants dropped leaves or had died. Turner (2013) found that the leaf surface and dust interaction was more important to stress levels than the actual amount of dust: however, metal-rich dust with low pH may have been the causal factor. The dust levels on ephemeral significant taxa as monitored at the Pardoo site by Woodman Environmental (2017) did not cause significant stress or death to the taxa monitored.

Sediment and water run-off from disturbed areas after significant rainfall events into surrounding native vegetation can occur and there is the possibility of impacts to vegetation. Likewise, introduction of weeds or other pathogens from activities such as clearing can degrade otherwise intact vegetation on a temporal basis.

A potential indirect impact zone surrounding all footprints to an extent of 20 m has been used to quantify potential indirect impacts of these processes on nearby significant flora and vegetation units. This area is referred to as the Indirect Impact Assessment Zone (IIAZ). This zone represents a potential worst-case area of indirect impact only, with actual loss of vegetation within this zone considered unlikely based on no obvious changes observed in the condition of the vegetation bordering the existing Wodgina Operations (Woodman Environmental field observations; Outback Ecology 2009a).

Investigations determining the presence of GDV have been undertaken at Wodgina (Woodman Environmental 2019a), and reference to this assessment has been utilised to present potential impact of groundwater drawdown on GDV by the project in **Section 4.4.1**. A qualitative assessment of the potential impact of drainage shadow is also provided based on the interruption of local creek and drainage systems by the project.



The main drivers of indirect fragmentation effects include reduced patch (habitat) area, increased edge effects (introduction of weeds and other degradation), altered patch shape, increased patch isolation and altered matrix structure. Smaller patches, including smaller areas of known populations of significant flora, can result in reduction of reproductive success of individual species and reduce overall species composition (Didham 2010). The length of time of which a patch has been isolated is also important, with species richness decreasing over time.

With respect to individual species, several traits may assist in predicting their sensitivity to fragmentation (Henle *et al.* (2004) as referenced by Didham 2010):

- Population size: smaller populations are more prone to extinction.
- Population variability: greater temporal variability in population size reduces the probability of population persistence.
- Competitive ability and sensitivity to disturbance: competitively-dominant species in undisturbed habitats may reduce at the expense of disturbance-opportunists.
- Degree of habitat specialisation: specialist species are more susceptible than generalists.
- Rarity: rare, patchily distributed species are more susceptible than common species.
- Biogeographical location: tropical and Mediterranean biomes are more sensitive to fragmentation than temperate biomes.

The impact of fragmentation of populations of significant flora and vegetation is difficult to quantify at a site level. Literature searches have revealed no studies that have been undertaken to determine the genetic diversity of significant flora subpopulations at Wodgina, or between the subpopulations at Wodgina and in the region. A qualitative assessment of the possible impacts of fragmentation by the proposals is provided in **Section 4.4.3**.

## 2.4 Assessment of Cumulative Impacts

A summary of the cumulative impact of both historical clearing (where data is available), the impacts of the proposed disturbance footprint and indirect impacts at Wodgina is provided in **Section 4.5**. This assessment is based on a worst-case scenario, assuming total clearing of the disturbance footprint areas and total loss of flora and vegetation within the IIAZ.

The impact of historical clearing on significant flora and vegetation at Wodgina is more difficult to quantify. Impacts through mining-related activities occurred at Wodgina prior to the identification of significant flora taxa in the area, and therefore historical data in relation to the extent of populations of these taxa within areas that were cleared is not complete. Impacts to flora and vegetation are based on the report by Woodman Environmental (2020) that collated results for relevant previous surveys.

Locations of significant flora recorded prior to surveys by Woodman Environmental (2019a), which occur in areas mapped as Cleared, have been included in the cumulative assessment as representation of historical impacts to such flora taxa; however, it is potentially an underestimate of the historical clearing impact. This is particularly pertinent to *Triodia chichesterensis* (P3).



There are historically cleared areas at Wodgina that were mapped as Cleared or Disturbed, and therefore have not been able to be allocated to any VU. Quadrats established in previously cleared areas (Outback Ecology 2009a) were established using a different sample size than that required by EPA (2016a), and as such are statistically incompatible with the data collected by Woodman Environmental (2019a). Therefore, the vegetation mapping undertaken by Outback Ecology has not been included in this assessment. The extent of clearing of VUs as mapped by Woodman Environmental (2012) have been determined using GIS, and an assessment of historical clearing of vegetation in this area has been provided.

## 2.5 Limitations

A number of flora and vegetation surveys have been undertaken at Wodgina. The Woodman Environmental (2020) report (the basis for this flora and vegetation impact assessment) summarises all methods and findings from these reports and provides an updated floristic analysis of quadrat data and vegetation mapping. The report identifies the impact of fire on the extent of *Euphorbia clementii* (P3) as a limitation based on the species being a fire-responder. A decline in individuals was recorded during the 2019 targeted survey in areas where individuals had previously been recorded (as discussed in **Section 1.5.1**). Due to the fire response of *Euphorbia clementii* (P3), and the lack of recently burnt areas in the study area at the time of survey, the impact on preferred habitat is considered to provide a more accurate representation of local impact on this taxon than the impact on the number of individuals (as discussed in **Section 4.3.3**).



## 3.0 Methods – Fauna

### 3.1 Identification of Threatening Processes

The current and future threats to significant species in the Pilbara Bioregion were identified by Carawardine *et al.* (2014), and include the following:

- **Fire:** Too frequent or too intense fires that results in loss of sheltering understorey and food resources.
- **Overgrazing and feral herbivores:** Livestock, mainly cattle (*Bos taurus*), and feral herbivores such as Donkeys (*Equus asinus*) and Camels (*Camelus dromedarius*) can result in habitat changes through trampling, selective grazing, introduction of weeds and simplification of vegetation structure.
- **Introduced predators:** Cats (*Felis catus*) occur throughout the Pilbara and Foxes (*Vulpes vulpes*) occur mainly on the coastal plains. These species have caused population declines and the contraction in the range of Pilbara fauna, particularly small and medium-sized mammals.
- **Cane toads:** Cane toads (*Rhinella marina*) periodically arrive in the Pilbara (e.g. on trucks) and their establishment is likely to impact native predators, reptiles and invertebrates.
- **Invasive plants:** Weeds are often associated with inappropriate fire and grazing regimes and may be introduced by mining activities. Weeds threaten habitats, particularly in wetlands or riparian areas.
- **Hydrological change:** Mine dewatering results in impacts below the surface, where it may affect groundwater dependent ecosystems, and above the surface, where it may change water flow regimes or create permanent waters. Permanent water may support introduced predators.
- **Mining:** Mining has direct impacts on fauna through habitat loss, alteration and fragmentation from both the mine and supporting linear infrastructure. Indirect impacts include altered hydrological and fire regimes and contamination of soil and water.
- **Agriculture:** though agriculture in the Pilbara is currently small-scale, future expansion of irrigated agriculture has the potential to alter hydrological regimes and result in habitat loss in potential croplands.
- **Tourism expansion:** tourism outside of DBCA-managed lands may result in impacts such as increased fire and introduction of exotic plants and animals.

Based on the list above, there are various threatening processes to native flora and fauna already operating in the Pilbara bioregion. To combat these threatening processes, Carawardine *et al.* (2014) suggest that the most cost-effective strategies are (in order) to control feral ungulates, establish predator-free wildlife sanctuaries and control cat predation around key wildlife assets.

Threatening processes specifically associated with the Proposal are listed in **Table 3.1**. These threats potentially cause impacts on fauna, which may be direct (e.g. loss of habitat or individuals within the project footprints) or indirect (e.g. altered fire regimes leading to habitat change, resulting in impacts to fauna populations). Impacts may also be cumulative, where the impacts of several projects or project stages combine.



These impacts were considered in relation to the fauna populations and habitats within the disturbance footprint, fauna populations in adjacent habitats (i.e. fauna in the local area and the remainder of the rocky range) and regional fauna populations. A 'local population' of fauna can vary from species to species depending on a range of factors including the mobility of the species, its habitat specificity and population structure. For the purpose of this assessment, the local population refers to all individuals of the species within 10 km range of the Fauna Study Area; however, the distribution of each species within this area is strongly influenced by the habitats available.

Note that for fauna there is generally no quantitative data available regarding direct or indirect impacts. The amount of habitat cleared is used as a substitute for the likely proportion of the fauna population lost. Indirect impacts are qualitatively assessed against known threatening processes for each species as presented in the literature. For example, if predation by feral cats is considered a threatening process for a species and the project is likely to result in the increase in feral cats, then it is considered likely that the project will cause an indirect impact on this species.



**Table 3.1 Key Direct and Indirect Threats that may impact fauna**

Threatening Process	Potential Impacts on fauna or fauna habitat	
	Direct Impact	Indirect Impact
<b>Clearing</b> Land clearing is recognised as a Key Threatening Process under the EPBC Act. Clearing of native vegetation will occur in the NVCP boundary area.	For most fauna, the loss of habitat is regarded as being the most significant direct impact on fauna in the NVCP boundary area. Although some fauna may relocate ahead of clearing, the loss of habitat will result in a proportional loss of fauna from the local population and mortality considered a high likelihood for fauna that do not relocate. The loss of some habitat features may be permanent, when structures such as rocky outcrops or caves cannot be recreated through rehabilitation. For some species habitat loss may be temporary and these species may return to sites post-rehabilitation. However, recolonisation of rehabilitated areas by fauna is a complex issue, and it does not necessarily follow that successful rehabilitation of vegetation will lead to successful recolonization by fauna.	Fragmentation of habitat may occur when habitat is cleared within the NVCP boundary area, fragmenting the remaining habitat into smaller, isolated patches. Widespread habitats such as Spinifex Stony Plains are less vulnerable to habitat fragmentation, however, linear habitats such as rocky ridges or drainage lines, may be broken up into separate areas. Fauna reliant on these habitats must either negotiate areas of cleared land or they will be isolated. Some fauna, such as birds, are highly mobile and less likely to be affected by habitat fragmentation. Small ground-dwelling species are more likely to be impacted by habitat fragmentation.
<b>Road mortalities</b> Road mortalities may occur when fauna and vehicles interact. It may be exacerbated by night driving and driving on roads that pass close to important habitat areas.	Many species have the potential to interact fatally with traffic, including nocturnal species crossing roads, low-flying bats, reptiles crossing/basking on tracks and kangaroos crossing tracks.	-
<b>Other accidental mortalities</b> Other mortalities of fauna may occur when native species are attracted to or interact with mining operations and infrastructure.	Fauna may become trapped in bins, skips, artificial water sources or steep-sided trenches. Fauna may shelter in pipes or other construction materials and become trapped or killed. Barbed-wire fences may cause entanglement and mortalities of bats.	-



Threatening Process	Potential Impacts on fauna or fauna habitat	
	Direct Impact	Indirect Impact
<b>Noise and vibration</b> Noise and vibration occur in association with mining activities and may include the operation of light and heavy vehicles, workshop noise, use of generators and power tools, drilling and blasting.	Increase in noise and vibration events in adjacent habitats.	At its lowest level, noise and vibration (e.g. from vehicle movements and generators) may cause fauna to avoid areas of otherwise suitable habitat. This may occur both within the NVCP boundary area and in adjacent habitats, though the overall effect on populations is not likely to be large. Drilling and blasting may also result in larger impacts such as the collapse or abandonment of bat roosts and abandonment of nests and/or eggs, burrows and/or young.
<b>Dust</b> Dust is likely to be produced during clearing, by driving on unsealed roads and tracks or through drilling and blasting.	Increase in production of dust, which may lead to dust clouds and dust deposition in surrounding habitats including waterbodies.	Where it impacts surrounding habitats, (e.g. roadsides), dust may reduce the potential of that habitat to supply food and shelter to fauna. Dust in waterbodies, such as water pools on drainage lines, may impact water quality and reduce the potential of these to support fauna.
<b>Artificial light</b> Artificial lighting occurs in association with night shift activities and includes vehicle lights and lighting of work areas.	Increase in artificial light spill into adjacent habitats.	Exposure to artificial light sources has the potential to impact fauna behaviour, including foraging and breeding behaviours. It may lead to fauna being attracted to light sources (where they may then be impacted by other processes) or preventing fauna from accessing otherwise suitable habitats.
<b>Altered fire regimes</b> Fires may be accidentally lit through ignition sources such as hot vehicles coming into contact with dry vegetation, sparks from hot works, inappropriate cigarette disposal and other ignition sources.	Increase in the frequency and intensity of fires in surrounding habitats. Note that the real risk of this impact is low, as standard operating procedures (e.g. firebreaks, fire extinguishers in vehicles) limit the sources of accidental ignition and prevent the spread of spot-fires.	Although fire is a natural part of the ecosystem, fires that are too frequent, too intense or very widespread can impact fauna by removing shelter (such as old-growth spinifex) and reducing productivity. While fauna populations can recover after fire as habitats regenerate, frequent fires may prevent this, causing local extinction.



Threatening Process	Potential Impacts on fauna or fauna habitat	
	Direct Impact	Indirect Impact
<b>Altered hydrological regimes</b> Clearing and modification of the landscape through the construction of pits and waste landforms can alter surface water flows. Artificial water sources such as dams and sumps may be constructed.	Increase in artificial water sources or permanent water, or changes to water-flows in drainage lines. Changes to groundwater levels in proximity to the pit footprint.	Artificial water sources and new sources of permanent water are likely to change the native faunal assemblage in a region where many species are adapted to the lack of water. Water sources may support populations of introduced predators that then prey on native species. Changes to underground water levels may impact the humidity of important bat roost caves.
<b>Invasive plants</b> Invasive plants may be introduced and/or spread around the site through the movement of seeds or soil.	Introduction of new weeds or spread of existing weeds resulting in the modification of habitats and simplification of habitat structure.	Habitats modified by weeds potentially support fewer fauna species. Weeds may prevent regeneration of fauna habitats after fire or rehabilitation.
<b>Introduced predators</b> Cats and wild dogs can be attracted to putrescible waste (e.g. landfill sites), be purposely fed by staff or be attracted to artificial water sources.	Increase in population of introduced predators such as cats and wild dogs.	Introduced predators prey on a variety of native fauna. Predation by feral cats is identified as a threatening process for significant fauna species, including the Northern Quoll, Pilbara Olive Python (particularly juveniles) and Spectacled Hare-wallaby.
<b>Introduction of Cane Toads</b> Cane Toads may be brought into the mine area on vehicles or freight.	Introduction of Cane Toads to water sources in the NVCP boundary area.	Cane Toads are likely to have a detrimental effect on native fauna species. Native predators such as the Northern Quoll and goannas may ingest them and die. Cane Toads prey on native frogs and invertebrates.
<b>Human disturbance</b> Human disturbance, such as entry of bat roosts or handling of fauna, may occur when staff are not appropriately educated.	Human entry of bat roosts may cause abandonment of the roost. Non-essential handling or harassment of fauna may result in stress to individual fauna handled. Fauna egress from areas of human interaction.	-



## 3.2 Cumulative Impacts on Fauna

Cumulative impacts have been assessed in the context of the previous mining activities at Wodgina, most recently the MARBL Lithium Project and Atlas DSO Project, as well as the backdrop of the current pattern of mining and other disturbances in the Pilbara Bioregion. A summary of historical clearing is included in **Section 5.1**. Note that 525.6 ha (9.5 %) of the Fauna Study Area was cleared prior to the MARBL Lithium Project and Atlas DSO Project, and no fauna habitat mapping is available for this area.

## 3.3 Assessment of the Scale of Impact

The scale of impact on the vertebrate faunal assemblage and significant fauna species was assessed according to the categories in **Table 3.2**. The scale of impact on each species was assessed in the context of:

- the characteristics of the fauna population known (or likely) to be present in the Fauna Study Area, such as the population size, the number of individuals likely to be present, whether the species is resident or visiting, or whether the species is likely to breed in the area
- the likely regional significance of the local fauna population, such as whether the population in the Fauna Study Area is likely to be of particular importance to maintaining the species in the bioregion, or for maintaining genetic diversity in the species
- the likely regional significance of the habitats present to the fauna population, such as whether the habitats are more important than those in surrounding areas for providing breeding, foraging or shelter habitat.

Except where specifically indicated, the scale of impact was assessed on the basis that no active management of threats is undertaken, and that the entire disturbance footprint area is cleared. Standard and targeted management and mitigation strategies may reduce the scale of impact for some species.

**Table 3.2 Scale of impact on local fauna populations**

Local Scale of impact	Description	Explanation
<b>Negligible</b>	No perceived impact on population.	Species infrequently occurs and/or is not reliant on the habitats that are impacted.
<b>Very Low</b>	No reduction in population size expected.	Although there may be impacts to some individuals, the population as a whole is unlikely to be reduced.
<b>Low</b>	Temporary reduction in population size; expected recovery of population after life of project.	The population may decline somewhat due to impacts on some individuals or due to loss of habitat. After the project has finished, habitats are rehabilitated and the population returns to the pre-impact state.
<b>Moderate</b>	Permanent reduction in population size; no threat to persistence of local population.	Although habitat critical to the survival of the species is reduced, the remaining area of habitat is sufficient to maintain a self-sustaining population of the species after the life of the project.
<b>High</b>	Permanent reduction in population size; persistence of local population in doubt.	Habitat critical to the survival of the species is reduced, fragmented or altered to the point that it is uncertain if the species can persist in the local area.
<b>Extreme</b>	Local extinction of population.	Habitat critical to the survival of the species is reduced, fragmented or altered to the point that the species can no longer be sustained in the local area.



### 3.4 Assessment of Impacts on Regional Fauna Populations

When the scale of impact on the local fauna population is assessed as Negligible, Very Low or Low, then it is considered that there is unlikely to be a regional impact. Where the scale of impact on the local fauna population is assessed as Moderate, High or Extreme, then there is the possibility of a regional impact. A regional impact may occur when the impact on a local population results in:

- the reduction in the range of the species in the region
- the loss of a genetically distinct population
- the loss of a population or habitat important for dispersal between other regional populations
- the loss of the entire known population or a loss in a significant proportion of the known regional population.

### 3.5 Assessment of the Significance of Impact on Fauna that are Matters of National Environmental Significance

Fauna listed as Matters of National Environmental Significance (MNES) under the EPBC Act were assessed as to whether the potential impacts of the development were likely to constitute a 'significant' impact on the species. A significant impact is one that is 'important, notable or of consequence, having regard to its context or intensity' (DoE 2013). Only species for which the local scale of impact was considered to be Moderate, High or Extreme (as per **Table 3.2**) were considered.

The determination on the risk of a 'significant' impact was undertaken with reference to 'Matters of National Environmental Significance: Significant Impact Guidelines 1.1' (DoE 2013). Additional guidance on what constitutes a significant impact was obtained from the 'EPBC Act referral guideline for the endangered northern quoll *Dasyurus hallucatus*' (DoE 2016), 'Conservation listing advice for *Macroderma gigas* Ghost Bat (TSSC 2016a) and 'Conservation listing advice for *Rhinonictis aurantia* (Pilbara form) Pilbara leaf-nosed Bat' (TSSC 2016c). The risk of a significant impact was determined to be High, Moderate or Low, as per **Table 3.3**. Note that according to DoE (2013) for a significant impact to be 'likely', it does not need to have a greater than 50 % chance of occurring, it is sufficient that the significant impact has a real chance of occurring. Where there is scientific uncertainty about a serious or irreversible impact, the precautionary principle applies.

**Table 3.3 Risk of a Significant Impact–Fauna**

Risk of a significant impact	Description	Example
Low	Low risk of a significant impact on the species.	Species infrequently occurs; no critical habitat is present or likely to be impacted; indirect impacts are few or none.
Moderate	Moderate risk of a significant impact on the species.	Species is recorded or likely to be present; only supporting habitats present or little impact on critical habitat if present; may be some indirect impacts on populations or habitats.
High	High risk of a significant impact on the species.	An important population of the species is known to be present; the project is likely to result in loss of critical habitat; indirect impacts are likely to have a large impact on the local population or on critical habitat.



Key to determining the risk of a significant impact is identifying the importance of the local population of the species and identifying habitat critical to the survival of the species.

An 'important population' is one that is necessary for the long-term survival and recovery of the species (DoE 2013). This may include key source populations, populations on the edge of the species range and/or populations important for maintaining genetic diversity. This may include a geographically distinct regional population, or collection of local populations, or a population, or collection of local populations that occurs within a particular bioregion.

'Habitat critical to the survival of the species' is defined by DoE (2013) as areas that are necessary for activities such as breeding, foraging, roosting or dispersal, areas necessary for the long-term maintenance of the species, areas necessary for maintaining genetic diversity and/or areas necessary for the reintroduction of population or recovery of the species.

### **3.6 Limitations**

Many fauna surveys and several years of fauna monitoring has been undertaken across the Fauna Study Area between 2008 and 2022. This data has been collected by a range of consulting groups and personnel. This impact assessment is reliant on the accuracy of the data collection and findings of those reports. Although some vertebrate fauna species have been relatively well-studied, there are still information gaps. For some species, basic data such as total population estimates, home-range sizes, patterns of dispersal or seasonal habitat use are not known or have only been subject to studies in other bioregions.



## 4.0 Results – Flora and Vegetation

### 4.1 Flora

#### 4.1.1 Significant Flora of the NVCP Permit Boundary

Numerous surveys for significant flora taxa have been undertaken at Wodgina, as detailed in Woodman Environmental (2020-Table 4).

This impact assessment considers the three significant flora taxa recorded within the proposed NVCP boundary:

- *Euphorbia clementii* (P3).
- *Terminalia supranitifolia* (P3).
- *Triodia chichesterensis* (P3).

A further three taxa (*Abutilon* aff. *hannii*, *Heliotropium muticum* (P3) and *Vigna triodiophila* (P3)) have been recorded in the wider Flora Study Area (Woodman Environmental 2020) but were not recorded in the proposed NVCP boundary despite intensive survey effort. Suitable habitat occurs in the proposed NVCP boundary for a further three significant taxa (*Eragrostis crateriformis* (P3), *Gomphrena leptophylla* (P3) and *Goodenia nuda* (P4)); however, these taxa have not been recorded at Wodgina, despite targeted survey over multiple survey events and are unlikely to be present in the NVCP boundary.

No flora taxa listed as Threatened under the EPBC Act or BC Act are known to occur at Wodgina.

#### 4.1.2 Regional Significance of Local Subpopulations of Significant Flora

Although *Euphorbia clementii* (P3) is not known to occur within the conservation estate, it has a relatively wide known distribution (330 km from near Port Hedland to east of the southern corner of Karajini National Park in the south) with 35 records representing approximately 25 populations (Woodman Environmental 2020). This taxon is a known fire-responder, and comprehensive survey is difficult in areas which have not experienced a burn within 12 months preceding the survey. Hence, its regional distribution, number of populations and number of individuals are difficult to quantify and are likely to be larger than current data suggests.

Although the local subpopulations of *Euphorbia clementii* (P3) at Wodgina are located on the western edge of its known range, the overall range of this taxon is extensive. Woodman Environmental (2011a) recorded at least 32 other locations of this taxon extending north-east of the eastern boundary of the Flora Study Area for approximately 6.5 km. The local Wodgina subpopulations are considered to have low regional significance, due to the large number of populations known, the large regional spatial distribution, the large distribution of the subpopulations at Wodgina and the high potential for further populations of this taxon to occur regionally.



*Terminalia supranitifolia* (P3) has a wide distribution (275 km from Kangan Station in the east to near Pannawonica in the west), with two of the 10 populations occurring in DBCA tenure (Murujunga National Park and Dolphin Island Nature Reserve). However, the population at Wodgina occurs over 190 km to the east of all other known populations, with Wodgina forming the eastern extent of the known range of this taxon. The habitat for this taxon is relatively restricted on a regional scale, occurring predominantly on higher rocky mesas and escarpments in the areas where it is known to occur. This taxon is relatively long-lived, with very few seedlings or otherwise younger individuals observed; the taxon is known to re-sprout following fire (Woodman Environmental field observations).

The subpopulations at Wodgina can be considered of moderate regional significance. Although this taxon is known to occur in the conservation estate in the western extent of its range, the locations at Wodgina are geographically disjunct from all other known populations and is itself not located on secure tenure.

*Triodia chichesterensis* (P3) occurs over a range of approximately 91 km from the north of Indee Station (south of Port Hedland) in the north to east of Mungaroona Nature Reserve in the south (DBCA 2007-); however, it is not currently known to occur in conservation estate. There are four known broad localities of this taxon known, including approximately 10 populations, extending in a north-south direction directly centred along the Great Northern Highway. It has been noted that the distribution of this taxon is confined to a narrow area in the central Chichester region of the Pilbara. Areas immediately to the west and east of its known distribution are poorly explored, but it is likely to be restricted to an area <100 km beyond current collections given the extensive nature of flora collecting efforts in the Pilbara (Anderson *et al.* 2017). Where available, plant density information for specimens on *Naturemap* (DBCA 2007-) have stated that the taxon is mainly dominant in the areas from which it has been collected. However, population data across its range is limited, with the most comprehensive data collected at Wodgina. The nearest known populations of this taxon to Wodgina are located within 20 km.

The Wodgina populations of *Triodia chichesterensis* (P3) are not located at a geographical edge of its range. Although the population data suggests that Wodgina is the largest population, notes regarding its density at other locations suggest that it is dominant where it occurs. It is considered that the Wodgina populations are of moderate regional significance.

## 4.2 Vegetation

No TECs or PECs are known from the Vegetation Study Area, and therefore are not known from within the NVCP boundary.

An assessment of the local conservation significance of each VU is presented in **Table 4.1**. A ranking of:

- 1 (Low) applied to VUs 2 and 10.
- 2 (Low-Moderate) applied to VUs 1, 5, 6, 7, and 8.
- 3 (Moderate) applied to VUs, 2, 4, 9, 11, and 14, due to the more limited extent present in the Vegetation Study Area and regionally restricted nature of the landform.
- 4 (Moderate-High) applied to VUs 12, 13 and 15 due to the limited extent of the VUs within the Vegetation Study Area and the potentially restricted nature of its regional extent.
- 5 (High). No VUs were considered to have a High local Conservation significance.



**Table 4.1 Local Conservation Significance Assessment of Vegetation Units within the Vegetation Study Area**

Vegetation Unit	Percentage of Study Area (%)	Landform Description	Preferred Habitat for Significant Flora	Local Conservation Significance Ranking (Table 2.3)
1	4.42	Red-brown clay loam with granite, quartz or ironstone stones on colluvial stone plains and low flat-topped rises. – locally common and not regionally restricted.	Nil	2
2	12.32	Red, brown or red-brown clay loam with metamorphic, ironstone, quartz and occasionally granite stones, occasionally with metamorphosed granite or granite outcropping, on lower slopes and colluvial outwashes of ranges and occasionally on low flat-topped rises. – locally common and not regionally restricted.	<i>Euphorbia clementii</i> (P3)	1
3	3.61	Red, brown or red brown clay loam with ironstone or metamorphosed granite stones over ironstone or metamorphosed granite outcropping on plateaus, crests and upper slopes of ranges. – locally common and potentially regionally restricted.	Nil	3
4	4.83	Red, brown or red-brown clay loam with metamorphosed granite, dolerite and occasionally ironstone stones over metamorphosed granite or dolerite outcropping on mid and upper slopes of ranges, and low ridges and hills. – locally common and potentially regionally restricted.	<i>Terminalia supranitifolia</i> (P3) <i>Triodia chichesterensis</i> (P3)	3
5	5.53	Red-brown clay loam with metamorphosed granite, ironstone, dolerite, quartz and calcrete stones, occasionally over metamorphosed granite and dolerite outcropping, on lower slopes and colluvial outwashes of ranges and low flat-topped rises. – locally common and not regionally restricted.	<i>Triodia chichesterensis</i> (P3)	2
6	3.09	Red clay loam with calcrete, quartz and metamorphosed granite stones, occasionally over calcrete outcropping, on colluvial outwashes of ranges and colluvial stony plains. – locally common and not regionally restricted.	<i>Triodia chichesterensis</i> (P3)	2



Vegetation Unit	Percentage of Study Area (%)	Landform Description	Preferred Habitat for Significant Flora	Local Conservation Significance Ranking (Table 2.3)
7	5.38	Red or red-brown clay loam with dolerite, calcrete and quartz stones, often with dolerite outcropping, on low hills. – locally common and not regionally restricted.	<i>Triodia chichesterensis</i> (P3)	2
8	1.99	Brown, red-brown or grey-brown clay loam with dolerite, calcrete, ironstone and quartz stones on colluvial stony plains. – locally common and not regionally restricted.	<i>Triodia chichesterensis</i> (P3)	2
9	20.38	Red, brown or red-brown clay loam with ironstone, metamorphosed granite or occasionally dolerite or quartz stones over ironstone or metamorphosed granite outcropping on cliffs, ridges and crests and upper to mid slopes of ranges. – locally common however regionally restricted. Although this VU was mapped at >10 % of the study area it is mapped on landform/soil types that is regionally restricted.	<i>Euphorbia clementii</i> (P3) <i>Terminalia supranitifolia</i> (P3) <i>Triodia chichesterensis</i> (P3)	3
10	18.23	Red, brown or red-brown sandy or clay loam, often with quartz or ironstone stones, on plains. – locally common, not regionally restricted.	<i>Euphorbia clementii</i> (P3)	1
11	2.71	Red, brown or red-brown sandy or clay loam with colluvial stones in minor drainage features including flats and small creeks. – locally common, regionally restricted.	<i>Euphorbia clementii</i> (P3)	3
12	0.88	Red, brown or grey-brown clay loam with calcrete or quartz stones on undulating plains. – locally restricted but not regionally restricted.	<i>Triodia chichesterensis</i> (P3)	4
13	0.85	Orange, brown or red-brown sandy or clay loam with granite and quartz stones over granite outcropping on undulating plains or low rises. – locally restricted but not regionally restricted.	Nil	4



Vegetation Unit	Percentage of Study Area (%)	Landform Description	Preferred Habitat for Significant Flora	Local Conservation Significance Ranking (Table 2.3)
14	3.07	Red or brown clay or sandy loam, usually with colluvial stones, in major creeks. – locally common and however regionally restricted.	Nil	3
15	0.23	Red clay loam with colluvial stones on plains. – locally restricted however not restricted regionally.	Nil	4
Cleared	12.48	Previously disturbed / developed areas (includes areas undergoing rehabilitation).	NA	NA



## 4.3 Assessment of Direct Impact

### 4.3.1 Direct Local Impact on Significant Flora Taxa – Locations and Individuals

Three significant flora taxa are known to occur in the proposed NVCP boundary, and two are present to some extent, in the proposed disturbance footprint:

- *Euphorbia clementii* (P3).
- *Terminalia supranitifolia* (P3) (present in the proposed disturbance footprint).
- *Triodia chichesterensis* (P3) (present in the proposed disturbance footprint).

The locations of significant flora taxa within the proposed NVCP boundary and the proposed disturbance footprint are shown in **Figure 4.1**. The numbers and percentages of locations and individuals within the proposed NVCP boundary and the proposed disturbance footprint are summarised in **Table 4.2** and **Table 4.3**, respectively.

Potential direct impacts to flora species of clearing (**Table 4.3**) are:

- *Euphorbia clementii* (P3): 0.00 % of individuals known in the Flora Study Area.
- *Terminalia supranitifolia* (P3): 5.26 % of individuals known in the Flora Study Area.
- *Triodia chichesterensis* (P3): 3.32 % of individuals known in the Flora Study Area.

**Table 4.2 Significant Flora Taxa within the proposed NVCP Boundary**

Significant Flora Taxa	Code*	Flora Study Area**		NVCP Boundary			
		# Locations	# Individuals	# Locations	% Locations	# Individuals	% Individuals
<i>Euphorbia clementii</i>	P3	322	61,529	3	0.93	20	0.03
<i>Terminalia supranitifolia</i>	P3	1,100	2,378	186	16.91	340	14.30
<i>Triodia chichesterensis</i>	P3	1,928	1,951,574	163	8.45	127,870	6.55

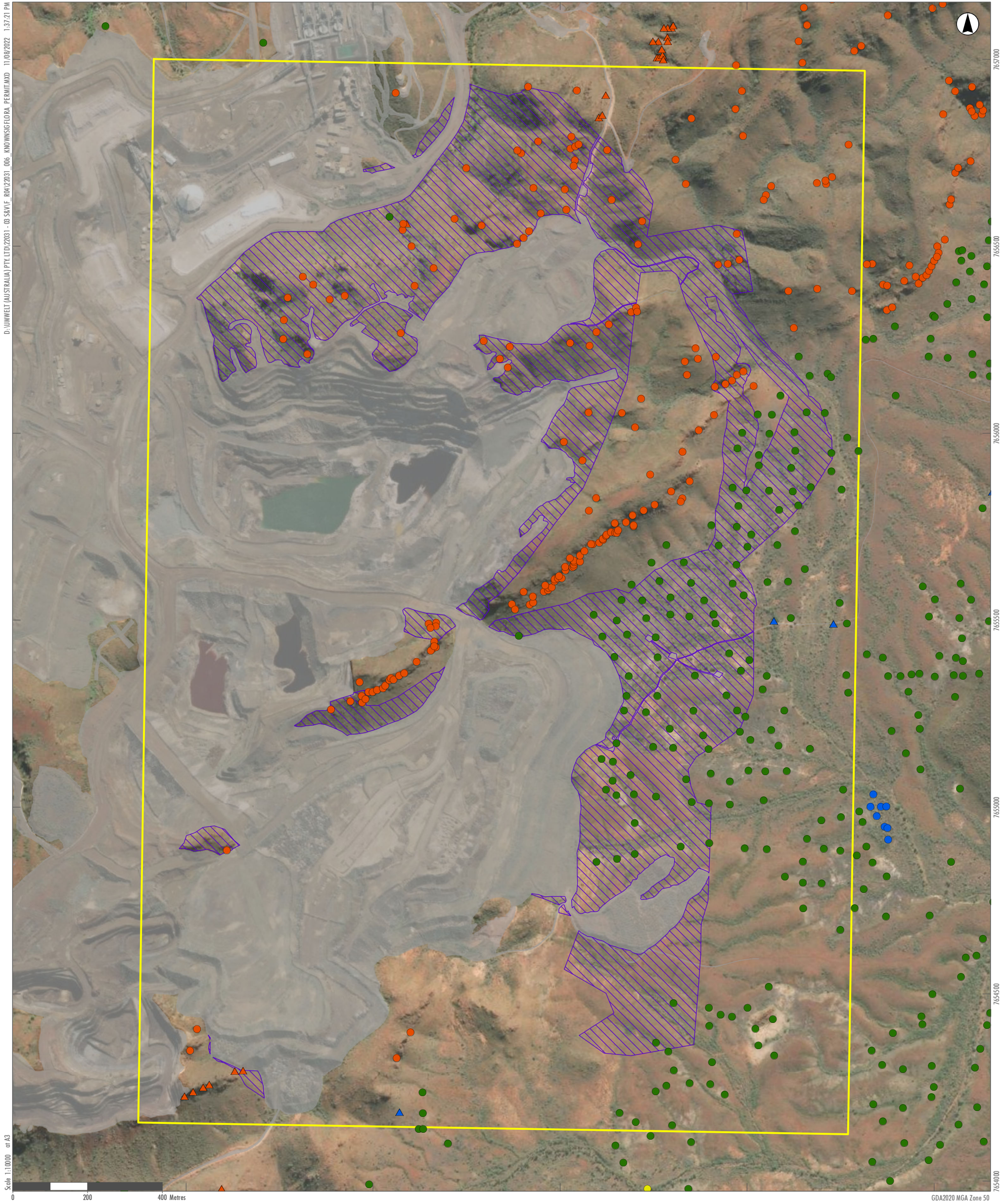
**Table 4.3 Impact on Significant Flora Taxa within the proposed Disturbance Footprint**

Significant Taxa	Code*	Flora Study Area**		Proposed Disturbance Footprint			
		# Locations	# Individuals	# Locations	% Locations	# Individuals	% Individuals
<i>Euphorbia clementii</i>	P3	322	61,529	0	0	0	0
<i>Terminalia supranitifolia</i>	P3	1,100	2,378	71	6.45	125	5.26
<i>Triodia chichesterensis</i>	P3	1,928	1,951,574	80	4.15	64,740	3.32

\*Note: Conservation Code as presented by DBCA (2019) and DBCA (2007-).

\*\*Note: records include survey information collected from outside the Flora Study Area as a result of surveys for the Project.





#### Legend

- Flora Study Area
- Proposed NVCP Boundary
- Proposed Disturbance Footprint
- Cleared

#### Significant Flora

- Ecl *Euphorbia clementii* (P3) – 2018/2019 surveys
- Ecl *Euphorbia clementii* (P3) – previous surveys
- ▲ Tch *Triodia chichesterensis* (P3) – 2018/2019 surveys
- Tsu *Terminalia supranitfolia* (P3) – 2018/2019 surveys
- ▲ Tsu *Terminalia supranitfolia* (P3) – previous surveys
- Aah *Abutilon* aff. *hannii* (potentially undescribed) – 2018/2019 surveys

FIGURE 4.1

Significant Flora Locations within the Proposed NVCP Boundary



### 4.3.3 Direct Local Impact on Significant Flora Taxa - Habitat

An assessment of the impact of the proposed NVCP boundary area on the preferred habitat for significant flora taxa, including *Euphorbia clementii* (P3) is presented in **Table 4.4**. This assessment quantifies the proposed impact on the preferred habitat (VUs) for taxa as presented in **Table 1.2**. Although suitable habitat for each known significant flora taxon within the entire proposed NVCP boundary was surveyed (summarised by Woodman Environmental 2020), survey effort in 2018-2019 for *Euphorbia clementii* (P3) was hampered due to lack of recently burnt areas (<12 months). As such, the impact on preferred habitat is considered to provide a more accurate representation of local impact on this taxon than the impact on the number of individuals. The impact on preferred habitat for the other taxa has been included for comparative purposes.

**Table 4.4 Impact on Significant Flora Habitat by the Proposal**

Significant Taxon	Preferred Habitat (VUs)	Total Habitat (ha)	NVCP Boundary		Disturbance Footprint	
			Area (ha)	% of preferred habitat	Area (ha)	% of preferred habitat
<i>Euphorbia clementii</i> (P3)	2, 9, 10, 11	3,618.15	145.58	<b>4.02</b>	61.46	<b>1.70</b>
<i>Terminalia supranitifolia</i> (P3)	4, 9	1,700.50	162.12	<b>9.53</b>	71.00	<b>4.18</b>
<i>Triodia chichesterensis</i> (P3)	4, 5, 6, 7, 8, 9, 12	2,838.46	250.21	<b>8.81</b>	105.71	<b>3.72</b>

### 4.3.4 Indirect Impacts to Significant Flora Taxa – Quantitative Assessment

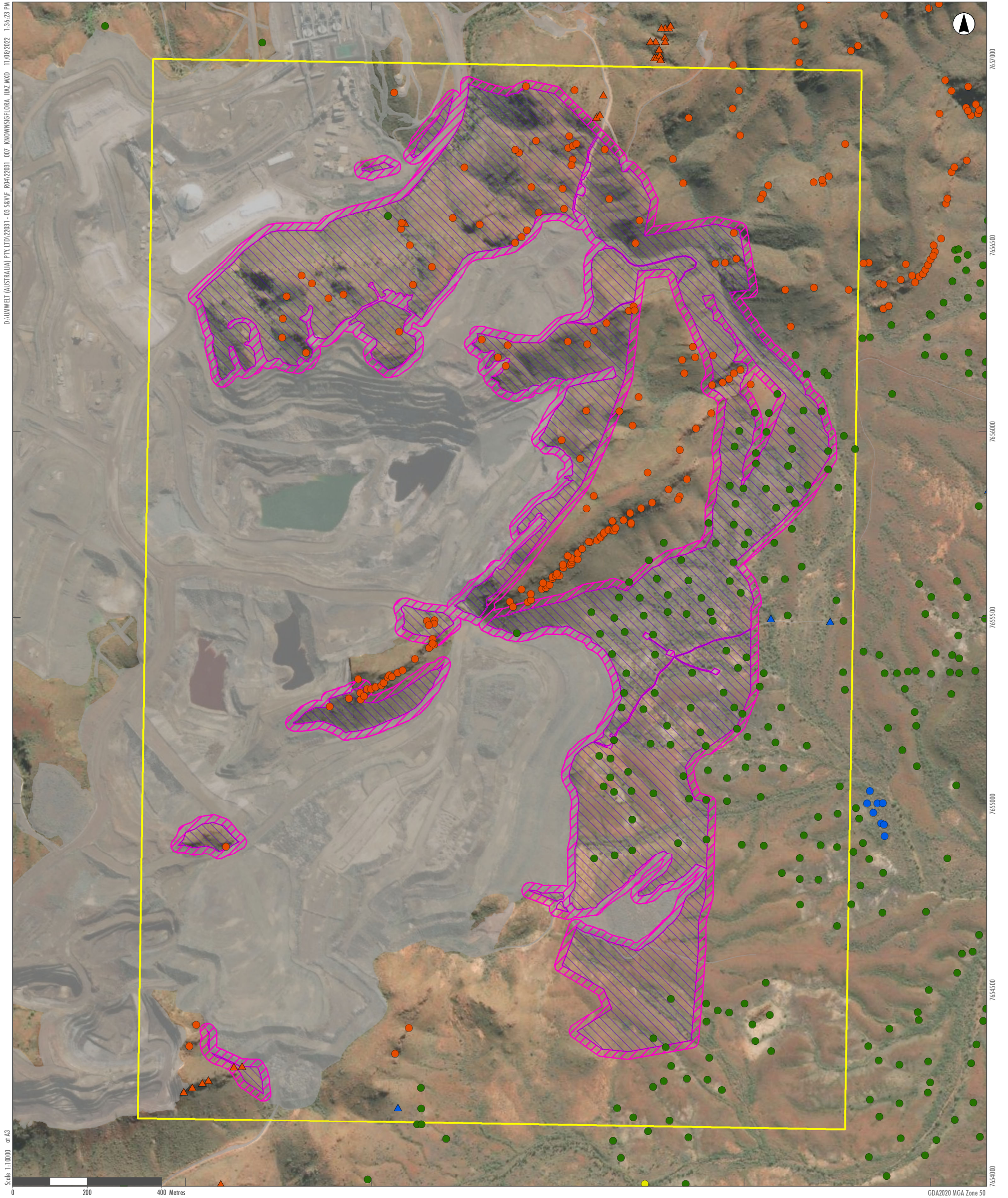
An assessment of the potential indirect impacts on significant flora and vegetation in areas that may be subject to factors such as dust and sediment run-off within the IIAZ of the proposed NVCP boundary area is presented in **Table 4.5** and **Table 4.6**, and shown on **Figure 4.2**. The total IIAZ is 38.67 ha, with 17.58 ha of native vegetation, all of which occurs in the Flora Study Area and therefore has been surveyed for significant flora taxa.

The potential Indirect impacts of the Proposal include:

- *Euphorbia clementii* (P3): 0 % of individuals known in the Flora Study Area.
- *Terminalia supranitifolia* (P3): 0.80 % of individuals known in the Flora Study Area.
- *Triodia chichesterensis* (P3): 0.63 % of individuals known in the Flora Study Area.

The potential indirect impacts to numbers of significant flora taxa, or their preferred habitat is minor in relation to the extent of direct impacts.





#### Legend

- Flora Study Area
- Proposed NVCP Boundary
- Proposed Disturbance Footprint
- Indirect Impact Assessment Zone
- Cleared

#### Significant Flora

- Ecl *Euphorbia clementii* (P3) – 2018/2019 surveys
- ▲ Ecl *Euphorbia clementii* (P3) – previous surveys
- Tch *Triodia chichesterensis* (P3) – 2018/2019 surveys
- Tsu *Terminalia supranitfolia* (P3) – 2018/2019 surveys
- ▲ Tsu *Terminalia supranitfolia* (P3) – previous surveys
- Aah *Abutilon* aff. *hannii* (potentially undescribed) – 2018/2019 surveys

FIGURE 4.2

Significant Flora Locations and Indirect Impact Assessment Zone within the Proposed NVCP Boundary



**Table 4.5 Impact on Significant Flora Taxa within the Indirect Impact Assessment Zone**

Significant Flora Taxa	Status	Flora Study Area		IIAZ			
		# Locations	# Individuals	# Locations	% Locations	# Individuals	% Individuals
<i>Euphorbia clementii</i>	P3	322	61,529	0	0	0	0.00
<i>Terminalia supranitifolia</i>	P3	1,100	2,378	11	1.00	19	0.80
<i>Triodia chichesterensis</i>	P3	1,928	1,951,574	13	0.67	12,250	0.63

**Table 4.6 Impact on Habitat of Significant flora taxa within the Indirect Impact Assessment Zone**

Significant Taxon	Status	Preferred Habitat (VUs)	Total Habitat in Study Area (ha)	IIAZ	
				Area (ha)	Percentage of Vegetation Study Area
<i>Euphorbia clementii</i>	P3	2, 9, 10, 11	3618.15	7.67	0.21
<i>Terminalia supranitifolia</i>	P3	4, 9	1700.50	11.65	0.69
<i>Triodia chichesterensis</i>	P3	4, 5, 6, 7, 8, 9, 12	2838.46	15.92	0.56



### 4.3.5 Significance of Local Impact on Significant Flora Taxa

The significance of impact on the significant flora taxa potentially impacted by the Proposal are presented in **Table 4.7**.

**Table 4.7 Significance of Local Impact on Significant Flora Taxa**

Significant Taxon	Impact Type	Percentage of Locations Proposed to be Impacted	Percentage of Individuals Proposed to be Impacted	Percentage of Preferred Habitat Proposed to be Impacted*	Overall Significance of Impact (Table 7)
<i>Euphorbia clementii</i> (P3)	Direct	0	0	1.70	Low
	Indirect	0	0	0.21	Low
	<b>Total</b>	<b>0</b>	<b>0</b>	<b>1.91</b>	<b>Low</b>
<i>Terminalia supranitifolia</i> (P3)	Direct	6.45	5.26	4.18	Low
	Indirect	1.00	0.80	0.69	Low
	<b>Total</b>	<b>1.45</b>	<b>6.06</b>	<b>4.87</b>	<b>Low</b>
<i>Triodia chichesterensis</i> (P3)	Direct	4.15	3.32	3.72	Low
	Indirect	0.67	0.63	0.56	Low
	<b>Total</b>	<b>4.82</b>	<b>3.95</b>	<b>4.28</b>	<b>Low</b>

\*Note: impact on preferred habitat calculations used for *Euphorbia clementii* (P3) only, due to targeted survey for this taxon in the permit/footprint areas deemed to be incomplete due to taxon's response to fire.

Overall, there is a Low significance of local impact proposed to all significant flora taxa *Euphorbia clementii* (P3), *Terminalia supranitifolia* (P3), and *Triodia chichesterensis* (P3) by clearing of the proposed disturbance footprint.

### 4.3.6 Impact on Significant Flora at the Regional Scale

#### 4.3.6.1 *Euphorbia clementii* (P3)

The potential impact of the proposed disturbance footprint is Low in terms of both the known number of individuals and the extent of preferred habitat within the Flora Study Area (**Table 4.3**; summarised in **Table 4.7**). In combination with the Low regional significance of the local subpopulations (**Section 4.1.2**), the impact of the proposed disturbance at the regional scale is ranked Low (as per **Table 2.4**).

#### 4.3.6.2 *Terminalia supranitifolia* (P3)

The potential impact of the proposed disturbance footprint is Low in terms of both the known number of individuals and extent of preferred habitat within the Flora Study Area (**Table 4.3**; summarised in **Table 4.7**). In combination with the Moderate regional significance of the local subpopulations (**Section 4.1.2**), the significance of the impact of the proposed disturbance at the regional scale is ranked Low (as per **Table 2.4**).



Although the regional significance of impact on this taxon has been ranked Low, the loss of individuals of this taxon and extant local habitat would have potentially higher impacts on this taxon in comparison to taxa such as *Euphorbia clementii* (P3) due to differences in life history (response to events such as fire; recruitment/regrowth strategies) and distribution of habitat in which they occur. The known subpopulations extend to the north, south and west outside of the Study Area (**Figure 1.2**).

#### 4.3.6.3 *Triodia chichesterensis* (P3)

The potential impact of the proposed disturbance footprint is Low in terms of both the known number of individuals and extent of preferred habitat within the Flora Study Area (**Table 4.3**; summarised in **Table 4.7**). In combination with the Moderate regional significance of the local subpopulations, the significance of the impact of the proposed disturbance at the regional scale is ranked Low (as per **Table 2.4**).

Although the regional significance of the local populations has been ranked Moderate, this taxon is relatively widespread through the Flora Study Area, with further records to the west, south and east of the Flora Study Area (**Figure 1.2**).

### 4.3.7 Local Direct Impact on Vegetation

#### 4.3.7.1 Vegetation Condition

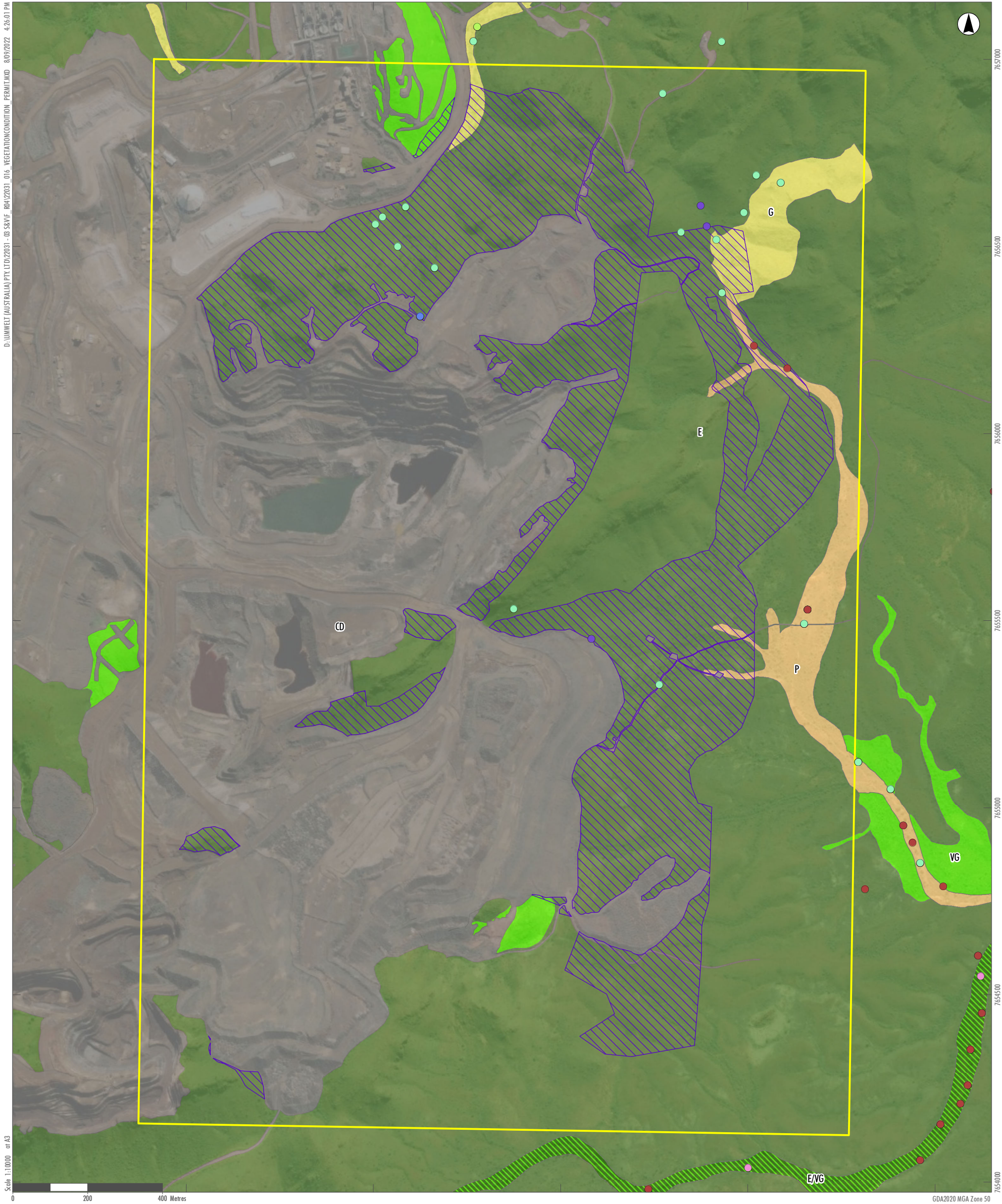
The representation of vegetation condition within the Vegetation study area is summarised in **Table 4.8**. Over 96 % of the vegetation was in Excellent condition. The area of vegetation in Excellent condition in the NVCP boundary represents 4.80 % of vegetation in Excellent condition mapped in the Vegetation study area. The area of vegetation in Excellent condition in the Proposed Disturbance Boundary represents 1.86 % mapped in the Vegetation Study Area.

**Table 4.8 Vegetation Condition within the Vegetation Study Area, Proposed NVCP Boundary and Disturbance Footprint**

Condition Category	Vegetation Study Area		NVCP Boundary		Proposed Disturbance Footprint	
	Area (ha)	As % of Mapped Vegetation	Area (ha)	As % of Mapped Condition	Area (ha)	As % of Mapped Condition
Excellent	5720.07	96.91 %	274.39	4.80 %	109.58	1.86 %
Excellent / Very Good	15.87	0.27 %	0.00	0.00 %	0.00	0.00 %
Very Good	43.35	0.73 %	5.00	11.53 %	0.43	0.01 %
Good	82.12	1.39 %	8.14	9.91 %	2.15	0.04 %
Good/Poor	21.37	0.36 %	0.00	0.00 %	0.00	0.00 %
Poor	19.55	0.33 %	9.65	49.37 %	1.39	0.02 %
*Cleared	842.79	-	243.37	28.97 %	0.21	0.004 %
Native Vegetation (Excellent to Poor)	5902.32	-	297.18	5.08	113.54	1.92
Total Area	6745.11	-	540.56	-	113.75	-

\*Includes Completely Degraded, Degraded and areas under rehabilitation.





- Legend**
- Proposed NVCP Boundary
- Proposed Disturbance Footprint
- Vegetation Condition**
- E Excellent
  - E/VG Excellent / Very Good
  - VG Very Good
  - G Good
  - P Poor
  - CD Completely Degraded
- Introduced Flora**
- Aej *Aerva javanica*
  - Cap *Calotropis procera*
  - Cec *Cenchrus ciliaris*
  - Cse *Cenchrus setiger*
  - Cyd *Cynodon dactylon*
  - Flt *Flaveria trinervia*
  - Paf *Passiflora foetida* var. *hispida*

FIGURE 4.3

**Vegetation Condition and Introduced  
Flora within the Proposed NVCP Boundary**



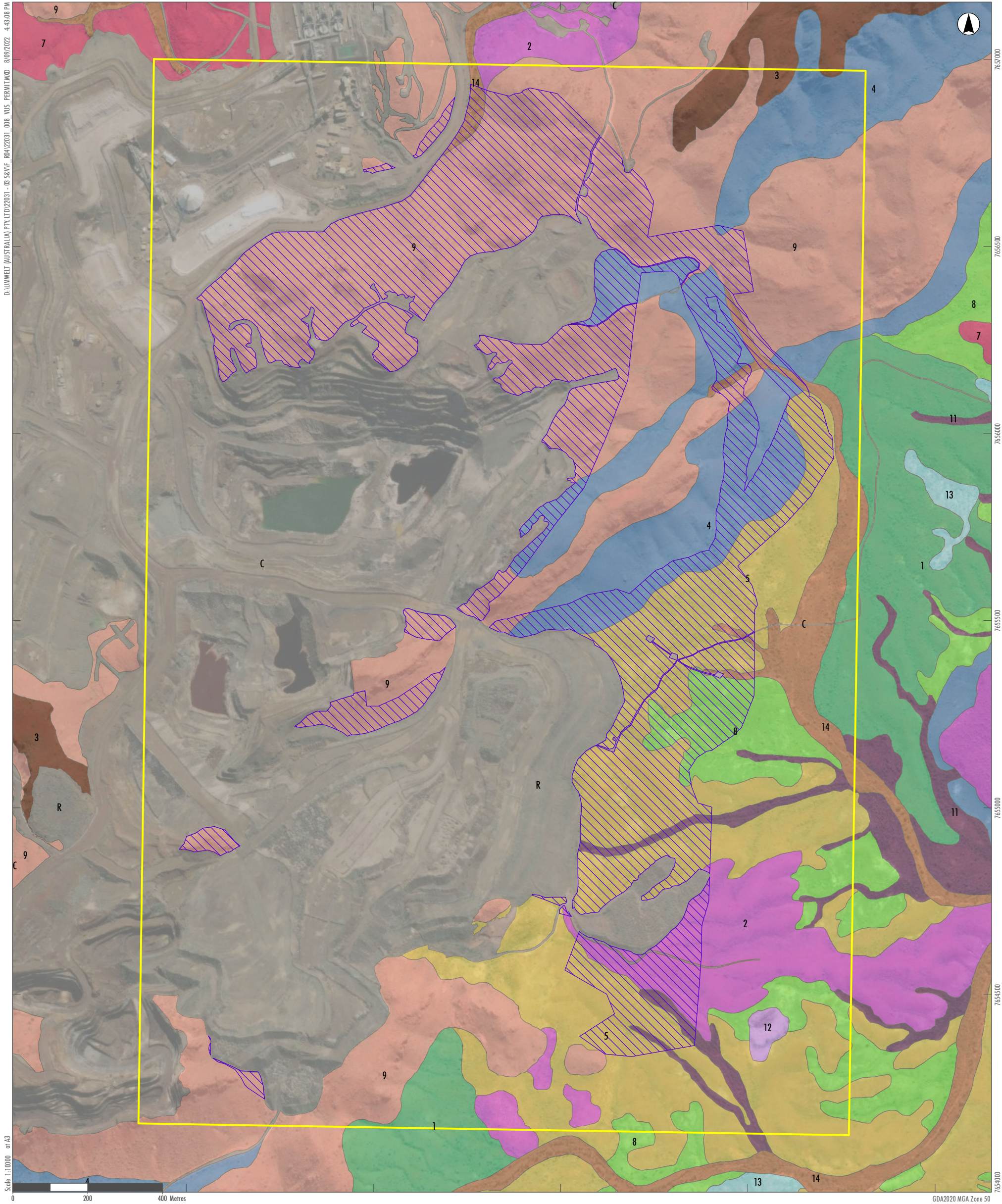
#### 4.3.7.2 Vegetation Units

Eight VUs are proposed to be directly impacted by clearing within the proposed NVCP boundary area. The NVCP boundary and disturbance footprint in association with VUs is shown in **Figure 4.4**. The extent of proposed footprint impact by areas and percentage of mapped extent of VUs within the Vegetation Study Area is presented in **Table 4.9**. The significance of local impact on VUs by the Proposal is ranked Nil or Low (see **Table 2.2**).

**Table 4.9 Local Direct Impact on Vegetation Units by the proposed NVCP Boundary and Proposed Disturbance Footprint**

VU	Total Vegetation Study Area Extent (ha)	Area within NVCP Boundary (ha)	Area within Disturbance Footprint (ha)	Disturbance Area as Percentage of Total VU Area mapped	Local Impact
1	297.86	9.76	0	0.00	Nil
2	831.05	18.38	4.29	0.52	Low
3	243.32	3.05	0	0	Nil
4	325.69	40.12	15.33	4.71	Low
5	372.96	70.34	30.45	8.16	Low
6	208.51	0	0	0	Nil
7	362.87	0.66	0.00	0	Nil
8	134.04	16.03	4.25	3.17	Low
9	1,374.81	122.00	55.67	4.05	Low
10	1,229.57	0	0	0	Nil
11	182.72	5.20	1.49	0.82	Low
12	59.57	1.06	0	0	Nil
13	57.11	0	0	0	Nil
14	207.11	10.58	2.05	0.99	Low
15	15.50	0	0	0	Nil
Cleared	842.71	243.37	0.21	0.03	-
Total area	<b>6,745.42</b>	<b>540.55</b>	<b>113.74</b>	-	-





- Legend**
- Flora Study Area
  - Proposed NVCP Boundary
  - Proposed Disturbance Footprint
  - Vegetation Units**
  - 1
  - 2
  - 3
  - 4
  - 5
  - 7
  - 8
  - 9
  - 11
  - 12
  - 13
  - 14
  - Cleared land

FIGURE 4.4  
Vegetation Units within the  
Proposed NVCP Boundary



### 4.3.8 Indirect Impact on Vegetation–Quantitative Assessment

The VUs within the IIAZ associated with the disturbance footprint is presented in **Figure 4.5**.

The potential impact on VUs within the IIAZ is presented in **Table 4.10**. The total IIAZ is 38.66 ha of which 17.57 has native vegetation (**Figure 4.5**); the remaining area within the IIAZ is previously ‘cleared’.

All VUs that are known to occur in the IIAZ will also potentially be impacted by direct impacts. The local direct impact on all VUs has been ranked as Nil or Low.

**Table 4.10 Local Indirect Impacts of the IIAZ on Vegetation Units**

VU	Total Study Area Extent (ha)	Proposed IIAZ (ha)	Percentage of Study Area mapped	Local Impact – IIAZ
1	297.86	0.00	0.00	Nil
2	831.05	1.01	0.12	Low
3	243.32	0.00	0.00	Nil
4	325.69	5.15	1.58	Low
5	372.96	3.58	0.96	Low
6	208.51	0.00	0.00	Nil
7	362.87	0.00	0.00	Nil
8	134.04	0.69	0.51	Low
9	1,374.81	6.49	0.47	Low
10	1,229.57	0.00	0.00	Nil
11	182.72	0.17	0.09	Low
12	59.57	0.00	0.00	Nil
13	57.11	0.00	0.00	Nil
14	207.11	0.48	0.23	Low
15	15.50	0.00	0.00	Nil
Cleared	842.71	17.57	-	-
Total Area	<b>6,745.42</b>	<b>38.66</b>	-	-



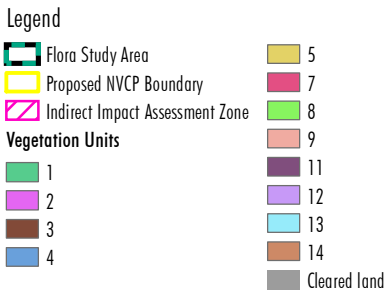
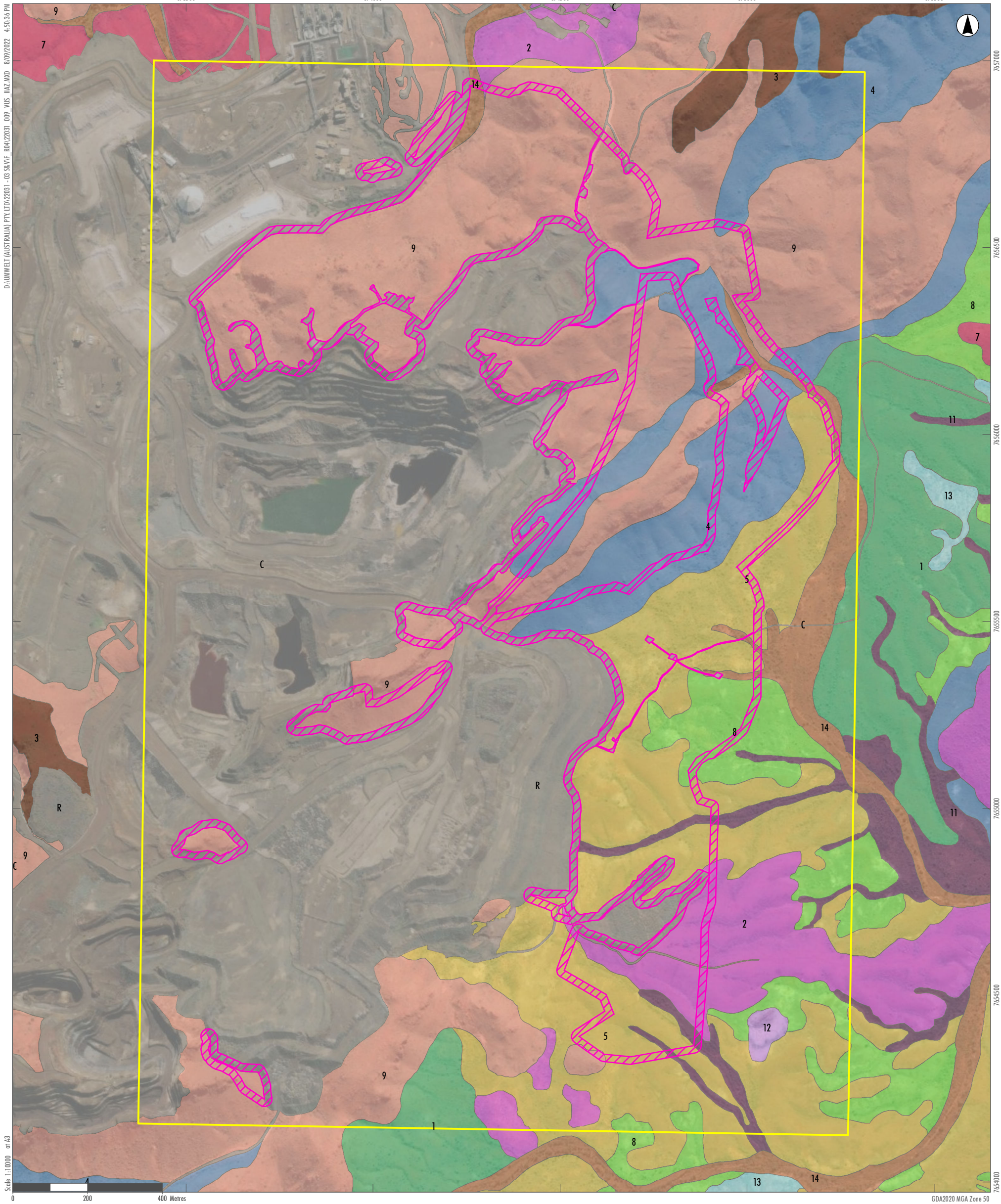


FIGURE 4.5

Vegetation Units and Indirect Impact Assessment Zone within the Proposed NVCP Boundary



### 4.3.9 Significance of Local Impact on Vegetation

There will be Nil or Low significance of impact at the local scale to all VUs by the direct and indirect potential impacts of the proposed disturbance footprint as presented in **Table 4.11** (see **Table 2.4**).

**Table 4.11 Significant of Local Impact on Vegetation Units**

VU	Direct Impact % (Table 4.8)	Indirect Impact % (Table 4.9)	Total Percentage Impact	Proposed Overall Impact on VUs (Table 2.2 Table 1.7)	Local Conservation Significance of VU (Table 2.3)	Significance Ranking of Impact (Table 2.4)
1	0.00	0.00	0.00	Nil	2	Nil
2	0.52	0.12	0.64	Low	1	Low
3	0.00	0.00	0.00	Nil	3	Nil
4	4.71	1.58	6.29	Low	3	Nil
5	8.16	0.96	9.12	Low	2	Low
6	0.00	0.00	0.00	Nil	2	Nil
7	0.00	0.00	0.00	Nil	2	Nil
8	3.17	0.51	3.69	Low	2	Low
9	4.05	0.47	4.52	Low	3	Low
10	0.00	0.00	0.00	Nil	1	Nil
11	0.82	0.09	0.91	Low	3	Low
12	0.00	0.00	0.00	Nil	4	Nil
13	0.00	0.00	0.00	Nil	4	Nil
14	0.99	0.23	1.22	Low	3	Low
15	0.00	0.00	0.00	Nil	4	Nil

### 4.3.10 Regional Impact on Vegetation

There is no published Pilbara vegetation dataset to undertake regional analysis on the impact of clearing of vegetation units on a regional scale. Given that no vegetation in the permit boundary constitutes any listed TECs or PECs, and the significance of local impact is ranked as Low (**Table 4.11**), it is considered that the regional impact on vegetation is likewise Low.

Both of the vegetation system associations located within the permit boundary will be impacted by the footprint; the percentage of the pre-European extent after impact is presented in **Table 4.12**. The impact will not reduce the extent of these vegetation system associations to below the 30 % pre-European extent threshold (EPA 2008).



**Table 4.12 Impact on the Vegetation System Associations of the Footprint**

Vegetation System Association/Landsystem	Pre-European Extent (ha)	Current Extant Area (ha)	Footprint Area (ha)	Percentage of Pre-European Extent Remaining
Abydos Plain – Chichester_93	2,476,377.6	2,473,007	51.06	99.86
Abydos Plain – Chichester_626	117,724.4	117,198.1	62.69	99.50

## 4.4 Qualitative Assessment of Indirect Impacts – Flora and Vegetation

### 4.4.1 Impacts to Groundwater Dependent Vegetation/Species

Based on the presence of several phreatophytic species, it is possible that some occurrences of VU 14 are dependent on groundwater, if the local water table is within reach of the root systems of these taxa (generally within 10 m of the ground surface). The obligate phreatophyte *Melaleuca argentea* is known from the Study Area, however only from three locations. It is not common or widespread at any of these locations. In one, there appears to be an extended period of seepage after significant rainfall events; this therefore may be from surface water infiltration rather than groundwater. Another location is within an artificial drain area in proximity to the Wodgina camp that is being influenced by anthropogenic factors, and therefore this location also may not be associated with shallow groundwater. It is unlikely that GDV occurs within the proposed NVCP boundary area.

The potential facultative phreatophyte *Melaleuca glomerata* is also known to occur at three locations in VU 14, while both *Eucalyptus victrix* (considered to be a vadophyte) and *Melaleuca linophylla* (potential facultative phreatophyte) are common in this VU. However, available evidence indicates that vegetation that is groundwater dependent is not extensive in the Study Area; it should be noted that depth to groundwater within elevated parts of Wodgina (main range) is generally at least 20 m from the surface (Golder 2018), and therefore would not be accessible to any occurrences of VU 14 in these areas (Woodman Environmental 2020).

### 4.4.2 Impacts from Surface Water Hydrology Changes

Riparian vegetation is defined as plant habitats and communities occurring in association with watercourses, both ephemeral and permanent. Woodman Environmental (2020) mapped two VUs in the Study Area containing riparian vegetation:

- VU 11: mapped in minor drainage features including flats and small ephemeral creeklines. This VU was mainly located on small drainage lines; however, it was also mapped on associated flats in the north-east of the Study Area. A total of 182.72 ha of VU 11 were mapped in the Study Area with only 1.49 ha within the disturbance footprint.
- VU 14: mapped in major ephemeral creek-lines. A total of 207.11 ha of VU 14 were mapped in the Study Area with only 2.05 ha within the disturbance footprint.



The main drainage line mapped with VU 14 occurs immediately to the east of the edge of the proposed disturbance footprint within the proposed NVCP boundary area. Water flow of both areas of VU 11 and 14 flow away from the proposed disturbance footprint, and therefore any resulting drainage shadow impact is likely to be minor provided any potential hydrology changes are managed through measures such as appropriate engineering controls.

No other VUs mapped within the Study Area are considered to represent wetlands (Woodman Environmental 2020).

### 4.4.3 Impacts from Increased Fragmentation

**Table 4.13** presents the approximate number of subpopulations of significant flora taxa in the Flora Study Area, the number of subpopulations located in the disturbance footprint, and potential fragmentation of these subpopulations by the proposed clearing. It is likely that there are fewer but more extensive populations occur in the Flora Study Area for the three significant flora taxa, with suitable habitat for each taxon occurring between currently known locations.

The clearing associated within the proposed NVCP boundary will increase the fragmentation of the known extent of subpopulations of both *Terminalia supranitifolia* (P3) and *Triodia chichesterensis* (P3), by separating existing subpopulations. The long-term impact of this fragmentation, if any, is not considered to be significant for *Triodia chichesterensis* (P3), due to the close proximity of the remaining subpopulations, and likely further extent of populations of this taxon surrounding the proposed NVCP boundary.

A subpopulation of *Terminalia supranitifolia* (P3) will be created (**Figure 1.2**). Considering the known distribution of this taxon within the Flora Study Area and known locations to the south and north outside of the Flora Study Area, it is unlikely that the long-term reproductive viability of this population would be impacted by the project (**Figure 1.2**).

The habitat of *Euphorbia clementii* (P3) is generally not associated with extractive mining operations, although it may have been impacted by clearing for associated infrastructure. This taxon is likely to be more widespread than the current data indicates. It is unlikely that current clearing has fragmented the distribution of subpopulations of *Euphorbia clementii* (P3) in the Study Area.

Although not directly or indirectly impacted, the proposed mine extension footprint will also not fragment the known subpopulations of *Vigna triodiophila* (P3) or *Ablution aff. hannii*.



**Table 4.13 Impact of further fragmentation of subpopulations of Significant Flora Taxa at Wodgina**

Taxa	Subpopulation Extent and Taxon Characteristics	Potential Fragmentation Impact (Proposed NVCP Footprint)
<i>Euphorbia clementii</i> (P3)	<ul style="list-style-type: none"> <li>• 23 subpopulations within Flora Study Area.</li> <li>• Two large subpopulations, extending outside the Flora Study Area and other populations known immediately outside the Flora Study Area.</li> <li>• Remainder are known from fewer grouped locations or single locations.</li> <li>• Subpopulations located on habitat other than the main range of the Flora Study Area.</li> <li>• Current clearing extent and extension of range associated with the proposed disturbance footprint separates north and south populations in the Flora Study Area; however, populations are linked by locations known further east (<b>Figure 1.2</b>).</li> <li>• Taxon is a disturbance opportunist; there will be large temporal variability in population size; relatively large population within the Flora Study Area.</li> <li>• Generalist habitat taxon.</li> </ul>	<ul style="list-style-type: none"> <li>• Two small subpopulations to be impacted.</li> <li>• Clearing layout will not lead to further or increased fragmentation of remaining subpopulations.</li> <li>• Impacts through fragmentation are unlikely significant.</li> </ul>
<i>Terminalia supranitifolia</i> (P3)	<ul style="list-style-type: none"> <li>• 17 subpopulations.</li> <li>• Two extensive subpopulations, both of which extend outside the Flora Study Area.</li> <li>• Remainder of subpopulations are known from fewer grouped locations or single locations.</li> <li>• Subpopulations on suitable habitat on the ranges within the Flora Study Area.</li> <li>• Current clearing extent separates the two large subpopulations (<b>Figure 1.2</b>).</li> <li>• Taxon is not a disturbance-opportunist (competitively dominant taxon in undisturbed habitat); little temporal variability in population size; relatively large population in Wodgina area but in specific habitat only.</li> <li>• Specialist habitat taxon.</li> </ul>	<ul style="list-style-type: none"> <li>• Three subpopulations (one of which are large populations) to be impacted.</li> <li>• Clearing layout will lead to the far north-eastern and southern extents of the main subpopulation at the EWL pit extension area remaining after clearing to be separated from the rest of the range, by approximately 1 km; there is a relatively large number of locations in this area that will remain.</li> <li>• Impacts through fragmentation are unlikely to reduce the long-term viability of the taxon at Wodgina; localised impacts to the long-term viability of remaining far eastern extent the large population to be impacted by the proposed disturbance footprint unlikely to occur due to the extent of the population remaining to the north-east on the range, although no suitable habitat between this area and the other main population at Wodgina occurs.</li> </ul>



Taxa	Subpopulation Extent and Taxon Characteristics	Potential Fragmentation Impact (Proposed NVCP Footprint)
<i>Triodia chichesterensis</i> (P3)	<ul style="list-style-type: none"> <li>25 subpopulations.</li> <li>3 large subpopulations and five moderately large subpopulations.</li> <li>Remainder known from fewer grouped locations or single records.</li> <li>Subpopulations on suitable habitat throughout the Flora Study Area.</li> <li>Current clearing extent separates main subpopulations in the north-west and south-east, with the third subpopulation located on the relatively flat lands to the north-east of the project area (<b>Figure 1.2</b>).</li> <li>Taxon is most likely not a disturbance opportunist (competitively dominant taxon in undisturbed habitat); little potential temporal variability in population size; relatively large population in Wodgina area extending outside of the Flora Study Area.</li> <li>Moderately specialist habitat taxon however habitat area is relatively large in local area.</li> </ul>	<ul style="list-style-type: none"> <li>One subpopulation to be impacted.</li> <li>Clearing layout will impact main south-eastern population (<b>Figure 1.2</b>).</li> <li>Clearing layout will further separate south-eastern and north-western subpopulations, increasing historical fragmentation by approximately 1 km, however the subpopulations are still potentially linked outside the Study Area.</li> <li>Impacts through fragmentation are not considered significant, due to likelihood of further linkages between the remaining subpopulations due to location of appropriate habitat.</li> </ul>

## 4.5 Cumulative Impacts

### 4.5.1 Historical Impacts – Significant Flora

**Table 4.14** presents the number of historically recorded locations and individuals recorded for significant taxa that occur on areas that have previously been cleared. Historical clearing of *Terminalia supranitifolia* (P3) can be considered worst case scenario; this assessment has been undertaken purely using GIS and assuming impact on a number of individuals which were recorded on the edge of ridges and on cliff faces, and inspection of such locations may reveal these to be extant.

The historical impact on *Triodia chichesterensis* (P3) is relatively unknown due to the uncertainty of the distribution of this taxon in these areas, with only 16 known locations likely to have been cleared. Further historical impacts were likely, however are unable to be quantified.

**Table 4.14 Historically Cleared Significant Flora Taxa Locations and Individuals**

Taxa	Number of Locations <sup>1</sup>	Number of Individuals <sup>1</sup>
<i>Euphorbia clementii</i> (P3)	46	606
<i>Terminalia supranitifolia</i> (P3)	96	179
<i>Triodia chichesterensis</i> (P3)	16	17,012

<sup>1</sup> Based on available data: Some cleared areas were never surveyed.



## 4.5.2 Historical Impacts – Vegetation

There is no VU dataset that covers the entire extent of original vegetation in the Flora Study Area prior to historical clearing activities. The VU dataset used in this assessment covers a total of 842.71 ha of cleared area (includes areas under rehabilitation).

Areas survey by Outback Ecology (2009a) was not mapped using classification analysis of flora data, and the structural groupings presented cannot be allocated to VUs as presented in Woodman Environmental (2020). Quadrat data collected during that survey was collected from quadrats of a different size to those required by EPA (2016b) and therefore is statistically incompatible with data collected and analysed by Woodman Environmental (2020). The main structural vegetation types mapped by Outback Ecology (2009a) that have been impacted include:

- 3b: Scattered *Grevillea wickhamii* subsp. *hispidula* over *Acacia acradenia* shrubland over mixed *Triodia* hummock grassland.
- 1a: *Acacia inaequilatera* Low Open Woodland over *Acacia acradenia* Open Shrubland over mixed *Triodia* hummock grassland.
- 4a: *Acacia acradenia* Open Shrubland over mixed *Triodia* hummock grassland.
- 8a *Eucalyptus leucophloia* subsp. *leucophloia* Open Woodland over *Grevillea wickhamii* subsp. *hispidula* Tall Open Scrub and *Acacia acradenia* Shrubland over mixed *Triodia* hummock grassland.

It was noted by Outback Ecology (2009a) that none of these structural vegetation types were significant, or otherwise unusual. VUs 3, 4, 7 and, 9 (as described by Woodman Environmental 2020) were most likely dominant in these cleared areas based on representation with the current VU mapping (**Figure 4.2**) and the above-mentioned descriptions.

The quadrats originally assessed by Woodman Environmental (2012) were used in the statistical analysis of the current VU dataset (Woodman Environmental 2020). An assessment of the original mapped VUs against the current extent of clearing in that survey area has been undertaken, and a delineation of the extent of VUs that have been cleared since the original mapping is presented in **Table 4.15**.

**Table 4.15 Extrapolated Extent of Historical Clearing of Vegetation Units within the Hercules Project Survey Area**

VU (Woodman Environmental 2012)	VU (Woodman Environmental 2020)	Extent of Historical Clearing (ha)
1	2	12.19
2	9	17.07
3	9	75.06
4	9	2.61
5	14	7.20
6	10	5.56



With reference to the information above, the VUs which have been most likely cleared due to historical mining activities is VU 9, with some impact on VUs 2, 10 and 14. VUs 2 and 10 were ranked '1' (Low) in terms of local significance (**Table 4.1**); VUs 9 and 14 was ranked '3' (Moderate).

### 4.5.3 Cumulative Impact on Significant Flora

The cumulative direct and indirect impacts of clearing for the proposed disturbance footprint and historical clearing on significant flora taxa are presented in **Table 4.16**, **Table 4.17** and **Table 4.18**.

#### 4.5.3.1 *Euphorbia clementii* (P3)

The cumulative impacts to *Euphorbia clementii* (P3) will not be significantly increased by the clearing and other activities associated within the proposed NVCP boundary. Historically, clearing associated with mining activities at Wodgina has not been associated with habitat suitable for this taxon, and the impacts to known locations and habitat likewise by the project are small. It is not considered that fragmentation of the taxon will be a significant issue as a result of clearing activities.

The cumulative local impact on this taxon is ranked Low; the cumulative impact on this taxon at a regional scale is also ranked Low (**Table 4.16**, **Table 4.17** and **Table 4.18**).

#### 4.5.3.2 *Terminalia supranitifolia* (P3)

The proposed disturbance footprint will largely impact the eastern subpopulation of *Terminalia supranitifolia* (P3) in the Flora Study Area, (**Figure 1.2** and **Figure 4.1**). It is likely that this impact extends on impact from the original Hercules minesite, and it is possible that this taxon occurred in other currently cleared areas; however, this is not possible to quantify.

The cumulative local and regional impact on *Terminalia supranitifolia* (P3) locations is ranked Moderate; the cumulative local and regional impacts on both individuals and habitat is ranked Low (**Table 4.16**, **Table 4.18**). The significance of impact on individuals is preferentially assessed, as those locations remaining incorporating greater numbers of individuals are of higher significance in terms of longevity of the populations.

#### 4.5.3.3 *Triodia chichesterensis* (P3)

The impact of the proposed disturbance footprint will be on a portion of the central sub-population that extends to the east of this area (**Figure 1.2** and **Figure 4.1**). The degree of historical clearing of this taxon is unable to be ascertained, however it may have occurred in the current Tailings Storage Facility and Waste Dump areas: clearing associated with the proposed NVCP boundary would therefore increase historical impacts. Although some fragmentation will occur, there are known records and suitable habitat for this taxon surrounding the proposed disturbance footprint, and the effects of the potential fragmentation are unlikely significant.

The cumulative local and regional impact on *Triodia chichesterensis* (P3) locations, individuals and habitat is ranked Low (**Table 4.16**, **Table 4.17**, **Table 4.18**).



**Table 4.16 Cumulative Impacts of the proposed disturbance footprint and historical clearing on Significant Flora Locations**

Significant Taxon	Total Number of Locations	Flora Study Area - Extant	Historical Impact	Proposed Impact	Total Cumulative Impact	Total Cumulative Impact (%)	Local Scale of Potential Impact	Regional Significance of Local Population	Regional Impact Ranking
<i>Euphorbia clementii</i> (P3)	368	322	46	0	46	12.50	Low	Low	Low
<i>Terminalia supranitifolia</i> (P3)	1196	1100	96	71	167	13.96	Low	Moderate	Low
<i>Triodia chichesterensis</i> (P3)	2094	1928	166	80	246	11.75	Low	Moderate	Low

**Table 4.17 Cumulative Impacts of the proposed disturbance footprint and historical clearing on Significant Flora Individuals**

Significant Taxon	Total Number of Individuals	Flora Study Area - Extant	Historical Impact	Proposed Impact	Total Cumulative Impact	Total Cumulative Impact (%)	Local Impact Ranking	Regional Significance of Local Population	Regional Impact Ranking
<i>Euphorbia clementii</i> (P3)	62,135	61,529	606	0	606	0.98	Low	Low	Low
<i>Terminalia supranitifolia</i> (P3)	2,557	2,378	179	125	304	11.89	Low	Moderate	Low
<i>Triodia chichesterensis</i> (P3)	1,968,586	1,951,574	17012	64,740	81,752	4.15	Low	Moderate	Low

**Table 4.18 Cumulative Impacts of the proposed disturbance footprint and historical clearing on Significant Flora Preferred Habitat**

Significant Taxon	Total Area (ha)	Vegetation Study Area - Extant (ha)	Historical Impact (ha)	Proposed Impact (ha)	Total Cumulative Impact	Total Cumulative Impact (%)	Local Impact Ranking	Regional Significance of Local Population	Regional Impact Ranking
<i>Euphorbia clementii</i> (P3)	3,695.52	3,583.03	112.49	61.46	173.95	4.71	Low	Low	Low
<i>Terminalia supranitifolia</i> (P3)	1,868.78	1,774.04	94.74	71.00	165.74	8.87	Low	Moderate	Low
<i>Triodia chichesterensis</i> (P3)	3,044.83	2,950.09	94.74	105.71	200.45	6.58	Low	Moderate	Low



## 4.5.4 Cumulative Impact on Vegetation

The potential cumulative impact on vegetation consists of the total proposed impact on each VU, including potential impact in the IIAZ, by proposed NVCP boundary, and extent of historical clearing, where data is available (**Table 4.19**).

**Table 4.19 Cumulative Impact of the proposal on Vegetation Units**

VU	Pre-Clearing Extent (ha)*	Cumulative Footprint (ha)	Percentage of Pre-Clearing Extent	Local Scale of Impact (Table 2.2)	Potential for Significance (Table 2.4)
1^	297.86	0.00	0.00 %	Nil	Nil
2	843.24	17.49	2.07 %	Low	Low
3^	243.32	0.00	0.00 %	Nil	Nil
4	325.69	20.48	6.29 %	Low	Low
5	372.96	34.03	9.12 %	Low	Low
6^	208.51	0.00	0.00 %	Nil	Nil
7^	362.87	0.00	0.00 %	Nil	Nil
8	134.04	4.94	3.69 %	Low	Low
9	1,469.55	156.90	10.68 %	Low	Low
10^	1,235.13	5.56	0.45 %	Low	Low
11	182.72	1.66	0.91 %	Low	Low
12^	59.57	0.00	0.00 %	Nil	Nil
13^	57.11	0.00	0.00 %	Nil	Nil
14	214.31	9.73	4.54 %	Low	Low
15^	15.50	0.00	0.00 %	Nil	Nil

\*Note: this area includes the area originally mapped in the Hercules Project Area which has since been cleared

^Note: impacts in these VUs are from historical clearing only; no further impact from the Proposal

The cumulative impact on all of the VUs has been ranked Low or Nil with reference to **Table 2.2**.

The significance of cumulative impact on all of these VUs is ranked Low, with reference to **Table 2.4**.



## 5.0 Results – Fauna

### 5.1 Local Impact on Fauna Habitat

Land clearing is recognised as a key threatening process under the EPBC Act, and as a key threatening process in the Pilbara by Carawardine *et al.* (2014). Clearing of native vegetation and structures such as rocky outcrops will result in a direct loss of fauna habitats. The occurrence of fauna habitat and previously cleared areas within the Fauna Study Area is shown in **Figure 5.1**. The Fauna Study Area is 5,531.3 ha in total, of which 525.67 ha (9.5 %) was cleared before 2009 (prior to the Atlas Wodgina DSO Project). This was prior to fauna habitat mapping being undertaken so no data are available on the proportion of each fauna habitat lost prior to 2009. The current extent of clearing in the Fauna Study Area, including the pre-2009 clearing, is 896.87 ha, representing 16.2 % of the Fauna Study Area (**Table 5.1**).

The proposed disturbance footprint within the NVCP boundary area is 113.75 ha, representing 2.1 % of the Fauna Study Area. The disturbance footprint comprises 105.03 ha of fauna habitat with the remaining 8.7 ha being already disturbed. This will bring the cumulative habitat loss since 2009 to 476.13 ha, or 9.5 % of the Fauna Habitat Area (**Table 5.1**).

Of the six broad fauna habitats that have been mapped in the Fauna Study Area, two are considered of particular importance to fauna: The Rocky Ridge and Gorge, and Drainage Line (**Table 5.1**).

The Rocky Ridge and Gorge habitat is important as it is of limited extent in the bioregion (in comparison to habitats such as Spinifex Stony Plains and Sandplain) and supports a suite of significant fauna including MNES. This habitat contains denning sites for the Northern Quoll and, in some parts of the Fauna Study Area, diurnal roost sites for the Pilbara Leaf-nosed Bat and Ghost Bat. Although not recorded at Wodgina, the Pilbara Olive Python has a high likelihood to occur and would also favour the Rocky Ridge and Gorge habitat. A total of 17.97 ha of Rocky Ridge and Gorge habitat will be cleared in the disturbance footprint, which represents 4.5 % of the original extent of Rocky Ridge and Gorge habitat in the Fauna Study Area. When considering the clearing undertaken for the MARBL Lithium and Atlas DSO Projects, the cumulative total for clearing of this habitat will be 55.80 ha or 13.9 % of the original extent of Rocky Ridge and Gorge habitat in the Fauna Study Area.

Important features in the Rocky Ridge and Gorge habitat are caves that support diurnal (daytime) roosting by the Pilbara Leaf-nosed Bat and/or Ghost Bat (**Figure 5.3** and **Figure 5.4**). Although caves that support diurnal roosting have been recorded in the western part of the range, no such features were found within the proposed disturbance footprint during surveys by Stantec (2018a, 2022). Although small caves were present, these were considered to provide nocturnal refuges for foraging bats, rather than diurnal roosts. It is unlikely the clearing within this habitat will result in the loss of diurnal bat roosts for the Ghost Bat or Pilbara Leaf-nosed Bat. Diurnal bat roosts in adjacent areas may be indirectly impacted by altered hydrological regimes causing changes in cave humidity. Bat monitoring 2010–2018 has found that the mining of the Atlas DSO Project had not significantly impacted the use of monitoring caves by bats when protected with a 100 m buffer (Stantec 2017, Biologic 2018b).



The Northern Quoll is also supported by the Rocky Ridge and Gorge habitat, where the cracks, crevices and caves provide shelter and breeding sites. Northern Quolls are known to occur in the disturbance footprint and clearing of this habitat is likely to lead to the permanent loss of the rocky structures that support this species. Rocky features are difficult to replicate in the rehabilitation process. An attempt at Mt Dove, 34 km to the north of Wodgina, had not yet met with success in 2015 despite construction of an artificial habitat in 2014 (MWH 2015).

The Drainage Line habitat is important; although it is widespread in the bioregion, it provides a range of important habitat elements (**Table 1.7**), a seasonal source of water and a potential corridor for fauna dispersal. Significant species such as the Northern Quoll may disperse along drainage lines, and the Pilbara Leaf-nosed Bat forages along drainage lines. A total of 5.63 ha of Drainage Line habitat is proposed to be cleared, which represents 1.7% of the original extent of Drainage Line habitat in the Fauna Study Area. When considering the clearing undertaken for the MARBL Lithium and Atlas DSO Projects, the cumulative total for clearing in this habitat will be 15.84 ha representing 4.7% of the original extent of Drainage Line habitat in the Fauna Study Area.

Important features associated with both the Rocky Ridge and Gorge and Drainage Line habitats are permanent and semi-permanent pools. None of the pools currently mapped are situated within the NVCP boundary area or disturbance footprint, thus are unlikely to be directly impacted. There is a potential for indirect impacts on some of these pools due to altered surface runoff or contamination.



**Table 5.1 Extent of Fauna Habitats in the Fauna Study Area**

Habitat	Extent in the Bioregion	Importance of habitat	Extent of each habitat remaining (ha)				Extent Cleared (ha) of each habitat (% of pre MARBL Lithium and Atlas DSO Projects habitat extent)		
			Fauna Study Area		Proposed Disturbance Footprint		Cleared 2009 – 2019 (% of pre-2009)	Proposed Disturbance Footprint (% of pre-2009)	Cumulative clearing: 2009-2019 + proposed clearing (as % of pre-2009)
			Pre MARBL Lithium & Atlas DSO Projects (2009) (% of Fauna Study Area)	Post MARBL Lithium & Atlas DSO Projects– Current state (% of Fauna Study Area)	Permit Area ha (%)	Disturbance Footprint ha (%)			
Ironstone Ridgetop	Limited	Limited	339.37 (6.1 %)	206.26 (3.7 %)	16.07 (3.1 %)	5.17 (4.5 %)	133.12 (39.2 %)	5.17 (1.5 %)	138.29 (40.7 %)
Rocky Ridge and Gorge	Limited	Important	401.94 (7.3 %)	364.11 (6.6 %)	47.23 (9.0 %)	17.97 (15.8 %)	37.83 (9.4 %)	17.97 (4.5 %)	55.80 (13.9 %)
Rocky Foothills	Widespread	Limited	1,415.39 (25.6 %)	1,286.23 (22.3 %)	90.76 (17.3 %)	35.16 (30.9 %)	129.16 (9.1 %)	35.16 (2.48 %)	164.32 (10.6 %)
Stony Rise	Widespread	Limited	175.15 (3.2 %)	174.34 (3.2 %)	2.19 (0.4 %)	0.11 (0.1 %)	0.82 (0.5 %)	0.11 (0.1 %)	0.93 (0.5 %)
Spinifex Stony Plain	Widespread	Limited	2,365.53 (42.2 %)	2,276.57 (41.1 %)	96.35 (18.4 %)	40.99 (36.0 %)	59.96 (2.6 %)	40.99 (1.8 %)	100.95 (4.3 %)
Drainage Line	Widespread	Important	334.35 (6.0 %)	324.14 (5.9 %)	12.91 (2.5 %)	5.63 (5.0 %)	10.21 (3.1 %)	5.63 (1.7 %)	15.84 (4.7 %)
Subtotal (fauna habitat only)	-	-	<b>5,002.74 (90.4 %)</b>	<b>4631.64 (83.7 %)</b>	<b>265.5 (50.6 %)</b>	<b>105.03 (92.3 %)</b>	<b>371.1 (7.4 %)</b>	<b>105.03 (2.1 %)</b>	<b>476.13 (9.5 %)</b>
Cleared	-	-	525.67 (9.5 %)	896.87 (16.2 %)	258.78 (49.4 %)	8.7 (7.7 %)	-	8.72	-
Totals (% of Fauna Study Area)	-	-	<b>5,531.3</b>	<b>5,531.30</b>	<b>524.29 (9.5 %)</b>	<b>113.75 (2.1 %)</b>	-	<b>113.75</b>	-

\* Note Minor differences in totals are due to cumulative discrepancies in spatial data (polygon alignments, 'slithers', etc).



## 5.2 Local Impact on Vertebrate Faunal Assemblages –

The scale of the impact on the local vertebrate assemblage is assessed as Low overall, but Moderate for saxicoline (rock-dwelling) species (**Table 5.2**). Species that are specifically associated with rocky habitats are likely to be impacted by the loss of 17.97 ha of Rocky Ridge and Gorge habitat. For smaller species, fragmentation of this habitat may present challenges to dispersal between remaining areas. However, these species are likely to be widespread through the remainder of the rocky range and in other ranges in the region. The remaining populations of saxicoline species are likely to be self-sustaining in the long-term, as there are substantial areas of suitable habitat remaining.

## 5.3 Local Impact on Significant Fauna Taxa

There are 17 species of conservation significant fauna that have been recorded or potentially occur in the Fauna Study Area (**Table 1.8**). For many species, the scale of impact is considered to be Low, Very Low, or Negligible, in that the population is either unlikely to be impacted, or the impact is likely to be small and temporary (**Table 5.2**).

The scale of impact is considered to be Moderate for the Northern Quoll, Gane's Blind Snake and Long-tailed Dunnart, as this Proposal will potentially lead to the loss of important habitat, primarily 17.97 ha of Rocky Ridge and Gorge habitat. The loss of this habitat is likely to be permanent, and lead to a permanent reduction of the carrying capacity of the rocky range for these species. However, the loss of this habitat is unlikely to lead to the local extinction of these or any species, as sufficient habitat area remains in the Fauna Study Area outside the disturbance footprint, and in the remainder of the rocky range outside the Fauna Study Area. The scale of impact is not likely to be High or Extreme for any species.

## 5.4 Regional Impact on Significant Fauna

There is unlikely to be an impact on any significant fauna taxa at a regional scale. Although the local population of some species will decrease, none are likely to be lost from the Fauna Study Area and all are likely to persist in the local area in the long-term. Therefore, there is not likely to be a range reduction, loss of an important population or impact on the ability of these species to disperse at a regional scale.

## 5.5 Cumulative Impacts

Habitat loss is the key threat to vertebrate fauna. Clearing of the disturbance footprint will result in the loss of 105.03 ha of fauna habitat. This is in addition to the 371.1 ha cleared for the MARBL Lithium and MARBL Lithium and Atlas DSO Projects and the 525.67 ha historically cleared. The cumulative loss of habitat is presented in **Table 5.1** and presented on **Figure 5.1**. Of key concern is the loss of Rocky Ridge and Gorge habitat, as this has been identified as limited in the region and important for significant fauna species. One of its key values is the presence of rocky crevices, cracks, caves and boulders, all features that are difficult to replicate in rehabilitation. Therefore, when cleared, the loss of this habitat is likely to be permanent. Currently, at least 9.4 % of this habitat type within the Fauna Study Area has been cleared as part of the MARBL Lithium and Atlas DSO Projects, with clearing under the proposed NVCP boundary will bring this total to 13.9 %.



The cumulative impacts of the Proposal are difficult to quantify on a regional scale. The key impact is habitat loss, particularly of the Rocky Ridge and Gorge habitat. The additional habitat loss associated with this project is small on a regional scale, however, rocky ranges in the Pilbara are often targeted for mining developments, with mining developments recognised by Carawardine *et al.* (2014) as a threat to fauna in the Pilbara Bioregion. Although rocky ranges are a feature of the bioregion, this habitat is more limited in extent than, for example, stony plains or sandplains. Targeting these ranges for mining development results in a disproportionate loss of these rocky habitats compared with more widespread habitat types. The rocky habitats are important as they provide habitat for Threatened species such as the Northern Quoll, Ghost Bat, Pilbara Leaf-nosed Bat and Pilbara Olive Python.



**Table 5.2 Potential Impacts on the Vertebrate Faunal Assemblage and Significant Fauna Species**

Species/Assemblage	Local Population	Potential Impacts	Regional Context	Scale of impact (local)
<b>Vertebrate Fauna Assemblage</b>  10 frogs (5 known to occur) 107 reptiles (59 known to occur) 140 birds (84 known to occur) 33 native mammals (26 known to occur) 8 introduced mammals (6 known to occur)	Most species, particularly birds, are widely distributed in the bioregion. Many arid zone species use a variety of habitats, though more productive habitats, such as Drainage Lines, may attract proportionally more species and individuals.	<ul style="list-style-type: none"> <li>Clearing the disturbance footprint will result in the loss of 105.03 ha of habitat. Native fauna are reliant on these habitats to provide their needs for shelter, foraging and breeding.</li> <li>Direct mortality of fauna whiles clearing, particularly ground-dwelling species, nocturnal species and dependent young.</li> <li>Road mortalities.</li> <li>Reduced access to adjacent habitats due to dust, noise, vibration, human disturbance or artificial lighting.</li> <li>Increase in feral cats and dogs leading to increased predation on fauna.</li> <li>Altered hydrological regimes leading to additional water sources (that may attract feral species) or impacts on permanent or semi-permanent pools downstream.</li> </ul>	Although the vertebrate fauna assemblage is diverse, it is similar in composition to that in the vicinity of other rocky ranges in the region.	<b><u>Low</u></b> The loss of 105.03 ha of fauna habitat is likely to result in the loss of almost all fauna from the disturbance footprint. No species are likely to be lost from the Fauna Study Area and many species are likely to recolonise rehabilitated areas.
	The faunal assemblage includes a suite of saxicoline (rock-dwelling) species that are likely to be reliant on the rocky range, and in particular the rocky microhabitats associated with the Rocky Ridge and Gorge habitat. This includes mainly reptiles and mammals.	<ul style="list-style-type: none"> <li>Loss of Rocky Ridge and Gorge habitat, which provides the cracks, caves and crevices on which these species rely.</li> <li>Fragmentation of the Rocky Ridge and Gorge habitat, hindering dispersal between the western and eastern parts of the range for small terrestrial species such as geckos.</li> <li>Direct mortality of individuals during clearing.</li> </ul>		<b><u>Moderate</u></b> Loss of 17.97 ha of Rocky Ridge and Gorge habitat, and fragmentation of the remaining habitat, is likely to lead to a permanent population decline in species that rely on these habitats. However, the remaining habitat areas in the rocky range are sufficient to support these species in the long-term.



Species/Assemblage	Local Population	Potential Impacts	Regional Context	Scale of impact (local)
<p><i>Pezoporus occidentalis</i></p> <p><b>Night Parrot</b></p> <ul style="list-style-type: none"> <li>Endangered – EPBC Act</li> <li>Critically Endangered – BC Act</li> </ul>	<p>This species remains unrecorded in the Fauna Study Area despite sampling using recommended methods (Western Wildlife 2019). The Night Parrot is rare throughout its range and is known from very few locations. Any known Night Parrot population would be an important population, given its rarity, but this species has only a low likelihood of occurring in the Fauna Study Area.</p>	<ul style="list-style-type: none"> <li>Clearing of Spinifex Stony Plain habitat (particularly long-unburnt areas with large hummocks) may reduce the area of habitat available for this species, however, it is very unlikely that this species occurs and these habitats are extensive in the landscape.</li> </ul>	<p>It is difficult to make an assessment on the regional status of this species, other than that it is thought to be extremely rare. There is a sighting from the Fortescue Marsh in the Pilbara Bioregion in 2005 (Davis and Metcalf 2008) and then two confirmed sightings in recent times from near Lake Gregory and near Wiluna (NPRT 2019). There are other areas of habitat in the region that are more likely to be potential habitat, such as the Fortescue Marsh and alluvial plains associated with major watercourses (TSSC 2016b). The habitats in the survey area are unlikely to be of particular significance for this species as they lack the chenopod shrublands thought to be important for foraging and the Spinifex grasslands are more heavily wooded than at known Night Parrot sites.</p>	<p><b><u>Very Low</u></b></p> <p>This species is unlikely to be present, the habitats present are unlikely to be of particular importance to the species and the clearing of 40.99 ha of Spinifex Stony Plain habitat is considered to be a small reduction in total habitat area available in the Fauna Study Area (1.8 %) and the broader Pilbara.</p>
<p><i>Dasyurus hallucatus</i></p> <p><b>Northern Quoll</b></p> <ul style="list-style-type: none"> <li>Endangered – EPBC Act</li> <li>Endangered – BC Act</li> </ul>	<p><b>Recorded.</b> This species is known to occur in the Fauna Study Area and the population is likely to be a high density breeding population, though the annual population size is likely to be</p>	<ul style="list-style-type: none"> <li>Clearing of habitat critical to the survival of the Northern Quoll is likely to be the driver of the greatest potential impact on this species. The Rocky Ridge and Gorge habitat represents critical habitat that is important for shelter and breeding.</li> </ul>	<p>The Northern Quoll occurs in rocky ranges in the Pilbara, and genetic evidence suggests that the population is a single continuous population (Spencer <i>et al.</i> 2013). Northern Quolls are known to</p>	<p><b><u>Moderate</u></b></p> <p>Loss of 17.97 ha of Rocky Ridge and Gorge shelter and breeding habitat, and 105.03 ha of foraging and dispersal habitat (i.e. all remaining native vegetation in</p>



Species/Assemblage	Local Population	Potential Impacts	Regional Context	Scale of impact (local)
	<p>influenced by environmental factors such as annual rainfall and bushfire. The population is likely to extend throughout the rocky range both within and outside the Fauna Study Area. In 2018 this species was recorded on six cameras and 12 scat locations (Stantec 2018b), and annual monitoring as part of the Abydos DSO Project captured seven individuals (including one female) and recorded Northern Quolls at three camera locations (Biologic 2018a). In 2019, the species was recorded at three camera locations and captured once (Western Wildlife 2019).</p>	<p>Reducing the area of this habitat is likely to result in a long-term decrease in the carrying capacity of the of the site and thus the total population size that can be supported locally. All habitat within 1 km of the Rocky Ridge and Gorge habitat, or within 1 km of northern quoll records, is potential foraging and dispersal habitat <b>(Figure 5.2)</b>.</p> <ul style="list-style-type: none"> <li>• Fragmentation of Rocky Ridge and Gorge habitat, resulting in increasing isolation of populations in the eastern parts of the range.</li> <li>• Increase in vehicle mortalities, particularly at night or in areas adjacent to shelter habitat (Rocky Ridge and Gorge).</li> <li>• Increase in the frequency or intensity of fire in Northern Quoll habitat.</li> <li>• Increase in feral cats and dogs leading to increased predation on Northern Quolls.</li> <li>• Direct mortality during clearing of shelter habitat (Rocky Ridge and Gorge) or by entrapment of individuals in bins or skips.</li> <li>• Altered hydrological regimes changing the amount of water available in Drainage Lines or changing water quality.</li> </ul>	<p>occur in other rocky ranges in the region and are often targeted as part of fauna surveys, including at Abydos (42 km east of Wodgina), Mt Dove (34 km northwest), Mt Webber (75 km southeast) and Corunna Downs (105 km southeast).</p>	<p>the disturbance footprint). The loss of shelter and breeding habitat is likely to be permanent, as it is difficult to re-create with rehabilitation. There may also be a temporary impact on individuals through direct mortality of individuals sheltering in rocky habitats during clearing and/or road mortalities during night shift operations. However, the reduction in population size is unlikely to prevent the long-term persistence of the species in the rocky range at Wodgina.</p>



Species/Assemblage	Local Population	Potential Impacts	Regional Context	Scale of impact (local)
<b><i>Rhinonictis aurantia</i></b> <b>Pilbara Leaf-nosed Bat</b> <ul style="list-style-type: none"> <li>Vulnerable – EPBC Act</li> <li>Vulnerable – BC Act</li> </ul>	<b>Recorded.</b> A single transitory diurnal roost and several nocturnal refuges are known to occur in the Fauna Study Area, and bats are likely to preferentially forage along Drainage Lines, gorges and over water pools, as well as in all other habitats present. Foraging bats have been recorded across the Fauna Study Area ( <b>Figure 5.3</b> ). No breeding sites (i.e. at permanent or temporary diurnal roosts) are known or likely to occur (Stantec 2018b).	<ul style="list-style-type: none"> <li>Loss of habitat. Rocky Ridge and Gorge habitat potentially contains caves that may be used as nocturnal refuges-while foraging, however, no significant roosts (transitory, non-permanent or permanent diurnal roosts) were found to occur in the proposed NVCP boundary area during a targeted survey (Stantec 2018a). Drainage Lines are likely to be important foraging habitat.</li> <li>Human disturbance at roost sites.</li> <li>Mortality of individuals in barbed wire fencing.</li> <li>Road mortalities of individuals foraging close to the ground at night.</li> <li>Disturbance to roost sites or important foraging areas from artificial lighting.</li> <li>Altered hydrological regimes may change the amount of water available in Drainage Lines, impacting foraging habitat quality or the internal humidity of roosting caves.</li> </ul>	On the basis of genetic work, the Pilbara leaf-nosed Bats that occur in the Pilbara and upper Gascoyne are considered to be a single population (TSSC 2016c). This population is divided among a series of colonies. This species only uses warm underground roosts with high humidity. Important sites are permanent and non-permanent diurnal roosts, which are used during the breeding cycle. The closest known permanent diurnal roosts are located about 25 km from the NVCP boundary area at Yule River, East Turner River and Glacier Valley (Stantec 2018b). Timing of the calls recorded at Wodgina suggest that the bats that forage in the Fauna Study Area may originate from one of these roosts, and the transitory diurnal roost (cave C2) at Wodgina may be a satellite roost of one of these colonies (Stantec 2018b). The habitats at Wodgina may be of local importance in maintaining gene flow between regionally important roosts.	<b>Low</b> Although 17.97 ha of Rocky Ridge and Gorge habitat will be cleared, this area has been subject to targeted survey and no diurnal roosting caves were found or considered likely to occur inside the NVCP boundary area (Stantec 2018a). The nearest known transitory roost at cave C2 is located approximately 1.6 km to the west of the NVCP boundary area. Despite being located near the Wodgina DSO disturbance footprint, bat activity at this cave has been consistent during monitoring 2012 – 2018 (Biologic 2018b). Loss of 5.63 ha of Drainage Line foraging habitat, and road mortalities may have a temporary impact on the local foraging population.



Species/Assemblage	Local Population	Potential Impacts	Regional Context	Scale of impact (local)
<b><i>Macroderma gigas</i></b> <b>Ghost Bat</b> <ul style="list-style-type: none"> <li>Vulnerable – EPBC Act</li> <li>Vulnerable – BC Act</li> </ul>	<b>Recorded.</b> This species has been recorded in the Fauna Study Area, and monitoring at caves in the western part of the range has consistently recorded the species 2012 – 2018 (Biologic 2018b). No maternity or permanent diurnal roost sites are known from the Fauna Study Area, but transitory diurnal roosts and diurnal roosts that are potential maternity roosts are known to occur. A count of 65 bats at cave C2 in 2012 represents a significant proportion (4.3 %) of the estimated 1500 bats in the regional population of the Chichester Ranges.	<ul style="list-style-type: none"> <li>Loss of habitat. Rocky Ridge and Gorge habitat contains caves and overhangs that may be used as nocturnal refuge, however, no significant roosts (permanent diurnal roosts, maternity roosts) were found to occur during a targeted survey (Stantec 2018a). A single diurnal roost with many scats and 2 bats was recorded in 2009 (Outback Ecology 2009).</li> <li>Human disturbance at roost sites.</li> <li>Mortality of individuals in barbed wire fencing.</li> <li>Accidental introduction of cane toads, brought in to site on trucks or in freight.</li> </ul>	The Pilbara population of the Ghost Bat is genetically distinct and separate from other populations in Australia (Woinarski <i>et al.</i> 2014, TSSC 2016a). Ghost Bats roost in both natural structures (such as caves), and old mine shafts. Intermittent roosts are used by a few individuals, and may be relatively shallow caves, rock crevices or smaller mines (Armstrong and Anstee 2000, Woinarski <i>et al.</i> 2014). Maternity roosts are regionally significant, and are situated in caves or deep mines with a high relative humidity, often with a small entrance opening into a larger chamber (Armstrong and Anstee 2000).	<b>Low</b> A total of 17.97 ha of Rocky Ridge and Gorge habitat will be lost, however, no known roost sites will be lost. The closest diurnal roost, where two bats were recorded in 2009, is located 100 m from the disturbance footprint ( <b>Figure 5.4</b> ). The relative importance of this roost site to the local colony of Ghost Bats is unknown. A Regionally significant roost at cave C2 is located approximately 1.6 km from the NVCP boundary area. Loss of 105.03 ha of foraging habitat. Although this species is not specific in its foraging habitat requirements, the foraging habitat lost is within 3 km of known diurnal roost sites. There may also be some temporary population decline due to loss of individuals to vehicle mortalities.
<b><i>Liasis olivaceus barroni</i></b> <b>Pilbara Olive Python</b> <ul style="list-style-type: none"> <li>Vulnerable – EPBC Act</li> <li>Vulnerable – BC Act</li> </ul>	This species remains unrecorded in the Fauna Study Area; however, it is highly likely to occur as it is known to occur in similar habitats in the region (Western Wildlife 2019). The lack of records despite many surveys over the past decade	<ul style="list-style-type: none"> <li>Loss of habitat. Rocky Ridge and Gorge habitat is likely to be the most important for this species, and Drainage Line habitats, particularly in close proximity to the rocky range, may be dispersal and foraging habitat.</li> <li>As a large, slow-moving snake, this species is vulnerable to road mortalities.</li> </ul>	The Pilbara Olive Python occurs throughout the Pilbara Bioregion, on ranges with gorges and waterholes. They use waterholes for hunting and spend the winter in rocky areas away from water, and adults can range widely (DEWHA 2008). At least 21 populations are	<b>Low</b> Loss of 17.97 ha of Rocky Ridge and Gorge habitat will permanently reduce the total area of habitat available to support this species, however, this species has yet to be recorded in the Fauna Study



Species/Assemblage	Local Population	Potential Impacts	Regional Context	Scale of impact (local)
	indicate that the population is unlikely to be high density.	<ul style="list-style-type: none"> <li>Altered hydrological regimes may lead to downstream changes in the availability of water pools for foraging.</li> <li>Increased numbers of feral cats may result in increased predation on juvenile pythons.</li> <li>Direct mortality of pythons sheltering in rock crevices during land clearing.</li> </ul>	known (DEWHA 2008). Only a single permanent water hole is known from the Fauna Study Area, so the habitat is possibly less important to this species than areas with many waterholes.	Area. Possible downstream impacts to water pools on drainage lines may impact the ability of these habitats to support this species.
<b><i>Falco hypoleucos</i></b> <b>Grey Falcon</b> <ul style="list-style-type: none"> <li>Vulnerable – EPBC Act</li> <li>Vulnerable – BC Act</li> </ul>	This species remains unrecorded in the Fauna Study Area, however, it is highly likely to occur as a foraging visitor. As this species occurs at very low densities (Garnett <i>et al.</i> 2011), only a single bird or pair of birds is likely to occur, and the survey area is likely to represent only part of a larger foraging range.	<ul style="list-style-type: none"> <li>Loss of foraging habitat. All habitats other than the Rocky Ridge and Gorge may be used for foraging by this species.</li> <li>Altered fire regimes may lead to loss of foraging habitat both within the survey area and in adjacent habitats.</li> </ul>	The Grey Falcon is widespread across much of arid and semi-arid northern and eastern Australia and is thought to represent a single subpopulation that occurs at very low densities (Garnett <i>et al.</i> 2011). Breeding habitat (tall trees in major watercourses) is absent from the Fauna Study Area but occurs throughout the region on larger rivers such as the Turner River. Although birds may forage in the Fauna Study Area, the habitats present are unlikely to be of particular importance to this species.	<b><u>Very Low</u></b> Clearing is unlikely to impact breeding habitat. A total of 105.03 ha of potential foraging habitat will be lost, but this is small in extent compared to the large home-range size of this species.
<b><i>Charadrius veredus</i></b> <b>Oriental Plover</b> <ul style="list-style-type: none"> <li>Migratory – EPBC Act</li> <li>Migratory – BC Act</li> </ul>	This species remains unrecorded in the Fauna Study Area, however, it is moderately likely to occur as a non-breeding visitor in ones, twos or small groups. Nationally significant numbers (230 birds) or internationally significant	<ul style="list-style-type: none"> <li>Altered hydrological processes may result in the loss of permanent or semi-permanent water pools in the Drainage Line habitat.</li> <li>Mining activities may result in additional habitat for this species, such as sewage ponds, turkey's nest dams or tailings</li> </ul>	Suitable habitat in the Fauna Study Area is of negligible importance compared other habitats available in the region, such as larger water pools on major water courses, marshland and coastal habitats.	<b><u>Negligible</u></b> Any potential impact is on very low numbers of non-breeding birds, and on habitats that are not important in maintaining populations of this species.



Species/Assemblage	Local Population	Potential Impacts	Regional Context	Scale of impact (local)
	numbers (2,300 birds) are not likely to occur, thus the habitats in the Fauna Study Area are not important for maintaining populations of this species.	facilities.		
<b><i>Tringa glareola</i></b> <b>Wood Sandpiper</b> <ul style="list-style-type: none"> <li>• Migratory – EPBC Act</li> <li>• Migratory – BC Act</li> </ul>	This species remains unrecorded in the Fauna Study Area, however, it is moderately likely to occur as a non-breeding visitor in ones, twos or small groups. Nationally significant numbers (130 birds) or internationally significant numbers (1,300 birds) are not likely to occur, thus the habitats in the Fauna Study Area are not important for maintaining populations of this species.	<ul style="list-style-type: none"> <li>• Altered hydrological processes may result in the loss of permanent or semi-permanent water pools in the Drainage Line habitat.</li> <li>• Mining activities may result in additional habitat for this species, such as sewage ponds, turkey's nest dams or tailings facilities.</li> </ul>	Suitable habitat in the Fauna Study Area is of negligible importance compared other habitats available in the region, such as larger water pools on major water courses, marshlands, and coastal habitats such as mangroves.	<b><u>Negligible</u></b> Any potential impact is on very low numbers of non-breeding birds, and on habitats that are not important in maintaining populations of this species.
<b><i>Tringa hypoleucos</i></b> <b>Common Sandpiper</b> <ul style="list-style-type: none"> <li>• Migratory – EPBC Act</li> <li>• Migratory – BC Act</li> </ul>	This species remains unrecorded in the Fauna Study Area, however, it is moderately likely to occur as a non-breeding visitor in ones, twos or small groups. Nationally significant numbers (190 birds) or internationally significant numbers (1,900 birds) are not likely to occur, thus the habitats in the Fauna Study Area are not important for maintaining populations of this species.	<ul style="list-style-type: none"> <li>• Altered hydrological processes may result in the loss of permanent or semi-permanent water pools in the Drainage Line habitat.</li> <li>• Mining activities may result in additional habitat for this species, such as sewage ponds, turkey's nest dams or tailings facilities.</li> </ul>	Suitable habitat in the Fauna Study Area is of negligible importance compared other habitats available in the region, such as larger water pools on major water courses, marshlands, and coastal habitats such as mangroves.	<b><u>Negligible</u></b> Any potential impact is on very low numbers of non-breeding birds, and on habitats that are not important in maintaining populations of this species.



Species/Assemblage	Local Population	Potential Impacts	Regional Context	Scale of impact (local)
<b><i>Apus pacificus</i></b> <b>Fork-tailed Swift</b> <ul style="list-style-type: none"> <li>Migratory – EPBC Act</li> <li>Migratory – BC Act</li> </ul>	This species remains unrecorded in the Fauna Study Area; however, it is highly likely to occur. As the Fork-tailed Swift is almost entirely aerial in Australia, no terrestrial habitat present in the Fauna Study Area is likely to be of particular importance to this species.	<ul style="list-style-type: none"> <li>There is unlikely to be any potential impacts to this species.</li> </ul>	This species has a very large global population, is widespread across Australia, and is almost entirely aerial. Although it may overfly the Fauna Study Area, no terrestrial habitat in the study area is likely to be important for this species.	<b><u>Negligible</u></b> Changes to the proposed disturbance footprint are unlikely to impact individuals or populations of this species.
<b><i>Falco peregrinus</i></b> <b>Peregrine Falcon</b> <ul style="list-style-type: none"> <li>Other Specially Protected Fauna – BC Act</li> </ul>	This species remains unrecorded in the Fauna Study Area, however, it is highly likely to occur, at least as a foraging visitor. If present, one or at most two pairs of birds are likely to occur, given a home range size of about 20 - 30 km <sup>2</sup> (Birdlife International 2019).	<ul style="list-style-type: none"> <li>Possible loss of breeding/nesting habitat (Rocky Ridge and Gorge habitat).</li> <li>Possible disturbance to breeding birds or young in nest during clearing, both within and adjacent to the disturbance footprint. Disturbance may be due to noise, light, vibration or dust.</li> </ul>	This species has an extremely large range, encompassing Australia and most other continents. Its global population size is also extremely large (Birdlife International 2019). Potential breeding habitat is present in the remainder of the rocky range outside the survey area, and on other ranges and major watercourses in the region. Foraging habitat is very widespread in the region.	<b><u>Low</u></b> Potential loss of 17.97 ha of breeding habitat (Rocky Ridge and Gorge) for one pair of birds. It is likely that a pair of birds can find an alternative breeding site, and this species is known to nest in abandoned open pits. Loss of 105.03 ha of potential foraging habitat, though this is on a very small scale when compared to the 20 – 30 km <sup>2</sup> (2,000 – 3,000 ha) home range for a single pair of birds.



Species/Assemblage	Local Population	Potential Impacts	Regional Context	Scale of impact (local)
<b><i>Ctenotus nigrilineatus</i></b> <b>Black-lined Ctenotus</b> <ul style="list-style-type: none"> <li>Priority 1 – DBCA Priority list</li> </ul>	<p>This species remains unrecorded in the Fauna Study Area; however, it is considered moderately likely to occur given that the type locality<sup>1</sup> (Woodstock) is about 40 km south of the Fauna Study Area and potentially suitable habitat is present.</p> <p><sup>1</sup> The place where the type specimen for the species was found</p>	<ul style="list-style-type: none"> <li>Clearing of habitat is likely to be the greatest potential impact on this species. The Spinifex Stony Plain habitat may be potential habitat for this species.</li> <li>Increase in feral cats leading to increased predation on the Black-lined Ctenotus.</li> <li>Increased frequency of fire may impact the presence of spinifex cover in potential Black-lined Ctenotus habitat.</li> </ul>	<p>Little is known about this rarely recorded species. It's thought that it is naturally patchily distributed and its current known distribution is in the Pilbara interior between Woodstock, Nullagine, Meentheena and Karajini National Park (IUCN 2019). It may be associated with stony plains near watercourses, and this habitat is widespread in the region.</p>	<p><b><u>Low</u></b></p> <p>Loss of 40.99 ha of Spinifex Stony Plain habitat is likely to result in some loss of potential habitat. However, this species remains unrecorded at Wodgina, despite trapping in this habitat, and the habitat area lost is small in relation to the area of habitat available in the remainder of the Fauna Study Area and the region.</p>
<b><i>Anilius ganei</i></b> <b>Gane's Blind Snake</b> <ul style="list-style-type: none"> <li>Priority 1 – DBCA Priority list</li> </ul>	<p>This species remains unrecorded in the Fauna Study Area; however, it is moderately likely to occur in association with Rocky Ridge and Gorge habitat and the Rocky Foothills habitat.</p>	<ul style="list-style-type: none"> <li>Loss of Rocky Ridge and Gorge and Rocky Foothills habitats are potentially the most important for this species.</li> <li>Fragmentation of Rocky Ridge and Gorge habitat. This species is not very mobile and is unlikely to navigate across cleared lands. However, the Rocky Foothills habitat will remain relatively well-connected.</li> <li>Altered fire regimes leading to increased fire frequency and loss of spinifex cover.</li> </ul>	<p>This species occurs in the Pilbara interior and is tentatively associated with moist gorges and gullies, though some of the early specimens are from the Newman townsite and Mt Whaleback waste dump (Aplin 1998). This species is probably associated with ranges throughout the region. If present, a population in the Fauna Study Area is unlikely to be of particular regional significance, and large areas of habitat remain in the adjacent ranges outside the disturbance footprint.</p>	<p><b><u>Moderate</u></b></p> <p>Loss of 17.97 ha of Rocky Ridge and Gorge habitat may result in a permanent loss of habitat for this species. However, this species has not been recorded within the proposed NVCP Boundary Area.</p>
<b><i>Lagorchestes conspicillatus</i></b> <b>Spectacled Hare-wallaby</b> <ul style="list-style-type: none"> <li>Priority 4 – DBCA</li> </ul>	<p><b>Recorded.</b> A single dead individual (possibly roadkill) was recorded opportunistically in the Fauna Study Area in 2018 (Biologic 2018a) It was also recorded approximately 14 km</p>	<ul style="list-style-type: none"> <li>Loss of Spinifex Stony Plain habitats, particularly long-unburnt areas.</li> <li>Increase in vehicle mortalities, particularly at night, in areas of Spinifex Stony Plain habitat.</li> </ul>	<p>This species is patchily distributed in the Pilbara, where it is generally uncommon and sparsely distributed (Van Dyck and Strahan 2008, Woinarski <i>et al.</i> 2014). The Spinifex grasslands on which this</p>	<p><b><u>Very Low</u></b></p> <p>The loss of potential habitat (40.99 ha of Spinifex Stony Plains) is likely to represent habitat for a single individual and is unlikely to lead to the permanent decline in</p>

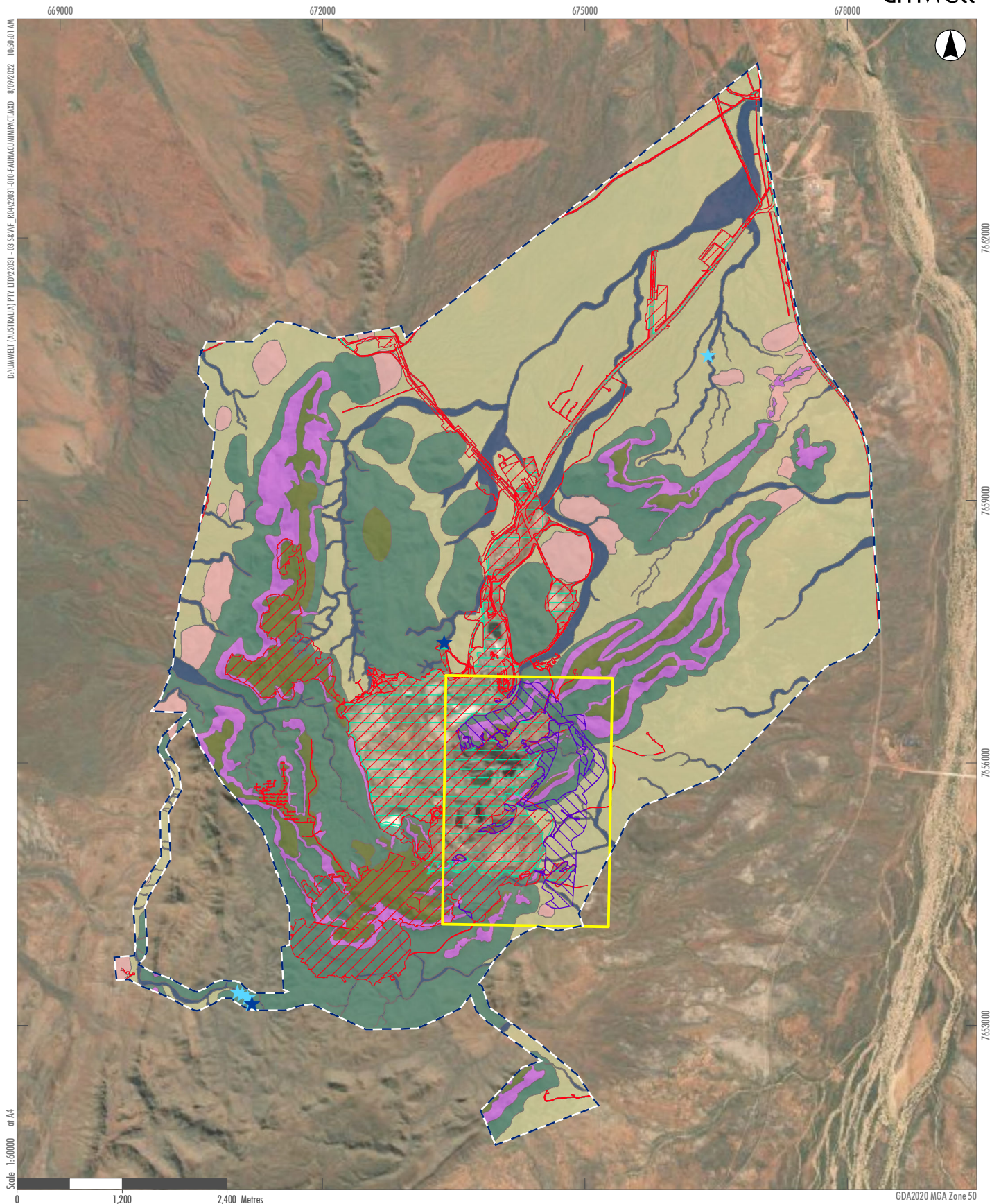


Species/Assemblage	Local Population	Potential Impacts	Regional Context	Scale of impact (local)
Priority list	from the Fauna Study Area (Western Wildlife 2019). It is likely to occur at low densities in the Spinifex Stony Plain habitat.	<ul style="list-style-type: none"> <li>Increase in feral cats leading to increased predation on the Spectacled Hare-Wallaby, both within and adjacent to the proposed disturbance footprint area.</li> <li>Altered fire regimes leading to increased fire frequency and loss of spinifex cover (and the large hummocks important for shelter) in the Spinifex Stony Plain habitat.</li> </ul>	species depends are widespread in the region, and the habitats in the Fauna Study Area are unlikely to be of particular importance for this species. If a population of Spectacled Hare-Wallaby is present, it is likely to be part of a wider population that extends well beyond the boundaries of the disturbance footprint.	this species in the local area or region.
<b><i>Sminthopsis longicaudata</i></b> <b>Long-tailed Dunnart</b> <ul style="list-style-type: none"> <li>Priority 4 – DBCA Priority list</li> </ul>	<b>Recorded.</b> This species was recorded in the Fauna Study Area in 2009 (Western Wildlife 2019). Though there have been no subsequent records, this is likely because this species is difficult to trap rather than an indication of rarity. The Long-tailed Dunnart is likely to be present as a resident breeding species with its population centred on the Rocky Ridge and Gorge and Rocky Foothills habitats.	<ul style="list-style-type: none"> <li>Loss of Rocky Ridge and Gorge and Rocky Foothills habitats are the most important for this species. Spinifex Stony Plains and Stony Rise habitats may be used for dispersal and foraging, though their relative importance is unknown.</li> <li>Fragmentation of Rocky Ridge and Gorge habitat, leading to possible isolation of any population in the eastern part of the rocky range.</li> <li>Increase in feral cats leading to increased predation on Long-tailed Dunnart.</li> <li>Direct mortality during clearing of shelter habitat (Rocky Ridge and Gorge).</li> </ul>	This species has a wide distribution through central Western Australia (Pilbara, Murchison and Gibson Desert), extending into central Australia. Habitat for this species is relatively common in the region, wherever there are rocky ranges. This species has been recorded from habitats near rocky ranges (such as stony plains) and presumably disperses between more rugged habitats, however, little is known about their pattern of dispersal.	<b><u>Moderate</u></b> Loss of important habitat, 17.97 ha of Rocky Ridge and Gorge, 35.16 ha of Rocky Foothills is likely to reduce the total habitat area available to this species, leading to a permanent population reduction. However, this species is likely to persist in the remainder of the rocky range.
<b><i>Leggadina lakedownensis</i></b> <b>Lakeland Downs Mouse</b> <ul style="list-style-type: none"> <li>Priority 4 – DBCA Priority list</li> </ul>	This species remains unrecorded in the Fauna Study Area, however, it is moderately likely to occur. The populations of this species can fluctuate dramatically, so it may be common one year and virtually	<ul style="list-style-type: none"> <li>Loss of Drainage Line and Spinifex Stony Plains habitats are the most likely to support this species.</li> <li>Increase in feral cats leading to increased predation on the Lakeland Downs Mouse.</li> </ul>	This species has an extensive but discontinuous population across the Pilbara and northern Australia, and is generally uncommon (Woinarski <i>et al.</i> 2014). Although known to occur in a range of habitats, in the	<b><u>Low</u></b> Although 46.62 ha of suitable habitat will be lost (40.99 ha of Spinifex Stony Plains and 5.63 ha of Drainage Line), this is unlikely to impact populations of this species on a regional level.



Species/Assemblage	Local Population	Potential Impacts	Regional Context	Scale of impact (local)
	undetectable the next (Van Dyck and Strahan 2008).		Pilbara Bioregion it is thought to prefer blacksoil plains and calcareous clays (Gibson and McKenzie 2009). As these habitats are absent from the Fauna Study Area, it is unlikely that the survey area is of particular importance to this species.	
<p><i>Pseudomys chapmani</i></p> <p><b>Western Pebble-mound Mouse</b></p> <ul style="list-style-type: none"> <li>Priority 4 – DBCA Priority list</li> </ul>	<p><b>Recorded.</b> The distinctive pebble-mounds of this species have been recorded in the Fauna Study Area, including recent records in 2019 (Western Wildlife 2019). This species is likely to be resident anywhere there are suitable small stones for mound building.</p>	<ul style="list-style-type: none"> <li>Loss of habitat. Spinifex Stony Plain and/or Ironstone Ridgetop habitats with small stones for mound-building.</li> <li>Increase in feral cats leading to increased predation on Western Pebble-mound Mouse, both within and adjacent to the disturbance footprint.</li> <li>Direct mortality during clearing of Spinifex Stony Plains or Ironstone Ridgetop.</li> <li>Altered fire regimes leading to increased fire frequency and loss of spinifex cover in the Spinifex Stony Plain habitat.</li> </ul>	<p>This species occurs in suitable stony habitats throughout the Pilbara. Its favoured habitat is widespread in the region, and the population at Wodgina is likely to extend outside the survey area boundary, throughout the gentle lower slopes of the rocky range that extends to the south and north. It is unlikely that the population of this species in the Fauna Study Area is of particular regional importance.</p>	<p><b>Low</b></p> <p>Although 46.16 ha of suitable habitat will be lost (40.99 ha of Spinifex Stony Plains and 5.17 ha of Ironstone Ridgetop), this is unlikely to impact populations of this species on a regional level. Adjacent habitat within the Fauna Study Area is likely to continue to support this species, and the remaining population is likely to persist in the long-term.</p>





# Legend

- Fauna Study Area
- Proposed NVCP Boundary
- Proposed Disturbance Footprint
- Current Cleared Areas
- Old Cleared Areas
- ★ Permanent Pool
- ★ Semi-Permanent Pool

## Fauna Habitat

- Drainage Line
- Ironstone Ridge Top
- Low Vegetation with Ephemeral Areas
- Rocky Foothills
- Rocky Ridge and Gorge
- Shrubland over Spinifex Sandplain
- Spinifex Sandplain
- Spinifex Stony Plain
- Stony Rises

FIGURE 5.1

Cumulative Impact on Fauna Habitat



## 5.6 Risk of a Significant Impact on Significant Fauna Taxa

Of the 17 significant fauna known to occur or potentially occurring in the Fauna Study Area, nine are listed as MNES under the EPBC Act. Of these, the scale of impact at a local level has been assessed as ‘Negligible’ for the four Migratory species and ‘Very Low’ for the Night Parrot, thus the potential impact on these species is not considered to be significant under the EPBC Act (**Table 5.2**). For the remaining four species, the scale of impact at a local level has been assessed as Low or Moderate (**Table 5.2**), indicating the potential for temporary decline in the local population.

The risk of a potential significant impact (**Table 3.3**) on the Pilbara Olive Python, Ghost Bat and Pilbara Leaf-nosed Bat is considered likely to be Low, however, the risk of a potential significant impact is considered to be High for the Northern Quoll. The impact on the Northern Quoll is primarily due to the loss of Rocky Ridge and Gorge habitat, which is important for shelter and breeding. Each of these has been considered further in the sections below and **Table 5.3**, **Table 5.4**, **Table 5.5** and **Table 5.6**.

### 5.6.1 Northern Quoll

Northern Quolls were monitored at eight sites between 2010 and 2018 in the western part of the range as part of the Atlas DSO Project. Initial captures were high (15 individuals), although captures dropped significantly in 2013/2014. This decline in capture rates was inferred to be due to the impacts of bushfire rather than mining (Stantec 2017). The monitoring in 2018 recorded an increase in quoll numbers (seven individuals including one female) as they recover after fire (Biologic 2018a). In 2018 this species was recorded on six cameras and 12 scat locations (Stantec 2018b), in 2019 the species was recorded opportunistically at three camera locations and caught once (Western Wildlife 2019). The Stantec (2022) survey recorded the species six times over 72 camera nights. The most recent survey within the Proposal area suggested the Northern Quoll population in the Survey area is currently low density that is recovering post-fire (Stantec 2022).

The known records and critical habitat for Northern Quoll is presented in **Figure 5.2**.

#### 5.6.1.1 Important Population

For the Northern Quoll, an ‘important population’ is defined by (DoE 2016) as being one or more of the following:

- High density Northern Quoll populations, which occur in refuge-rich habitat critical to the survival of the species, including where cane toads are present.
- Populations occurring in habitat that is free of cane toads and unlikely to support cane toads upon arrival i.e. granite habitats in WA, populations surrounded by desert and without permanent water.
- Populations subject to ongoing conservation or research actions i.e. populations being monitored by government agencies or universities or subject to reintroductions or translocations.

Although Northern Quolls are present at Wodgina in low numbers (Western Wildlife, 2019), it is considered an important population as it occurs in the refuge-rich habitat of the rocky range and is in habitat that is free of cane toads. This population is likely to extend throughout the rocky range, both inside and outside the Fauna Study Area. Northern Quolls have been recorded throughout the rocky parts of the Fauna Study Area (**Figure 5.2**).



### 5.6.1.2 Habitat Critical for the Survival of the Species

For the Northern Quoll, 'habitat critical to the survival of the species' is defined by DoE (2016) as:

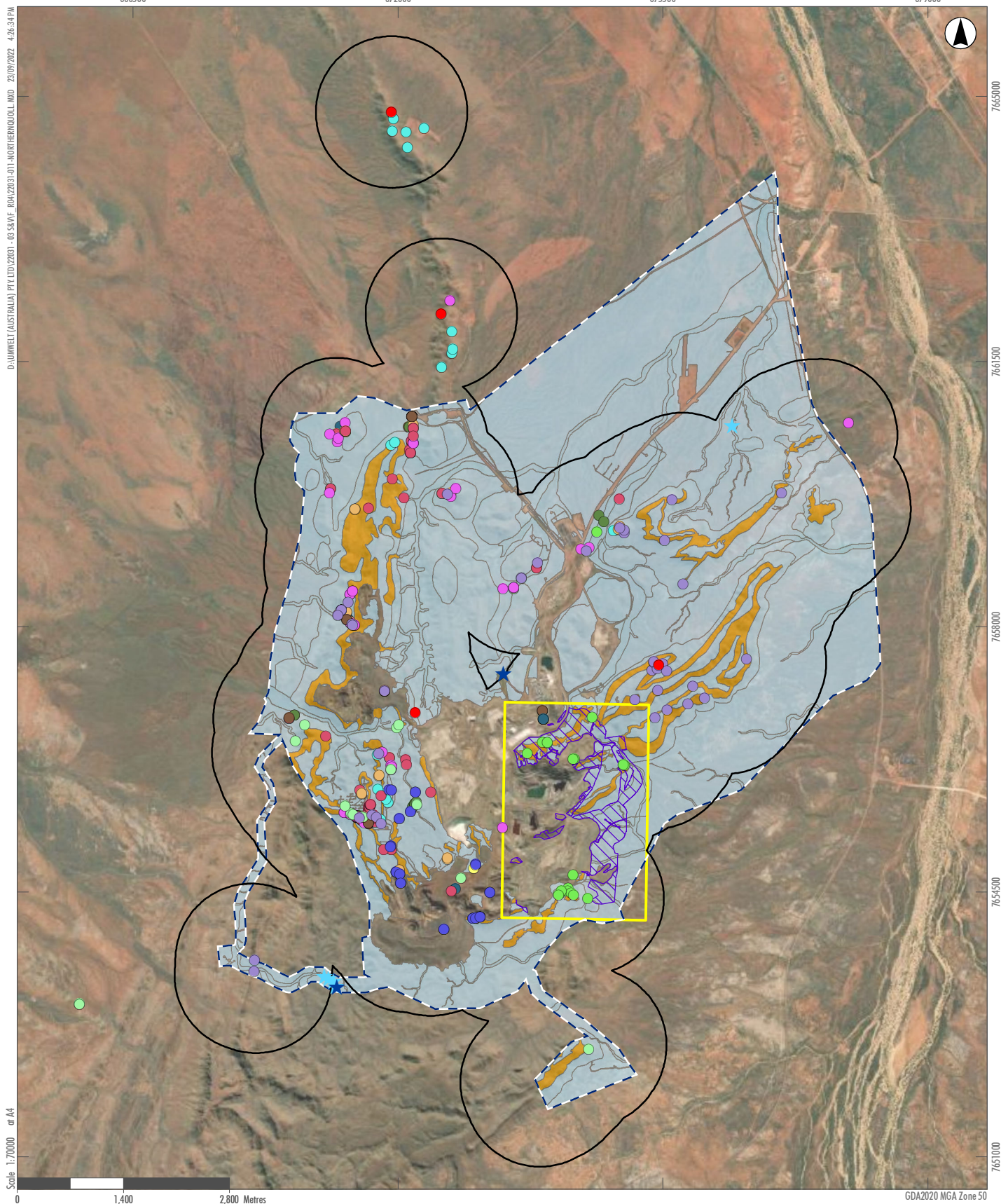
- Offshore islands where the Northern Quoll is known to exist.
- Rocky habitats such as ranges, escarpments, mesas, gorges, breakaways, boulder fields, major drainage lines or treed creek lines.
- Structurally diverse woodland or forest areas containing large diameter trees, termite mounds or hollow logs.
- Dispersal and foraging habitat, when connected with populations considered important for the long-term survival of the Northern Quoll.

The Rocky Ridge and Gorge habitat in the Fauna Study Area is critical habitat (for breeding and shelter) for the Northern Quoll (Commonwealth of Australia 2016). This habitat is also likely to extend outside the Fauna Study Area, though this has not been mapped. The Rocky Ridge and Gorge habitat is refuge-rich, containing caves and crevices likely to be used by the Northern Quoll for shelter and breeding. Dispersal and foraging habitat is not generally well-understood, but is considered by DoE (2016) to be all habitat within 1 km of Northern Quoll records or breeding habitat (**Figure 5.2**). As the Northern Quolls at Wodgina are part of an 'important population', dispersal and foraging habitat is also considered to be critical habitat.

The potential reduction in population size due to potential impacts to habitat is considered unlikely to prevent the long-term persistence of the species in the rocky range at Wodgina (**Table 5.2**).

An assessment of significant impact on the Northern Quoll is presented in **Table 5.3**. The implementation of the Proposal is likely to trigger three of the nine significant impact criteria for the Matters of National Environmental Significance under the EPBC ACT (DoE 2013).





- Legend**
- Fauna Study Area
  - Proposed NVCP Boundary
  - Proposed Disturbance Footprint
  - Northern Quoll Habitat**
    - Critical Habitat
    - Supporting Habitat
    - Foraging Habitat
  - ★ Permanent Pool
  - ★ Semi-Permanent Pool

**Northern Quoll Record**

- 2019
- 2018
- 2017
- 2016
- 2015
- 2014
- 2012
- 2011
- 2010
- 2009
- 2008
- Other

FIGURE 5.2

Northern Quoll Records and Habitat within the Fauna Study Area



**Table 5.3 Assessment of potential impacts of the on the Northern Quoll (En) against Significant Impact Guideline Criteria (DoE 2013)**

Significant Impact Criteria (Guideline 1.1)	Likelihood and Rationale
Lead to a long-term decrease in the size of a population	<p><b>Likely</b></p> <p>The loss of 17.97 ha of Rocky Ridge and Gorge habitat is likely to result in a permanent reduction in the area of shelter habitat with the associated potential for breeding. The loss of this habitat is likely to reduce the carrying capacity of the rocky range leading to a permanent decrease in the local population size. The Northern Quoll occurs in a variety of habitats across its range, but in the Pilbara, favours dissected rocky escarpments (Hill and Ward 2010, Van Dyck and Strahan 2008). Where shelter habitat occurs within the Northern Quolls predicted range, it is considered 'habitat critical to the survival of the species' (Commonwealth of Australia 2016). In the Pilbara, shelter habitat (with associated denning habitat), consists of rocky habitats such as ranges, escarpments, mesas, gorges, breakaways, boulder fields and major drainage lines (Commonwealth of Australia 2016). In the proposed disturbance footprint area, shelter habitat is primarily the 17.97 ha of Rocky Ridge and Gorge habitat (<b>Figure 5.2</b>).</p>
Reduce the area of occupancy of the species	<p><b>Likely</b></p> <p>Loss of 17.97 ha of Rocky Ridge and Gorge habitat is likely to lead to a permanent loss of these habitats.</p> <p>Other habitat in the proposed disturbance area can be considered critical foraging and dispersal habitat, of which 105.03 ha will be lost to clearing.</p>
Fragment an existing population into two or more populations	<p><b>Unlikely</b></p> <p>Although the Rocky Ridge and Gorge habitat will be cleared within the proposed disturbance footprint, it is unlikely to lead to fragmentation and genetic isolation of the population on either side of the proposed disturbance footprint. The Northern Quoll is very mobile and capable of dispersing long distances, for example, 2.5 km in one day (Schmitt <i>et al.</i> 1989), 3.5 km in seven days (King 1989), 2–3 km at Poondano (Process Minerals International, unpublished data) and 2 km at the Buckland Project (Phoenix Environmental Sciences 2012). DoE (2016) recognise all native vegetation within 1 km of shelter habitat or Northern Quoll records as foraging and dispersal habitat. <b>Figure 5.2</b> maps potential dispersal and foraging habitat, showing that the population is likely to remain connected across the Fauna Study Area.</p>
Adversely affect habitat critical to the survival of a species	<p><b>Likely</b></p> <p>The Northern Quoll occurs in a variety of habitats across its range, but in the Pilbara, favours dissected rocky escarpments (Hill and Ward 2010, Van Dyck and Strahan 2008). Where shelter habitat occurs within the Northern Quolls predicted range, it is considered 'habitat critical to the survival of the species' (Commonwealth of Australia 2016). In the Pilbara, shelter and denning habitat consists of rocky habitats such as ranges, escarpments, mesas, gorges, breakaways, boulder fields and major drainage lines (Commonwealth of Australia 2016). In the Fauna Study Area, shelter habitat is primarily the 17.97 ha of Rocky Ridge and Gorge habitat (<b>Figure 5.2</b>).</p>



Significant Impact Criteria (Guideline 1.1)	Likelihood and Rationale
Disrupt the breeding cycle of a population	<p><b>Unlikely</b></p> <p>Although the loss of 17.97 ha of Rocky Ridge and Gorge habitat is likely to result in a permanent reduction in the area of potential breeding and shelter habitat reducing the carrying capacity of the rocky range, it is unlikely to disrupt the breeding cycle of the population. The Northern Quoll population in the Fauna Study Area is likely to be a breeding population, as indicated by presence of females (Western Wildlife, 2019).</p>
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<p><b>Unlikely</b></p> <p>The loss of potential 17.97 ha of breeding and shelter habitat is likely to reduce the carrying capacity of the rocky range leading to a permanent decrease in the local population size, however the species is unlikely to continue to decline. There may also be impacts to individuals (e.g. through road mortalities and other accidental deaths) or indirect impacts (e.g. increase in feral predators) that may lead to population reduction, at least on a temporary level, during the operation of the project.</p>
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	<p><b>Unlikely</b></p> <p>Feral cats are already known to occur in the Fauna Study Area, with cats recorded on camera traps in eight of 40 locations sampled in April 2019 (Western Wildlife 2019). Although it is possible that feral cats may increase in abundance due to the Proposal, it is likely that feral cats are an on-going existing threat, attracted to the current landfill site, accommodation village and water sources. Cane toads may potentially be brought into site on trucks or in freight, though the chance of this species establishing itself in the Fauna Study Area is low, as there is little permanent water available.</p>
Introduce disease that may cause the species to decline	<p><b>Unlikely</b></p> <p>The Proposal is unlikely to result in the introduction or transmission of disease, as it is unlikely that bats potentially carrying disease will be moved either purposely or accidentally; Pets (i.e. cats and dogs) are not permitted within the project and landfill and waste water treatment facilities are managed as per DWER licence conditions.</p>
Interfere with the recovery of the species	<p><b>Unlikely</b></p> <p>No recovery actions for the Northern Quoll are currently underway or proposed within the NVCP boundary area.</p>



## **5.6.2 Pilbara Leaf-nosed Bat**

### **5.6.2.1 Important Population**

On the basis of genetic work, the Pilbara leaf-nosed Bats are considered to be a single population (TSSC 2016c). This population is divided among a series of colonies. As known breeding colonies are relatively few, they are likely to be regionally important in maintaining the species. The Pilbara Leaf-nosed Bats in the Fauna Study Area are part of the important population that occurs across the Pilbara, but no regionally important colonies (breeding roosts) are known or likely to occur within the Fauna Study Area. However, transitory diurnal roosts (of which one is present) may be important for maintaining gene—flow between larger colonies.

### **5.6.2.2 Habitat Critical for the Survival of the Species**

For the Pilbara Leaf-nosed Bat, ‘habitat critical to the survival of the species’ is defined by TSSC (2016c) as underground diurnal roosts with warm temperatures and high humidity, listed in order of priority for conservation, they are:

- Permanent Diurnal Roosts (Priority 1).
- Non-permanent Diurnal Roosts (Priority 2).
- Transitory Diurnal Roosts (Priority 3).

Habitat important for the persistence of the local population, although not considered to be critical habitat, is:

- Nocturnal refuges (Priority 4).

It is difficult to define critical foraging habitat (TSSC 2016c). However, suitable foraging habitat located within vicinity of a diurnal roost in order of priority for conservation includes:

- gorges with pools (Priority 1)
- gullies (Priority 2)
- rocky outcrops (Priority 3)
- major watercourses (Priority 4)
- open grasslands and woodlands (Priority 5).

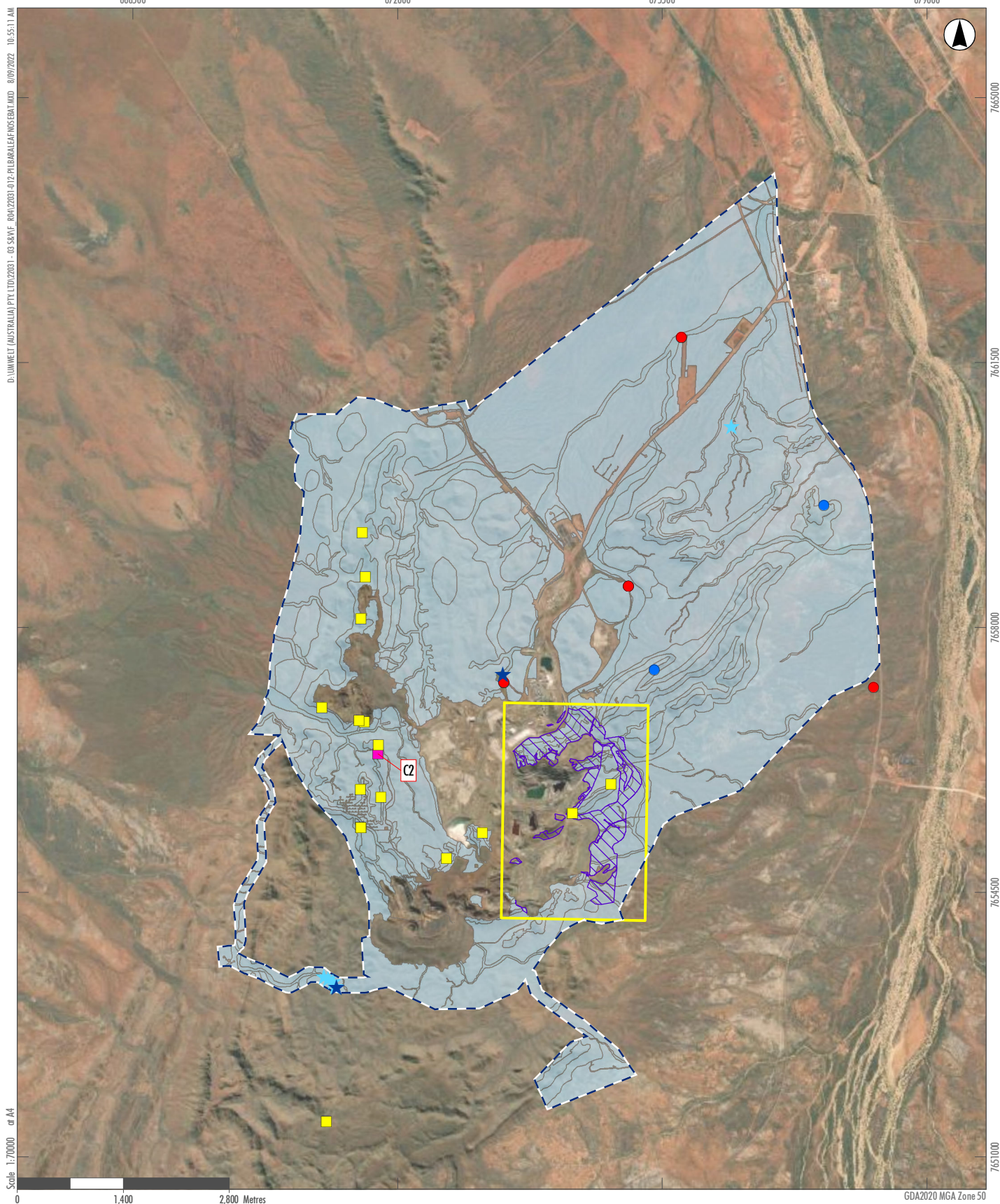


In the Fauna Study Area, roosting habitat critical to the survival of the Pilbara Leaf-nosed Bat is a single known transitory diurnal roost at cave C2 (**Figure 5.3**). A second transitory diurnal roost is known from outside the Fauna Study Area at cave C6, approximately 21 km east of the Fauna Study Area. No permanent or non-permanent diurnal roosts are known or considered likely to occur in the Fauna Study Area, the nearest located about 25 km away at Yule River, East Turner River and Glacier Valley (Stantec 2018a, 2018b). Timing of the calls recorded in the Fauna Study Area suggest that the bats that forage in the Fauna Study Area may originate from one of these roosts, and the transitory diurnal roost (cave C2) may be a satellite roost of one of these colonies (Stantec 2018b). The habitats at may be of local importance in maintaining gene flow between regionally important roosts. After a targeted bat survey in 2018, it was considered that no critically important roosting habitat was likely to occur within the NVCP boundary area (Stantec 2018a). The results of a targeted survey in 2022 align with the previous surveys of the Rocky Ridge habitat that also failed to identify suitable roosting habitat and recorded foraging in low numbers (Stantec 2022).

Critical foraging habitat is likely to be present, as this species is known to roost at cave C2 and bats may fly 10 km or more from a roost to forage (TSSC 2016c). Bats have been recorded foraging across the Fauna Study Area, including on the most recent surveys in 2018 and 2019 (**Figure 5.3**). Pilbara Leaf-nosed Bats are likely to forage in several habitats, including Drainage Lines (aligns with 'major watercourses, priority 4'), Rocky Ridge and Gorge (aligns with 'rocky outcrops, priority 3' and 'gullies, priority 2') and over permanent and semi-permanent pools in Drainage Lines (aligns with 'gorges with pools, priority 1'). Within the Rocky Ridge and Gorge habitat are caves that may be used as nocturnal refuges i.e. used while feeding at night but not used for day roosting. The known records and critical habitat are presented in **Figure 5.3**.

**Table 5.4** presents the assessment of the potential impacts of the Proposal against the significant impact criteria for the Pilbara Leaf-nosed Bat (Department of Environment 2013). The implementation of the Proposal is unlikely to trigger any of the nine significant impact criteria.





- Legend**
- Fauna Study Area
  - Proposed NVCP Boundary
  - Proposed Disturbance Footprint
  - ★ Permanent Pool
  - ★ Semi-Permanent Pool
  - Pilbara Leaf-nosed Bat Habitat**
  - Supporting Habitat
  - Pilbara Leaf-nosed Bat Cave**
  - Nocturnal Refuge

**Pilbara Leaf-nosed Bat Critical Habitat**

Transitory Diurnal Roost

**Pilbara Leaf-nosed Bat Record**

● 2019

● 2018

FIGURE 5.3

**Pilbara Leaf-nosed Bat Records and Habitat within the Fauna Study Area**



**Table 5.4 Assessment of potential impacts of the on the Pilbara Leaf-nosed Bat (Vu) against Significant Impact Guideline Criteria**

Significant Impact Criteria (Guideline 1.1)	Likelihood and Rationale
Lead to a long-term decrease in the size of an important population of a species	<p><b>Unlikely</b></p> <p>Loss or disturbance to permanent or non-permanent diurnal roosts is considered likely to cause a long-term decrease in population size (TSSC 2016c). The nearest permanent diurnal roosts are 25 km from the project (Stantec 2018b). As there will be no loss or disturbance to these roost types, there is unlikely to be a significant impact on the population.</p>
Reduce the area of occupancy of an important population	<p><b>Unlikely</b></p> <p>The area of occupancy of this species is determined by the presence of suitable warm, humid underground roost sites (TSSC 2016c, Woinarski <i>et al.</i> 2014). As the Proposal is not likely to impact a permanent or transient diurnal roost site, the area of occupancy is unlikely to be reduced.</p>
Fragment an existing important population into two or more populations	<p><b>Unlikely</b></p> <p>Supporting habitat surrounds the disturbed areas with the proposed clearing unlikely to fragment the population of the Pilbara Leaf-nosed Bat.</p>
Adversely affect habitat critical to the survival of a species	<p><b>Unlikely</b></p> <p>There are no permanent or non-permanent diurnal roosts present within the proposed NVCP boundary area, and the single transitory diurnal roost present is located approximately 1.6 km outside the proposed disturbance footprint.</p>
Disrupt the breeding cycle of an important population	<p><b>Unlikely</b></p> <p>Wodgina is not known to support a permanent diurnal roost of Pilbara Leaf-nosed Bats. One of the five roosts identified in the western part of the range and monitored between 2012 and 2018 is considered to be a transitory diurnal roost, the remaining four are nocturnal refuges, and bat call activity has been consistently recorded in these caves each year (Biologic 2018b, Stantec 2018b). The closest known permanent diurnal roosts (breeding sites) are located about 25 km from the proposed disturbance footprint at Yule River, East Turner River and Glacier Valley. Timing of the calls recorded at Wodgina suggest that the bats that forage in the Fauna Study Area may originate from one of these roosts (Stantec 2018b). Although 17.97 ha of Rocky Ridge and Gorge habitat will be cleared, this has been subject to a targeted survey and no diurnal roosts were located or considered likely to occur (Stantec 2018a). It is unlikely that the Proposal will disrupt a breeding roost of this species.</p>



Significant Impact Criteria (Guideline 1.1)	Likelihood and Rationale
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<p><b>Unlikely</b></p> <p>The individuals that roost at cave C2 potentially forage 10 km or more from the roost when present and are particularly likely to favour Drainage Line and Rocky Ridge and Gorge habitats for foraging. Clearing the proposed disturbance footprint will result in the loss of 23.60 ha of potential foraging habitat, comprising 5.63 ha of Drainage Line and 17.97 ha of Rocky Ridge and Gorge. Bats were recorded foraging within the footprint by Stantec (2018a) and nocturnal refuges (used at night while foraging) are likely to be lost. However, the loss of habitat is small compared to that available in the local area and is unlikely to lead to a substantial population decline.</p>
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	<p><b>Unlikely</b></p> <p>Feral cats are already known to occur in the Fauna Study Area, with cats recorded on camera traps in eight of 40 locations sampled in April 2019 (Western Wildlife 2019). Although it's possible that feral cats may increase in abundance due to the Proposal, it is likely that feral cats are an on-going existing threat, attracted to the current landfill site, accommodation village and water sources.</p>
Introduce disease that may cause the species to decline	<p><b>Unlikely</b></p> <p>Implementation of the Proposal is unlikely to result in the introduction or transmission of disease, as it is unlikely that bats potentially carrying disease will be moved either purposely or accidentally. Pets (i.e. cats and dogs) are not permitted within the project and landfill and waste water treatment facilities as per licence conditions.</p>
Interfere substantially with the recovery of the species	<p><b>Unlikely</b></p> <p>No recovery actions for the Pilbara Leaf-nosed Bat are currently underway or proposed within the Project area.</p>



## 5.6.3 Ghost Bat

### 5.6.3.1 Important Population

The Ghost Bats of the Pilbara region are disjunct and genetically distinct to those that occur in the Kimberley, Northern Territory and Queensland. The Pilbara population is divided between those in the Hamersley Ranges and those in the Chichester Ranges, though the genetic differentiation is low, suggesting bats move between these populations (Ottewell *et al.* 2017). The Ghost Bats of the Fauna Study Area fall within the Chichester Range subpopulation, which is estimated to be about 1,500 individuals (TSSC 2016a). In the Chichester region, Ghost Bats are often found in large maternal roosts, and these congregations are important for the survival of the species. However, smaller roosts are also likely to be important, allowing bats to occupy and forage through more of the landscape, resulting in dispersal and gene-flow between larger roosts. As the overall Chichester population is so small, all populations are likely to be important. Ghost Bats at Wodgina are part of an important population that is likely to utilise a number of caves throughout the range (**Figure 5.4**). The largest numbers of bats physically observed, as reported by (Biologic 2018b, Stantec 2018b, Outback Ecology 2009b; 2012) were:

- Cave C1 – 23 bats in 2014.
- Cave C2 – 65 bats in 2012, including young.
- Cave C5 (4 km south of the Fauna Survey Area, formerly known as Cave AC-54) – 60 bats in 2009.
- Cave AC-80 (4 km south of the Fauna Survey Area) – 60 bats in 2009.
- Cave C6 (21 km east of Fauna Survey Area, formerly known as Cave SC-21) – 40 bats in 2009 and 2 bats in 2010.
- Cave PC3 – 3 bats in 2017.
- Cave C7a – 14 bats in 2017 (flew to Cave C7b, 20 m from Cave C7a).

A count of 65 bats at Cave C2 in the Fauna Study Area is regionally significant, as this represents 4.3 % of the estimated 1,500 individuals in Chichester subpopulation. No known diurnal roost caves are within the disturbance footprint, the nearest being cave SC-10 at which 2 bats were recorded in 2009, and this cave is proposed to be avoided by WLPL through a 100 m exclusion area. The results of the Stantec (2022) target survey align with a previous survey (Stantec, 2018b) of the Rocky Ridge habitat which also failed to identify suitable roosting habitat and only recorded PLNB foraging in low numbers.

Assessment of risks on the Ghost Bat is hampered by a lack of quantitative data on this species. The Ghost Bat is difficult to monitor as even low-level disturbance at caves can cause this species to leave a site or go to alternative roost sites. Little is known about the relative importance of the habitats surrounding roost sites as foraging sites. The information available for this species within the Fauna Study Area is still sparse, despite over ten years of monitoring.



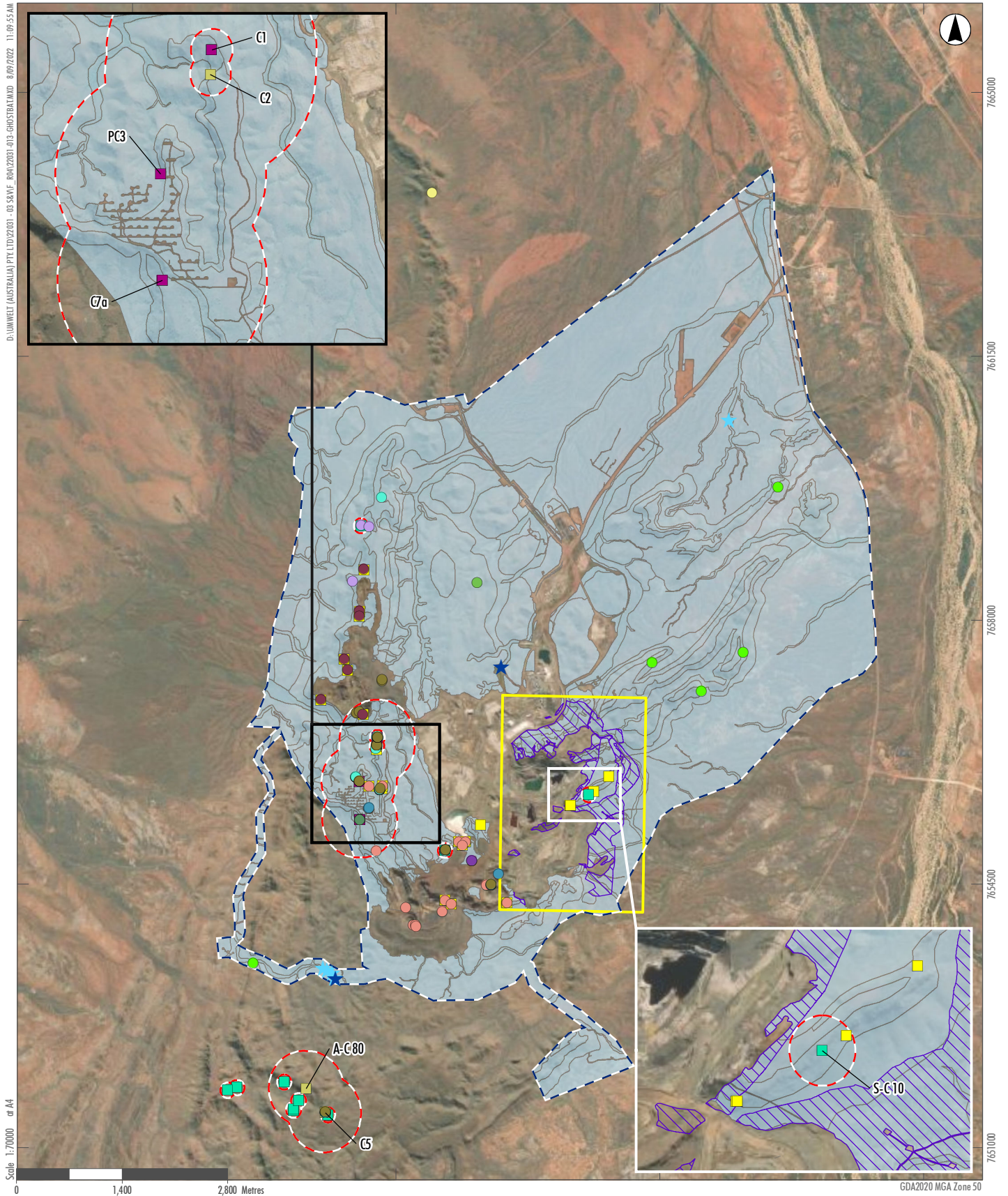
### Habitat Critical for the Survival of the Species

Similarly to the Pilbara Leaf-nosed Bat, the Ghost Bat requires deep caves for diurnal roosting and breeding. These caves are usually deep natural caves or disused mines (TSSC 2016a). As the overall population is so small, it is likely that all diurnal roost sites are 'habitat critical for the survival of the species', with maternity (breeding) roosts the most significant. There are several caves in and around the Fauna Study Area that have been identified as either diurnal roosts or diurnal roosts that are potential maternity roosts (Biologic 2018b, Outback Ecology 2009b). Ghost Bats are likely to move between several caves seasonally or on the basis of weather conditions (TSSC 2016a), so it is likely that caves in the Fauna Study Area are part of a network of caves used by the local Ghost Bat population.

Although the foraging ecology of the Pilbara populations has not been studied, a recent Queensland study has found that male Ghost Bats forage up to 11.8 km from the roost, while lactating females forage within 3 km (Augusteyn *et al.* 2018). A study in the Northern Territory found that bats foraged on average 1.9 km from their diurnal roost (Tidemann *et al.* 1985). Ghost Bats have large wings and are capable of flying considerable distances to forage, but there is uncertainty around the relative importance of close foraging habitats. If bats are forced to fly further to forage, this may impact on breeding success and cause population decline (Augusteyn *et al.* 2018). Therefore, any foraging habitat within 3 km of a diurnal roost or potential maternity roost may be considered important foraging habitat.

The assessment of the potential impacts of the Wodgina project expansion against the significant impact criteria for the Ghost Bat (Department of Environment 2013) is presented in **Table 5.5**. Implementation of the Proposal is unlikely to trigger any of the nine significant impact criteria.





- Legend**
- Fauna Study Area
  - Proposed NVCP Boundary
  - Proposed Disturbance Footprint
  - ★ Permanent Pool
  - ★ Semi-Permanent Pool
  - Ghost Bat Habitat**
  - Supporting Habitat
  - Critical Habitat - Exclusion Zone

- Ghost Bat Critical Habitat**
- Diurnal roost
  - Potential Maternity roost
  - Regionally significant diurnal roost
  - Transitory Diurnal Roost
  - Ghost Bat Cave**
  - Nocturnal Refuge

- Ghost Bat Record**
- 2018
  - 2016
  - 2015
  - 2014
  - 2013
  - 2012
  - 2011
  - 2010
  - 2009
  - 2008
  - 1975

FIGURE 5.4

Ghost Bat Records and Habitat within the Fauna Study Area



**Table 5.5 Assessment of potential impacts of the on the Ghost Bat (Vu) against Significant Impact Guideline Criteria**

Significant Impact Criteria (Guideline 1.1)	Likelihood and Rationale
Lead to a long-term decrease in the size of an important population of a species.	<p><b>Unlikely</b></p> <p>Loss or disturbance to diurnal and/or maternity roosts is likely to lead to a long-term decrease in the Ghost Bat population. The proposed disturbance footprint contains 17.97 ha of Rocky Ridge and Gorge habitat, but no roosts sites are known from within this area. The nearest at cave SC-10 is protected from the disturbance footprint by a 100 m. Cave C2, which is regionally significant, is located approximately 6 km to the west. As no roost sites are likely to be lost, there is unlikely to be a decrease in the size of the population.</p>
Reduce the area of occupancy of an important population.	<p><b>Unlikely</b></p> <p>The area of occupancy of this species is likely to be determined by the presence of caves that may be suitable underground diurnal roost sites. The proposed disturbance footprint contains 17.97 ha of Rocky Ridge and Gorge habitat, but no roosts sites are known from within this area. As no roost sites are likely to be lost, there is unlikely to be a decrease in the size of the population.</p>
Fragment an existing important population into two or more populations.	<p><b>Unlikely</b></p> <p>The Ghost Bat is a large, mobile species. Its population may be fragmented if a swathe of roost sites are lost or disturbed, preventing bats from moving through the landscape. No roost sites are likely to be lost, and bats are known to forage 2–11.8 km from the roost (Tidemann <i>et al.</i> 1985, Augusteyn <i>et al.</i> 2018), indicating the Proposal is unlikely to result in population fragmentation.</p>
Adversely affect habitat critical to the survival of an important population.	<p><b>Unlikely</b></p> <p>Threats such as habitat clearing (resulting in loss of roost sites or foraging habitat), disturbance through drilling and blasting, road mortalities and altered hydrology may adversely affect habitat that is critical to this species. The Ghost Bat has a relatively slow reproductive rate, it is vulnerable to localised threats (TSSC 2016a). Loss or disturbance to diurnal and/or maternity roosts is likely to lead to a long-term decrease in the Ghost Bat population.</p> <p>The proposed disturbance footprint contains 17.97 ha of Rocky Ridge and Gorge habitat, but no roosts sites are known from within this area. As no roost sites are likely to be lost, there is unlikely to be a decrease in the size of the population. Part of the proposed NVCP boundary area is within 3 km of known diurnal roost sites (<b>Figure 5.4</b>), so potentially important foraging habitat may be impacted. Bats flying in these areas may also be impacted by nocturnal road mortalities. Despite this, significant areas of foraging habitat remain, including areas beyond the Fauna Study Area and including, high value foraging habitat such as Drainage Lines.</p>



Significant Impact Criteria (Guideline 1.1)	Likelihood and Rationale
Disrupt the breeding cycle of an important population.	<p><b>Unlikely</b></p> <p>Loss or disturbance to a maternity roost would disrupt the breeding cycle of this species. While most of the bats in this region are thought to congregate on relatively few large maternity roosts in disused mines, caves C1, PC3, C7a and C7b have been identified as potential maternity roosts in the Fauna Study Area (Biologic 2018b), but none were found in the proposed disturbance footprint (Stantec 2018a). Clearing in the proposed disturbance footprint is unlikely to result in the loss of maternity roosts, therefore no disruption to breeding is anticipated.</p>
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	<p><b>Unlikely</b></p> <p>No diurnal roost sites are known from the proposed disturbance footprint. The closest cave (SC-10, where 2 bats were recorded in 2009) is proposed to be avoided by WLPL by a 100 m exclusion zone. Foraging bats may be impacted through loss of habitat in proximity to diurnal roost caves and road mortalities. As the Ghost Bat has a relatively slow reproductive rate, it is vulnerable to localised threats (TSSC 2016a). Part of the proposed disturbance footprint is within 3 km of known diurnal roost sites, including Cave C2 which is a regionally significant diurnal roost, so important foraging habitat may be impacted. Bats flying in these areas may also be impacted by nocturnal road mortalities. Despite this, significant areas of foraging habitat remain, including areas beyond the Fauna Study Area and including high value foraging habitat such as Drainage Lines.</p>
Result in invasive species that are harmful to the species becoming established in the species' habitat.	<p><b>Unlikely</b></p> <p>Although introduced predators such as cats may compete with the Ghost Bat for prey, it is unknown whether this is a significant threat. However, Cane Toads are likely to be a severe threat to the species (TSSC 2016a). Cane toads may potentially be brought into site on trucks or in freight. Although possible, the real risk of a successful Cane Toad introduction into Ghost Bat foraging habitat is low, as there is a single permanent water pool.</p>
Introduce disease that may cause the species to decline.	<p><b>Unlikely</b></p> <p>The Proposal is unlikely to result in the introduction or transmission of disease, as it is unlikely that bats potentially carrying disease will be moved either purposely or accidentally. Pets (i.e. cats and dogs) are not permitted within the project and landfill and waste water treatment facilities as per licence conditions.</p>
Interfere substantially with the recovery of the species.	<p><b>Unlikely</b></p> <p>No recovery actions for the Pilbara Leaf-nosed Bat are currently underway or proposed within the Project area.</p>



## 5.6.4 Pilbara Olive Python

### 5.6.4.1 Important Population

The Pilbara Olive Python occurs throughout the Pilbara Bioregion, on ranges with gorges and waterholes. They use waterholes for hunting and spend the winter in rocky areas away from water, and adults can range widely (DEWHA 2008). At least 21 locations are known to support the species (Department of the Environment, Water, Heritage and the Arts (DEWHA) 2008).

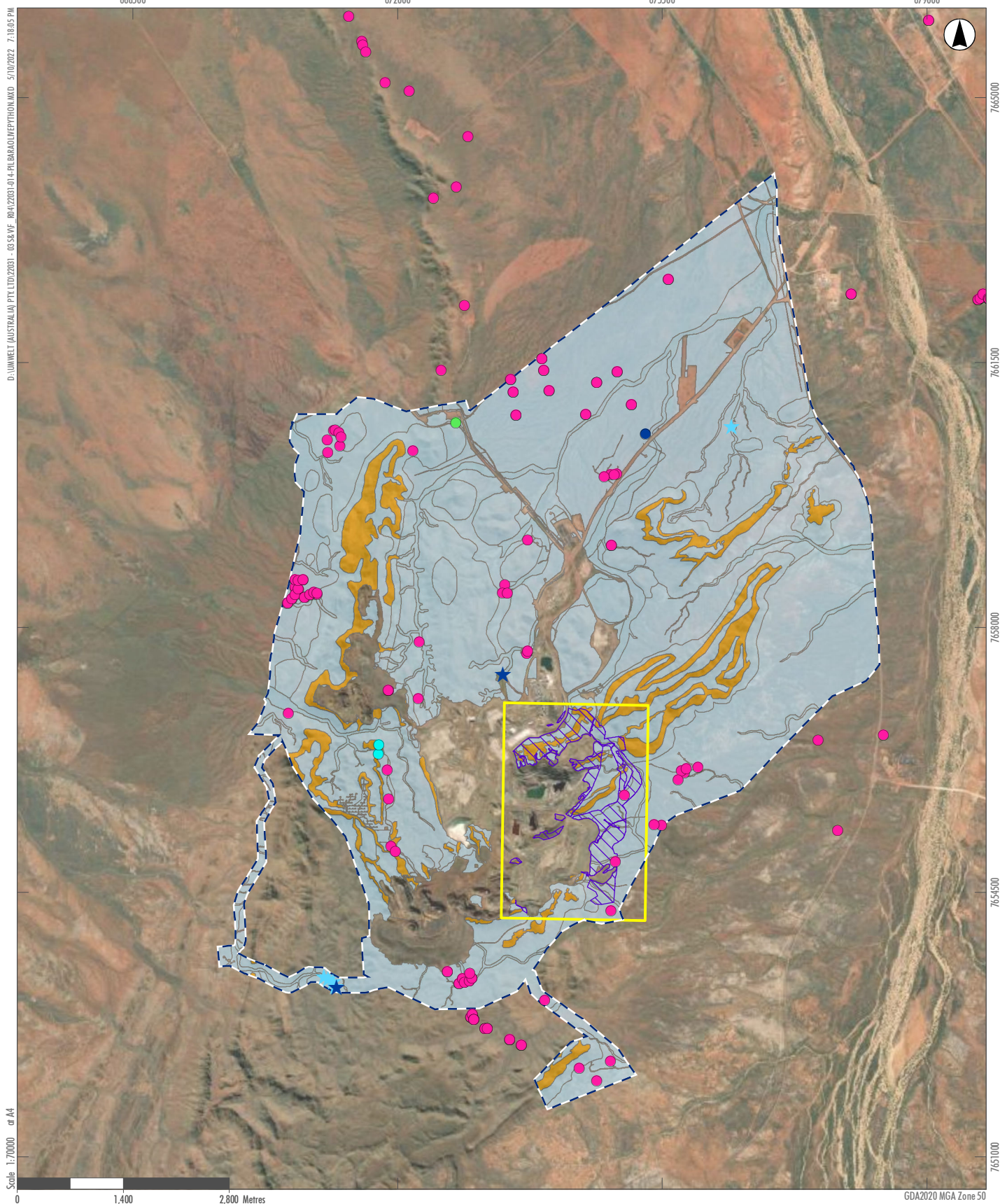
Despite many surveys within suitable habitat areas (e.g. eight to ten years of targeted surveys for bats, Northern Quolls and as part of Level 1 and 2 fauna surveys (see Stantec 2018b)), the Pilbara Olive Python has not been recorded in the Fauna Study Area, though it is known to occur in other rocky ranges in the region and is considered likely to occur (Western Wildlife 2019, Stantec 2018b). If present, the population is unlikely to be an important population. While likely to be present, the population is unlikely to be a large source population that is important for maintaining the presence of this species in the region.

### 5.6.4.2 Habitat Critical for the Survival of the Species

Rocky Ridge and Gorge habitat, particularly areas with permanent or semi-permanent water pools, are critical habitat for this species. Drainage Lines that traverse the Spinifex Stony Plains are supporting habitat, allowing for dispersal and foraging, but this species is likely to be strongly associated with rocky habitats. The occurrence of the Pilbara Olive Python habitat is presented in **Figure 5.5**.

The assessment of the potential impacts of the Proposal against the significant impact criteria for the Pilbara Olive Python (Department of Environment 2013) is presented in **Table 5.6**. Implementation of the Proposal is unlikely to trigger any of the nine significant impact criteria.





# Legend

- Fauna Study Area
- Proposed NVCP Boundary
- Proposed Disturbance Footprint
- ★ Pilbara Olive Python Record (2011)
- Pilbara Olive Python Habitat**
- Critical Habitat
- Supporting Habitat
- ★ Permanent Pool
- ★ Semi-Permanent Pool

## Other Fauna (Capture or Evidence of)

- *Lagorchestes conspicillatus leichardti*, Spectacled Hare-wallaby (mainland)
- *Pseudomys chapmani*, Western Pebble-mound Mouse
- *Sminthopsis longicaudata*, Long-tailed Dunnart

FIGURE 5.5

Pilbara Olive Python Habitat and Other Fauna Records within the Fauna Study Area



**Table 5.6 Assessment of potential impacts of the Proposal on the Pilbara Olive Python (Vu) against Significant Impact Guideline Criteria**

Significant Impact Criteria (Guideline 1.1)	Likelihood and Rationale
Lead to a long-term decrease in the size of an important population of a species.	<p><b>Unlikely</b></p> <p>This species has not yet been recorded in the Fauna Study Area, despite surveys within its habitat, and considerable areas of its favoured habitats remain outside the proposed disturbance footprint. The Pilbara Olive Python population in the Fauna Study Area is unlikely to represent an important population.</p>
Reduce the area of occupancy of an important population.	<p><b>Unlikely</b></p> <p>This species has not yet been recorded in the Fauna Study Area, despite surveys within its habitat, and considerable areas of its favoured habitats remain outside the proposed disturbance footprint. The Pilbara Olive Python population in the Fauna Study Area is unlikely to represent an important population.</p>
Fragment an existing important population into two or more populations.	<p><b>Unlikely</b></p> <p>The Pilbara Olive Python is a large snake that is highly mobile, capable of traversing considerable distances. Even though 17.97 ha of critical habitat (Rocky Ridge and Gorge) and 5.63 ha of supporting habitat (Drainage Line) is to be cleared, this species is likely to be able to disperse around the proposed project footprint. Therefore, it is unlikely that a Pilbara Olive Python population, if present, would be fragmented into two or more populations.</p>
Adversely affect habitat critical to the survival of the species.	<p><b>Unlikely</b></p> <p>The project involves clearing 17.97 ha of critical habitat (Rocky Ridge and Gorge), a habitat that is unlikely to be replicated through site rehabilitation and thus permanently lost. This represents 4.47 % of this habitat type within the Fauna Study Area. No permanent or semi-permanent pools are within the proposed disturbance footprint. Although this habitat will be lost, it is not thought to be supporting an important population of this species. Considerable areas of habitat remain outside the proposed disturbance footprint and outside the Fauna Study Area.</p>
Disrupt the breeding cycle of an important population.	<p><b>Unlikely</b></p> <p>This species has not yet been recorded in the Fauna Study Area, despite surveys within its habitat, and considerable areas of its favoured habitats remain outside the proposed disturbance footprint. The Pilbara Olive Python population in the Fauna Study Area is unlikely to represent an important population.</p>



Significant Impact Criteria (Guideline 1.1)	Likelihood and Rationale
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	<p><b>Unlikely</b></p> <p>This species has not yet been recorded in the Fauna Study Area, despite surveys within its habitat, and considerable areas of its favoured habitats remain outside the proposed disturbance footprint. Loss of 17.97 ha of Rocky Ridge and Gorge habitat may lead to a localised impact on this species but is unlikely to lead in a significant population decline in the Pilbara Olive Python.</p>
Result in invasive species harmful to the species becoming established in the species' habitat.	<p><b>Unlikely</b></p> <p>Feral cats are a threat to this species, as they prey on juvenile pythons, and foxes prey on pythons and compete for prey (DEWHA 2008). Feral cats are already known to occur at in the Fauna Study Area, with cats recorded on camera traps in eight of 40 locations sampled in April 2019 (Western Wildlife 2019). It is possible that feral cats may increase in abundance due to the Proposal, but it is more likely that feral cats are an on-going existing threat, attracted to the current landfill site, accommodation village and water sources. Cane toads may potentially be brought into site on trucks or in freight, though Cane Toads are not identified as a significant threat for this species.</p>
Introduce disease that may cause the species to decline.	<p><b>Unlikely</b></p> <p>The project is unlikely to result in the introduction or transmission of disease, as it is unlikely that pythons potentially carrying disease will be moved either purposely or accidentally.</p>
Interfere substantially with the recovery of the species.	<p><b>Unlikely</b></p> <p>The proposed NVCP boundary area is not within or near a population being managed for conservation. Several actions for the conservation of the Pilbara Olive Python have been identified by DEWHA (2008). These include identification of high conservation priority populations, ensuring road-widening, maintenance and mining do not adversely impact populations, managing changes to hydrology that may impact water tables or surface run-off, control of cats and foxes, raising awareness of the species with road-users and investigation of options to link populations. Although 17.97 ha of Rocky Ridge and Gorge habitat will be cleared, this is not likely to significantly reduce any population present in the rocky range overall.</p>



## 6.0 Conclusions

### 6.1 Summary of Impact Assessment

#### 6.1.1 Flora and Vegetation

Three significant flora taxa have been recorded within the proposed NVCP boundary. The impact assessment considered the following significant flora taxa, as the presence and distribution of these taxa are known within the proposed NVCP boundary area:

- *Euphorbia clementii* (P3).
- *Terminalia supranitifolia* (P3).
- *Triodia chichesterensis* (P3).

##### ***Euphorbia clementii* (P3)**

Although *Euphorbia clementii* (P3) occurs within the NVCP boundary the species is not known from within the proposed disturbance footprint. The impact of the Proposal on *Euphorbia clementii* (P3) is ranked Zero in terms the known number of individuals and Low in terms of extent of preferred habitat. The significance of impact at the local and regional scales, and the significance of cumulative impact are also assessed as being Low.

##### ***Terminalia supranitifolia* (P3)**

The impact of the disturbance footprint on *Terminalia supranitifolia* (P3) is ranked Low in terms of both the number of individuals and extent of preferred habitat, and the significance of impact on this taxon at the local and regional scales were also assessed as Low. Loss of individuals and extant local habitat of this taxon may have longer-lasting impacts in comparison to taxa such as *Euphorbia clementii* (P3), due to differences in life history (response to events such as fire; recruitment/regrowth strategies) and distribution of habitat in which they occur.

The significance of cumulative impact was assessed as Low in terms of impact to numbers of individuals, although a higher proportion of locations are at risk for impact. *Terminalia supranitifolia* occurs within habitats, that whilst are not rare in the region, occupy a small proportion of the landscape and can be highly prospective for mining activity.

##### ***Triodia chichesterensis* (P3)**

The impact of the Proposal on *Triodia chichesterensis* (P3) is ranked Low in terms of both the known number of individuals and extent of preferred habitat. The significance of impact at the local and regional scales, and the significance of cumulative impact are also assessed as Low.

#### **Vegetation Units**

No vegetation unit mapped in the NVCP boundary area at Wodgina comprises conservation significant vegetation as defined by the EPA (EPA 2016a; b).



The impact of the footprint on all VUs was ranked as Nil or Low; the significance of these impacts was likewise ranked Nil or Low.

The cumulative impact on all VUs has been ranked Low or Nil.

### **6.1.2 Fauna**

There are 17 species of significant fauna that have been recorded or potentially occur in the Fauna Study Area. For many species, the scale of impact on a local level is considered to be Low, Very Low, or Negligible.

The scale of impact is considered to be Moderate for the Northern Quoll, Gane's Blind Snake and Long-tailed Dunnart, as this project will lead to the loss of important habitat, primarily 17.97 ha of Rocky Ridge and Gorge habitat. The loss of this habitat is likely to be permanent, and lead to a permanent reduction of the carrying capacity of the rocky range for these species. However, the loss of this habitat is unlikely to lead to the local extinction of these or any species, as sufficient habitat area remains in the Fauna Study Area outside the disturbance footprint, and in the remainder of the rocky range outside the Fauna Study Area. The scale of impact is not likely to be High or Extreme for any species.

There is unlikely to be an impact on any significant fauna taxa at a regional scale. Although the local population of some species may decrease, none are likely to be lost from the Fauna Study Area and all are likely to persist in the local area in the long-term. Therefore, there is not likely to be a range reduction, loss of an important population or impact on the ability of these species to disperse through the region.

For fauna that are MNES, there is a high risk of a significant impact on the Northern Quoll with the Proposal likely to trigger five of the nine significant impact criteria (Department of Environment 2013). The risk of a significant impact on other fauna that are MNES is considered to be low.



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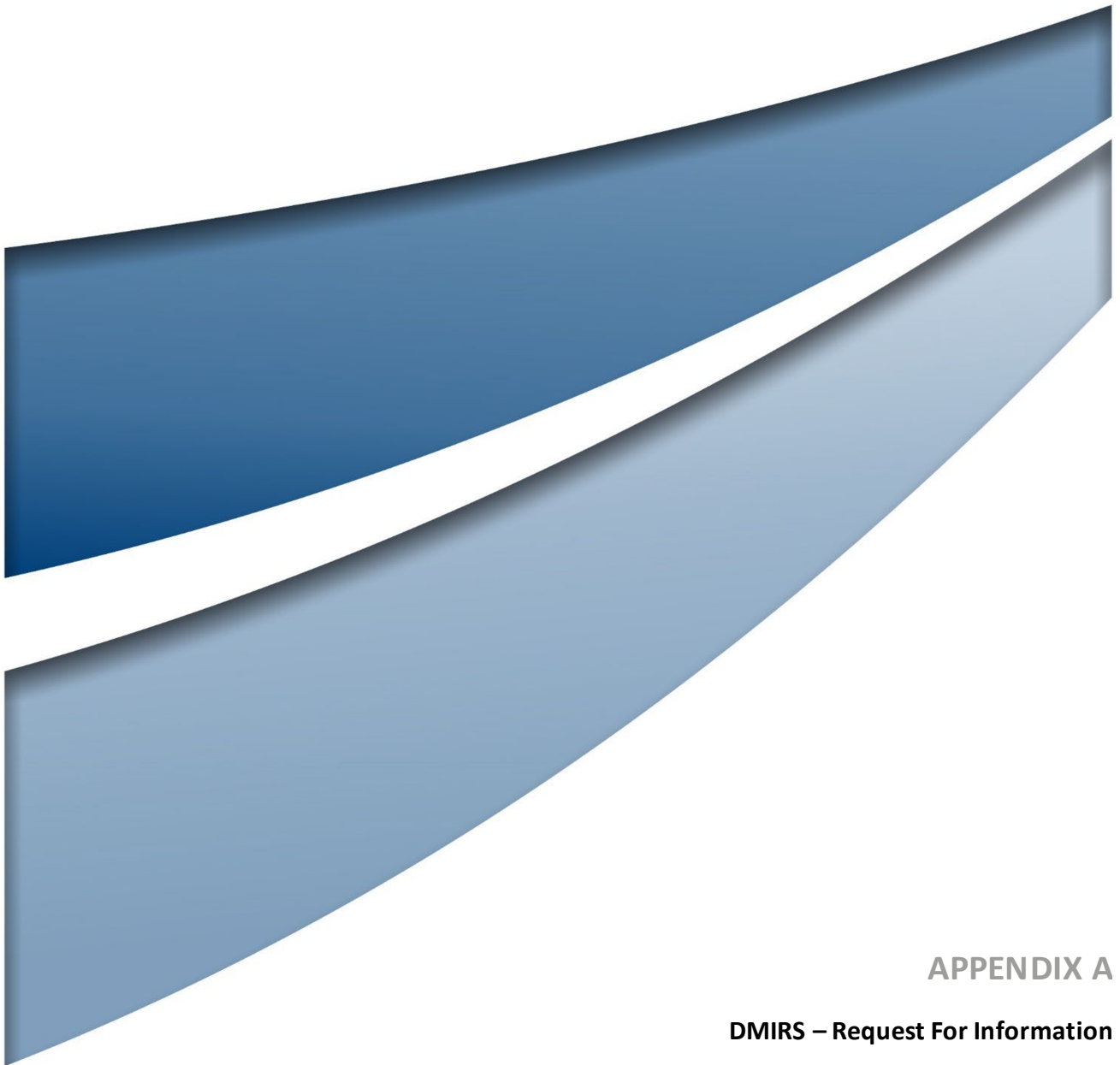


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## APPENDIX A

**DMIRS – Request For Information**





Government of **Western Australia**  
Department of **Mines, Industry Regulation and Safety**

Our ref CPS 8230/1 / A2323/201801  
CPS 8295/1 / A2778/201801  
Enquiries Alicia Dudzinska  
Ph 08 9222 3231  
[alicia.dudzinska@dmirs.wa.gov.au](mailto:alicia.dudzinska@dmirs.wa.gov.au)

The Registered Manager  
Mineral Resources Limited  
1 Sleat Road  
APPLECROSS WA 6153

**Attention:** David Swain

Dear Sir,

**Application to Clear Native Vegetation under the *Environmental Protection Act 1986*  
Wodgina Lithium Pty Ltd - Wodgina Lithium Project (CPS 8230/1 and CPS 8295/1)**

The Department of Mines, Industry Regulation and Safety (DMIRS) has commenced assessment of your native vegetation clearing permit CPS 8230/1 for the purpose of mineral production, and CPS 8295/1 for the purposes of a lithium conversion plant and associated infrastructure. The Wodgina Significant Species Management Plan (SSMP) was referred to the Department of Biodiversity, Conservation and Attractions (DBCA) for comments and further recommendations as part of the assessment for CPS 8230/1. Further information is required to enable the Department to adequately assess your application. The items requiring further information is outlined below.

**General**

- DMIRS requires that MRL utilises the results of the detailed flora and vegetation survey, and the level 1 and targeted fauna surveys, to form the basis of a revised impact assessment, quantifying impacts to each conservation significant species and key habitats. The revised impact assessment should consider the regional and local context, including which habitat areas have already been lost and removed, and potential loss of connectivity between populations on the western and eastern ranges as a result of the proposed clearing. MRL are required to demonstrate how they will avoid, minimise or offset impacts to each conservation significant species. Exclusions zones must be determined from the survey findings and presented in figures within the SSMP.



- For CPS 8295/1, please provide the Woodman (2018) detailed flora and vegetation spatial data in shapefile (.shp) format (not GDB). Additionally, exclusion zones for significant fauna habitat types (e.g. ridges) intersected by CPS 8295/1 will need to be established. Please provide DMIRS with an updated shapefile of the application area, or a shapefile of the exclusion zones. Please note that if the application area is reduced, a second advertisement period is not required.

### **Fauna component of the SSMP**

- The NVCP supporting document provides capture rates of Northern Quolls (individuals) from 2010 to 2018 from within the Wodgina area. Please confirm that this relates to the monitoring program for Atlas Iron. Furthermore, there are no discussions around whether Northern Quoll are successfully utilising the artificial habitats installed by Atlas Iron (e.g. denning/breeding). Please provide further information on the location and utilisation rates of these artificial habitats.
- It is understood that approximately 36.6 hectares (9.86% of the current extent) of the Rocky Ridges habitat type is likely to be cleared under CPS 8230/1. However, as potential Northern Quoll denning locations have not been identified within the area proposed to clear, the extent of the proposed impact is unclear. Potential denning locations need to be identified and exclusion zones/buffers should be proposed for these sensitive areas.
- It is stated in the Stantec (2018) report that Northern Quolls at Wodgina occur in similar densities at Abydos Project, Mt Dove, Mt Webber and Corunna Downs. However, it is unknown whether the data from these other mine sites are pre-mining or post-mining. When revising the impact assessment and developing the SSMP, only contemporary data should be considered.
- Specific DBCA comments are provided within an edited version of the SSMP pdf. As the file is too large to attach via email, an ad-hoc file transfer link will be set up for Mr David Swain and Mr David Temple-Smith to access the document. Please be advised that the ad-hoc file transfer link will be valid for two weeks from the date of this letter.

### **Flora component of the SSMP**

- The flora component of the SSMP appears to be written in the context of fauna management and therefore lacks the specific details for flora that has been provided for the fauna species. For example, the Management Level 2 flora species have not been described as it has been for the Management Level 2 fauna species.
- It is noted that the gas pipeline native vegetation clearing permit CPS 8068/1 was approved to clear a total of 67 individuals of *Terminalia supranitifolia*, and CPS 8230/1 proposes to clear an additional 348 individuals from a total of 1,136 individuals recorded within the Study Area. No other Priority flora species are proposed to be cleared as part of CPS 8230/1. It is noted in the supporting document for CPS 8230/1 that '*in terms of reasonably foreseeable cumulative impacts on conservation significant flora at the Wodgina Project, there are no proposals for significant additional clearing in areas considered to be important*



*habitat for these taxa*'. However, the application area for CPS 8295/1 (Lithium Hydroxide) contains vegetation units that are considered to be preferred habitats for all conservation significant flora taxa recorded by Woodman during the 2018 survey. As such, there is a risk that some species are likely or have the potential to be impacted outside of CPS 8230/1 by the clearing proposed under CPS 8295/1. MRL must demonstrate understanding of the likelihood of Priority flora species occurring within the application areas, and then apply appropriate management actions to mitigate the cumulative impacts (e.g. exclusion zones).

- The risk assessment model on the “potential risk of harm to conservation significant species” is based on the likelihood of Priority flora occurring within a proposed clearing area – ‘present’ and ‘likely’ species are listed as Management Level 2 and ‘potential’ and ‘unlikely’ as Management Level 3. In both levels of management, surveys are proposed to be undertaken prior to new clearing activities in areas where appropriate surveys have not previously been undertaken, and the main management objectives are to avoid or minimise clearing of these species. However, once planning has been undertaken for infrastructure development, it is recognised that relocating infrastructure is difficult to achieve, and the experience is that it rarely happens. If exclusion zones are to be utilised, they should be determined and included within the SSMP. Additionally, Level 3 species have no specific management actions identified. Please clarify the objective and proposed management actions for Level 3 species.
- In section 4.2 it is stated that four Level 1 and four Level 2 flora and vegetation surveys have been undertaken at various areas at Wodgina since 2017, and 11 historical surveys (dated 2000-2013) have been conducted. Using this information, vegetation mapping should be presented in relation to the proposed and approved disturbance footprint (as shown in figure 2), to determine if suitable habitat is present for any Threatened or Priority flora within the project area. All the survey information should be collated and used to inform the likelihood of Threatened and Priority flora occurring within the area, or an explanation provided as to why only one set of data is used (the risk assessment model is only based on one report, Woodman 2018). A table should be included in the SSMP on the likelihood assessment, presenting the reason for why the species were considered /likely/potential etc.

Once the likelihood assessment is completed, the following process should be followed:

- Conservation significant flora which are already known to occur in the project area should first be checked to see if a targeted survey has been undertaken to determine the full size and extent of the population, and their locations mapped in relation to the disturbance footprint.
- Conservation significant flora which are indicated as ‘likely’ or ‘potential’ should have their suitable habitat identified and mapped in relation to the proposed disturbance footprint. Any suitable habitat found within the proposed disturbance area should have a targeted survey undertaken to determine the presence/absence of the Threatened/Priority flora, and if present, the full size and extent mapped in relation to the disturbance footprint.



- Please note that if any Threatened flora is identified as present as a result of targeted surveys, authorisation under section 40 of the *Biodiversity Conservation Act 2016* will be required in addition to any other clearing permit approval issued by DMIRS.
- Conservation significant flora which are indicated as 'unlikely' (based on the absence of suitable habitat) should not require any targeted surveys (on the condition that the habitat assessment is considered correct).
- If targeted surveys do not locate any Threatened or Priority species – no further management actions are required (on the condition that the targeted surveys is undertaken in accordance with the Technical Guide for flora and vegetation surveys for EIA).

Once the presence/absence of Threatened/Priority flora has been adequately determined, management actions such as those identified in table 15 can be applied to all Threatened/Priority flora present. Exclusion areas should be mapped and presented in the plan (preferably with a minimum 10 m buffer to reduce the risk of accidental clearing/secondary impacts for Priority flora and 50m buffer for any Threatened flora).

Where impacts can't be avoided, proposed impacts for each species should be presented in the plan, and management actions discussed demonstrating what efforts have been made to minimise impacts. Separate maps may need to be provided for each species if it is not able to be clearly presented in a single map. The additional information within the revised SSMP will allow DBCA to determine if the proposed management actions can adequately mitigate the proposed impacts.

Other comments include:

- It is noted that the management of conservation significant flora has been classified (Level 1, 2 or 3) based on the Woodman (2018) detailed flora and vegetation survey report. However, the locations of the Level 2 flora species (Figure 6) appears to not include all the locations as identified by Woodman (2018; Figures 8.1 - 8.10 from the Woodman report). Figure 6 should be updated to ensure consistency.
- Table 10 (pg 20) showing the management level summary has no reference to flora.
- Table 15 (pg 37) –
  - A proposed management action states that MRL will ensure “no unauthorised clearing activities through implementation of an internal clearing permit procedure”. This procedure should be provided in an appendix.
  - The proposed management action of ‘Shall not be cleared without a licence to take flora under the WC Act or BC Act’ should only reference Authorisation to take Threatened flora required under the *Biodiversity Conservation Act 2016*.
  - Minimise impacts from construction and mining operations and changed fire regimes are management objectives. Management actions need to be outlined to meet these objectives, and indirect impacts should also be considered. For example, fire management actions are not specially



- discussed. How will dust as a result of mining activities be managed – what are the dust suppression activities?
- Monitoring is proposed but this needs to be discussed in more detail i.e. what will be monitored? (e.g. if the species was cleared, how many populations were cleared, plant health of remaining populations). What parameters will be used to determine this? What is the frequency of monitoring?
  - Management triggers and contingency actions where decline or deaths are noted during the monitoring, needs to be detailed.
  - Table 17 (pg 44) listing clearing procedure appears to mainly apply to fauna. This should be updated to consider flora as well.
  - Section 7.9. Reporting –
    - As per Table 22 (pg 54) it appears that reporting is included as part of Management Level 3. A separate section on reporting should be included in the relevant management level sections, providing details on what will be reported and to who.
    - Clearing of conservation significant flora to be notified to DBCA ([flora.data@dbca.wa.gov.au](mailto:flora.data@dbca.wa.gov.au)).

In view of this, the assessment of your clearing application will be deferred until Wodgina Lithium Pty Ltd provides the Department with the requested information.

If you have any queries regarding this notice, please contact Alicia Dudzinska, Environmental Officer on (08) 9222 3231 or email [Alicia.dudzinska@dmirs.wa.gov.au](mailto:Alicia.dudzinska@dmirs.wa.gov.au)

Yours sincerely



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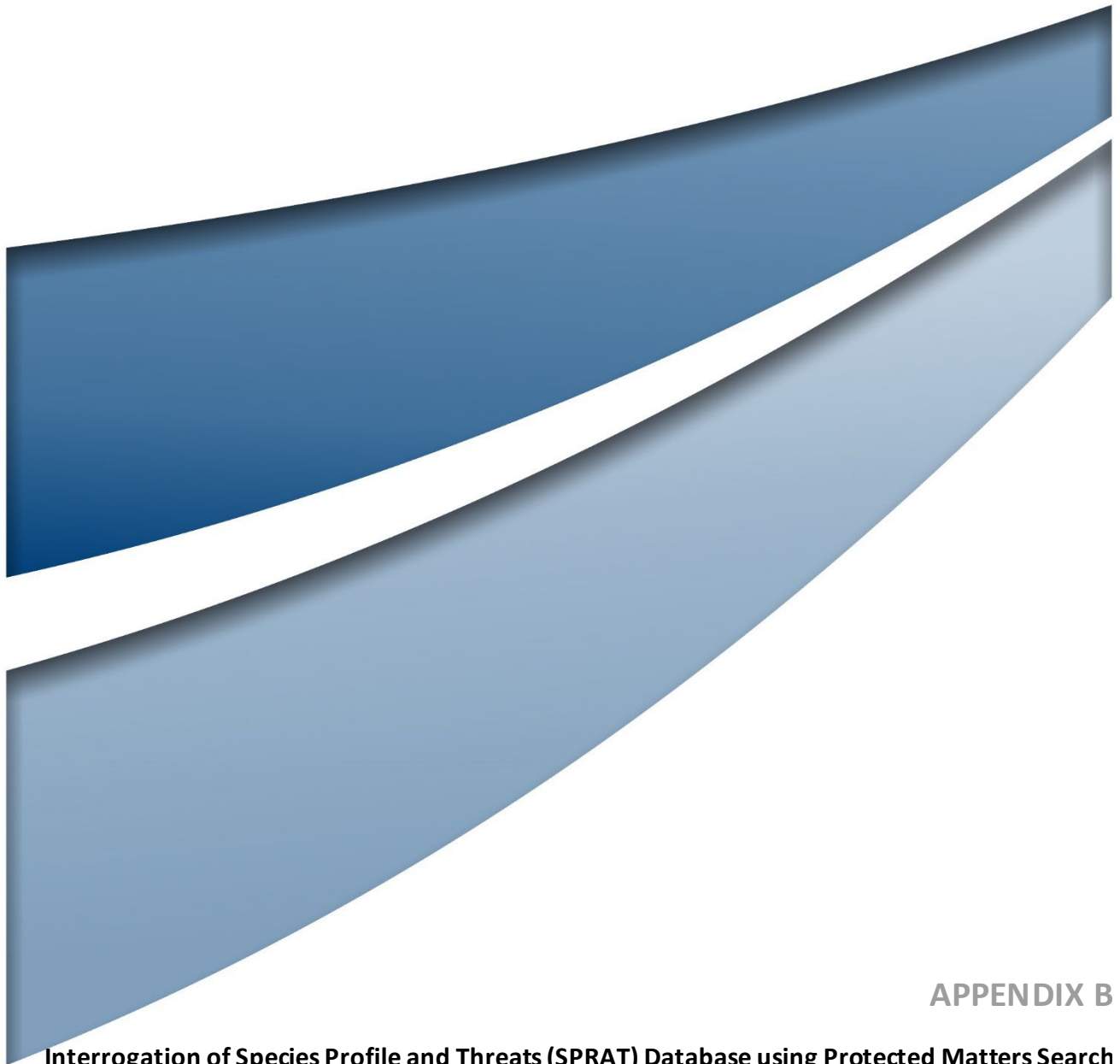
Melissa Harrison

Team Leader

Resource and Environmental Compliance Division

24 January 2019





## APPENDIX B

**Interrogation of Species Profile and Threats (SPRAT) Database using Protected Matters Search Tool. (DAWE 2021)**





# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 01-Dec-2021

[Summary](#)

[Details](#)

[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



# Summary

## Matters of National Environment Significance

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

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance (Ramsar</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	None
<a href="#">Listed Threatened Species:</a>	11
<a href="#">Listed Migratory Species:</a>	11

## Other Matters Protected by the EPBC Act

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

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

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

<a href="#">Commonwealth Lands:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	16
<a href="#">Whales and Other Cetaceans:</a>	None
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None
<a href="#">Habitat Critical to the Survival of Marine Turtles:</a>	None

## Extra Information

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

<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">EPBC Act Referrals:</a>	18
<a href="#">Key Ecological Features (Marine):</a>	None
<a href="#">Biologically Important Areas:</a>	1
<a href="#">Bioregional Assessments:</a>	None
<a href="#">Geological and Bioregional Assessments:</a>	None



# Details

## Matters of National Environmental Significance

Listed Threatened Species

[ Resource Information ]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.  
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		

<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Falco hypoleucos</a> Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Pezoporus occidentalis</a> Night Parrot [59350]	Endangered	Species or species habitat may occur within area
<a href="#">Rostratula australis</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area

MAMMAL

<a href="#">Dasyurus hallucatus</a> Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
<a href="#">Macroderma gigas</a> Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Macrotis lagotis</a> Greater Bilby [282]	Vulnerable	Species or species habitat known to occur within area



Scientific Name	Threatened Category	Presence Text
<a href="#">Rhinonictoris aurantia (Pilbara form)</a> Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area
PLANT		
<a href="#">Pityrodia sp. Marble Bar (G.Woodman &amp; D.Coultas GWDC Opp 4)</a> [88310]	Endangered	Species or species habitat likely to occur within area
REPTILE		
<a href="#">Liasis olivaceus barroni</a> Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat likely to occur within area
Listed Migratory Species [ <a href="#">Resource Information</a> ]		
Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat may occur within area
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat may occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area



Scientific Name	Threatened Category	Presence Text
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
<a href="#">Glareola maldivarum</a> Oriental Pratincole [840]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

### Other Matters Protected by the EPBC Act

Listed Marine Species	[ <a href="#">Resource Information</a> ]	
Scientific Name	Threatened Category	Presence Text
Bird		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
<a href="#">Bubulcus ibis as Ardea ibis</a> Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area



Scientific Name	Threatened Category	Presence Text
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
<a href="#">Chalcites osculans as Chrysococcyx osculans</a> Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area overfly marine area
<a href="#">Glareola maldivarum</a> Oriental Pratincole [840]		Species or species habitat may occur within area overfly marine area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat may occur within area overfly marine area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area



Scientific Name	Threatened Category	Presence Text
<a href="#">Rostratula australis as Rostratula benghalensis (sensu lato)</a>		
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area

### Extra Information

EPBC Act Referrals		[ Resource Information ]	
Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
<a href="#">Abydos Direct Shipping Ore Project</a>	2012/6345	Controlled Action	Post-Approval
<a href="#">Additional Rail Infrastructure between Herb Elliott Port Facility and Cloudbreak Mine Site</a>	2010/5513	Controlled Action	Post-Approval
<a href="#">Development of the Wodgina Direct Shipping Ore Project, Stage 2</a>	2011/5975	Controlled Action	Post-Approval
<a href="#">North Star Hematite Project</a>	2012/6530	Controlled Action	Post-Approval
<a href="#">North Star Magnetite Project</a>	2012/6689	Controlled Action	Post-Approval
<a href="#">Roy Hill to Port Hedland Rail Line and Associated Infrastructure</a>	2010/5424	Controlled Action	Post-Approval
<a href="#">Wodgina Direct Shipping Ore Project</a>	2009/5167	Controlled Action	Post-Approval
Not controlled action			
<a href="#">Development of iron ore resources in eastern Pilbara region, including port at P</a>	2004/1562	Not Controlled Action	Completed
<a href="#">Expansion of the Talison Minerals Storage Facility, Wodgina Mine</a>	2008/4675	Not Controlled Action	Completed
<a href="#">Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia</a>	2015/7522	Not Controlled Action	Completed
<a href="#">Pilbara Bulk Ore Transport System Project, WA</a>	2016/7637	Not Controlled Action	Completed



Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
<a href="#">Pilbara Transmission Project, Pilbara, WA</a>	2018/8349	Not Controlled Action	Completed
<a href="#">Rail and Port Facilities</a>	2001/474	Not Controlled Action	Completed
<a href="#">Wodgina Lithium Mine Expansion, Pilbara, NT</a>	2018/8194	Not Controlled Action	Completed
Not controlled action (particular manner)			
<a href="#">Additional Rail Infrastructure</a>	2012/6314	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Atlas Boodarie Link Project, WA</a>	2012/6506	Not Controlled Action (Particular Manner)	Post-Approval
<a href="#">Mine the Hercules Deposit under the Wodgina Direct Shipping Ore Project Stage 3</a>	2013/6789	Not Controlled Action (Particular Manner)	Post-Approval
Referral decision			
<a href="#">Mine the Hercules Deposit under the Wodgina Direct Shipping Ore Project ??? Stage 3</a>	2013/6777	Referral Decision	Completed
Biologically Important Areas			
Scientific Name		Behaviour	Presence
Seabirds			
<a href="#">Ardenna pacifica</a>			
Wedge-tailed Shearwater [84292]		Breeding	Known to occur



# Caveat

## 1 PURPOSE

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

The report contains the mapped locations of:

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

## 2 DISCLAIMER

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

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

## 3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

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

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

## 4 LIMITATIONS

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

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

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

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

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

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



# Acknowledgements

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

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

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



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

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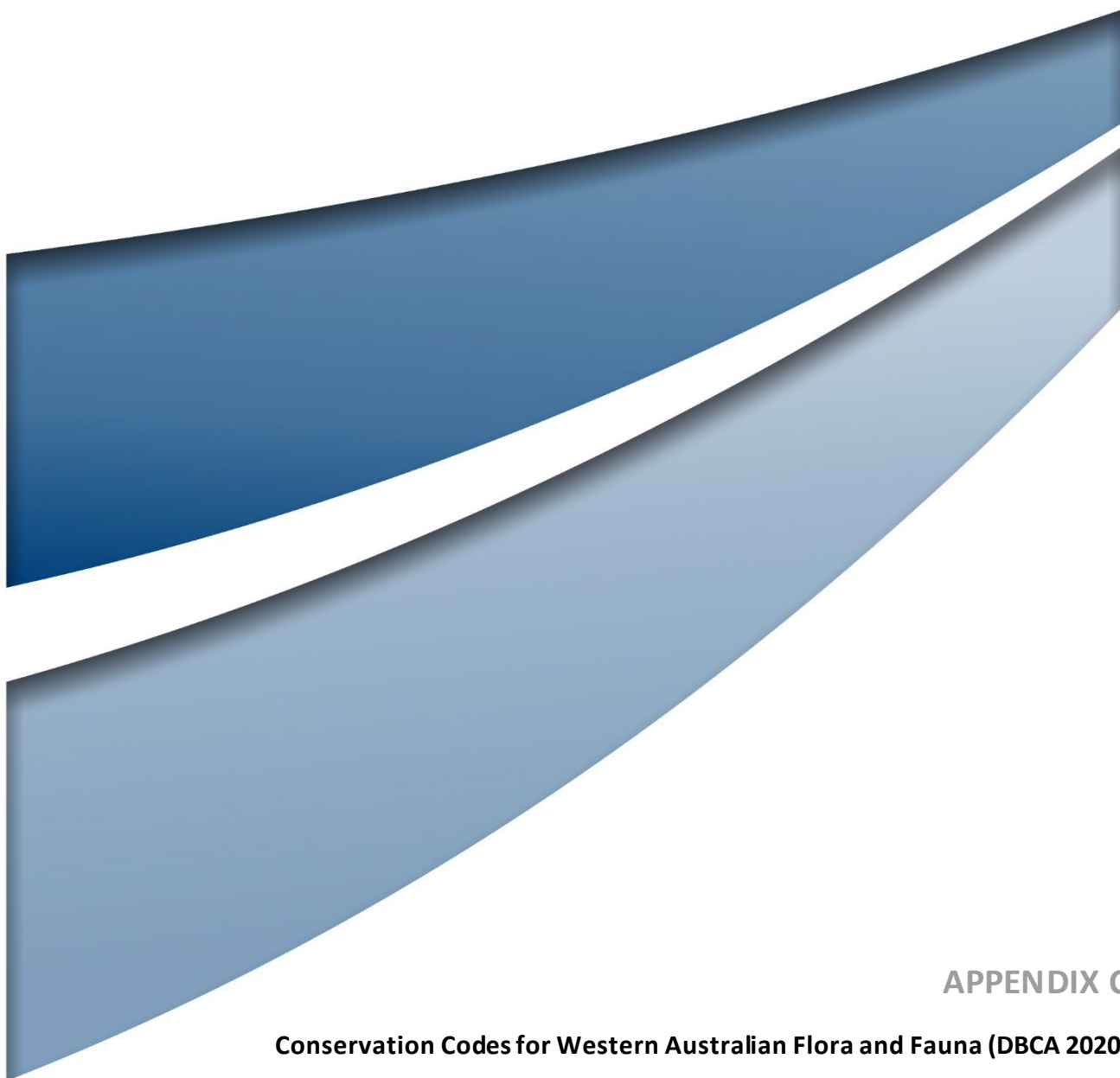
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## APPENDIX C

**Conservation Codes for Western Australian Flora and Fauna (DBCA 2020)**



# CONSERVATION CODES

## For Western Australian Fauna and Flora

Threatened, Extinct and Specially Protected fauna or flora<sup>1</sup> are species<sup>2</sup> which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

**The *Wildlife Conservation (Specially Protected Fauna) Notice 2018* and the *Wildlife Conservation (Rare Flora) Notice 2018* have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* to be the lists of Threatened, Extinct and Specially Protected species<sup>3</sup> under Part 2 of the *Biodiversity Conservation Act 2016*.**

Categories of Threatened, Extinct and Specially Protected fauna and flora are:

### **T**      **Threatened species**

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

***Threatened fauna*** is the species of fauna that are listed as critically endangered, endangered or vulnerable threatened species.

***Threatened flora*** is the species of flora that are listed as critically endangered, endangered or vulnerable threatened species.

The assessment of the conservation status of threatened species is in accordance with the BC Act listing criteria and the requirements of Ministerial Guideline (Number 1) and Ministerial Guideline (Number 2) that adopts the use of the International Union for Conservation of Nature (IUCN) Red List of Threatened Species Categories and Criteria<sup>4</sup>, and is based on the national distribution of the species.

### **CR**      **Critically endangered species**

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

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines.

Examples of use:

- The western ringtail possum (*Pseudocheirus occidentalis*) is listed as a critically endangered threatened species under the *Biodiversity Conservation Act 2016*.
- Western ringtail possum is listed as critically endangered under the *Biodiversity Conservation Act 2016*.
- Listing reference in a table: column heading: BC Act, row text: CR.

### **EN**      **Endangered species**

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

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines.

Examples of use:

- *Caladenia hopperiana* is listed as an endangered threatened species under the *Biodiversity Conservation Act 2016*.
- *Caladenia hopperiana* is listed as endangered under the *Biodiversity Conservation Act 2016*.
- Listing reference in a table: column heading: BC Act, row text: EN.



**VU Vulnerable species**

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

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines.

Examples of use:

- The forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) is listed as a vulnerable threatened species under the *Biodiversity Conservation Act 2016*.
- Forest red-tailed black cockatoo is listed as vulnerable under the *Biodiversity Conservation Act 2016*.
- Listing reference in a table: column heading: BC Act, row text: VU.

**Extinct species**

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

**EX Extinct species**

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

Examples of use:

- *Acacia kingiana* is listed as an extinct species under the *Biodiversity Conservation Act 2016*.
- *Acacia kingiana* is listed as extinct under the *Biodiversity Conservation Act 2016*.
- Listing reference in a table: column heading: BC Act, row text: EX.

**EW Extinct in the wild species**

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

Currently there are no fauna or flora species listed as extinct in the wild.

**SP Specially protected species**

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

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

**MI Migratory species**

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

Migratory species include birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA)<sup>5</sup>, China (CAMBA)<sup>6</sup> or The Republic of Korea (ROKAMBA)<sup>7</sup>, and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention)<sup>8</sup>, 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.

Examples of use:

- The wedge-tailed shearwater (*Ardenna pacifica*) is listed as a specially protected migratory species under the *Biodiversity Conservation Act 2016*.
- Wedge-tailed shearwater is listed as migratory under the *Biodiversity Conservation Act 2016*.
- Listing reference in a table: column heading: BC Act, row text: MI.



**CD Species of special conservation interest (conservation dependent)**

Species of special conservation need that are 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).

Currently only fauna are listed as species of special conservation interest.

Examples of use:

- The wambenger, south-western brush-tailed phascogale (*Phascogale tapoatafa wambenger*) is listed as a specially protected species of special conservation interest under the *Biodiversity Conservation Act 2016*.
- Wambenger, south-western brush-tailed phascogale, is listed as conservation dependent under the *Biodiversity Conservation Act 2016*.
- Listing reference in a table: column heading: BC Act, row text: CD.

**OS Species otherwise in need of special protection (other specially protected)**

Species 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).

Currently only fauna are listed as species otherwise in need of special protection.

Examples of use:

- The dugong (*Dugong dugon*) is listed as a specially protected species otherwise in need of special protection under the *Biodiversity Conservation Act 2016*.
- Dugon is listed as other specially protected fauna under the *Biodiversity Conservation Act 2016*.
- Listing reference in a table: column heading: BC Act, row text: OS.

**P Priority species**

Priority is not a listing category under the BC Act.

All fauna and flora are protected in WA following the provisions in Part 10 of the BC Act. The protection applies even when a species is not listed as threatened or specially protected, and regardless of land tenure (State managed land (Crown land), private land, or Commonwealth land).

Species that may possibly be threatened species that do not meet the criteria for listing under the BC Act because of insufficient survey 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 prioritisation for survey and evaluation of conservation status so that consideration can be given to potential listing as threatened.

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

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

**1 Priority 1: Poorly-known species - known from few locations, none on conservation lands**

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, for example, 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 for threatened listing and appear to be under immediate threat from known threatening processes. These species are in urgent need of further survey.

Examples of use:

- *Borya stenophylla* is listed as a Priority 1 species by the Department of Biodiversity, Conservation and Attractions.
- *Borya stenophylla* is listed as Priority 1 on the DBCA Priority Flora List.
- Listing reference in a table: column heading: DBCA, row text: P1.



## 2 Priority 2: Poorly-known species - known from few locations, some on conservation lands

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, for example, 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 for threatened listing and appear to be under threat from known threatening processes. These species are in urgent need of further survey.

Examples of use:

- *Caladenia nivalis* is listed as a Priority 2 species by the Department of Biodiversity, Conservation and Attractions.
- *Caladenia nivalis* is listed as Priority 2 on the DBCA Priority Flora List.
- Listing reference in a table: column heading: DBCA, row text: P2.

## 3 Priority 3: Poorly-known species - known from several locations

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. These species need further survey.

Examples of use:

- *Acacia nitidula* is listed as a Priority 3 species by the Department of Biodiversity, Conservation and Attractions.
- *Acacia nitidula* is listed as Priority 3 on the DBCA Priority Flora List.
- Listing reference in a table: column heading: DBCA, row text: P3.

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

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

(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as a conservation dependent specially protected species.

(c) Species that have been removed from the list of threatened species or lists of conservation dependent or other specially protected species, during the past five years for reasons other than taxonomy.

(d) Other species in need of monitoring.

Examples of use:

- *Banksia aculeata* is listed as a Priority 4 species by the Department of Biodiversity, Conservation and Attractions.
- *Banksia aculeata* is listed as Priority 4 on the DBCA Priority Flora List.
- Listing reference in a table: column heading: DBCA, row text: P4.

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

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

<sup>3</sup> Schedules are not referred to when stating the listing status of threatened, extinct or specially protected species under the BC Act. See the examples provided under each listing category.

<sup>4</sup> Western Australia has assigned species to threat categories using the *IUCN Red List of Threatened Species Categories and Criteria* since 1996 (referencing all criteria). At the national level, threatened species listings under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) reference only some of the IUCN criteria (<http://www.environment.gov.au/biodiversity/threatened/nominations/forms-and-guidelines>).

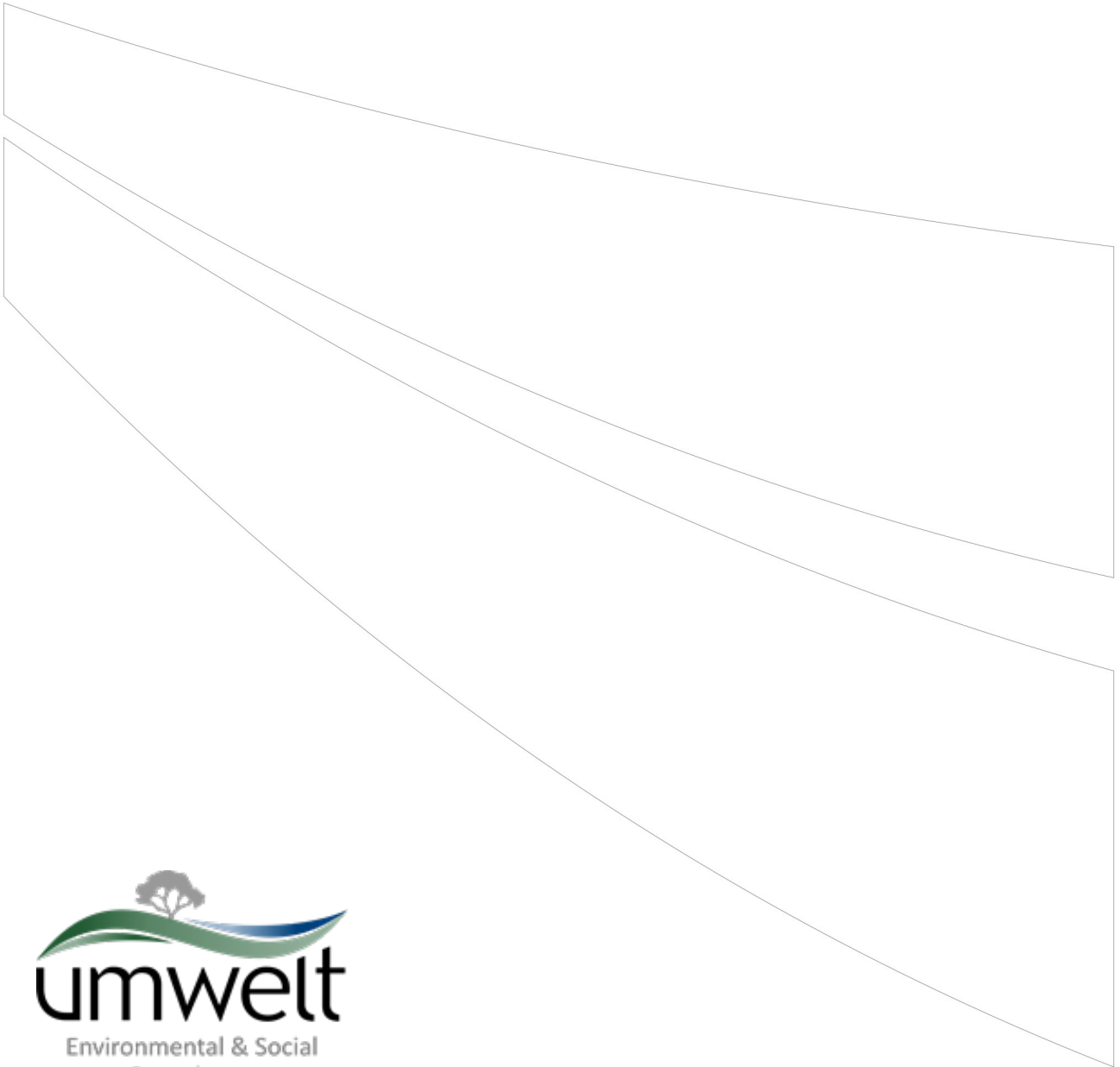
<sup>5</sup> JAMBA - first included in the WA migratory species list in 1980.

<sup>6</sup> CAMBA - first included in the WA migratory species list in 2010.

<sup>7</sup> ROKAMBA - first included in the WA migratory species list in 2010.

<sup>8</sup> Bonn Convention (Birds) - first included in the WA migratory species list in 2015.

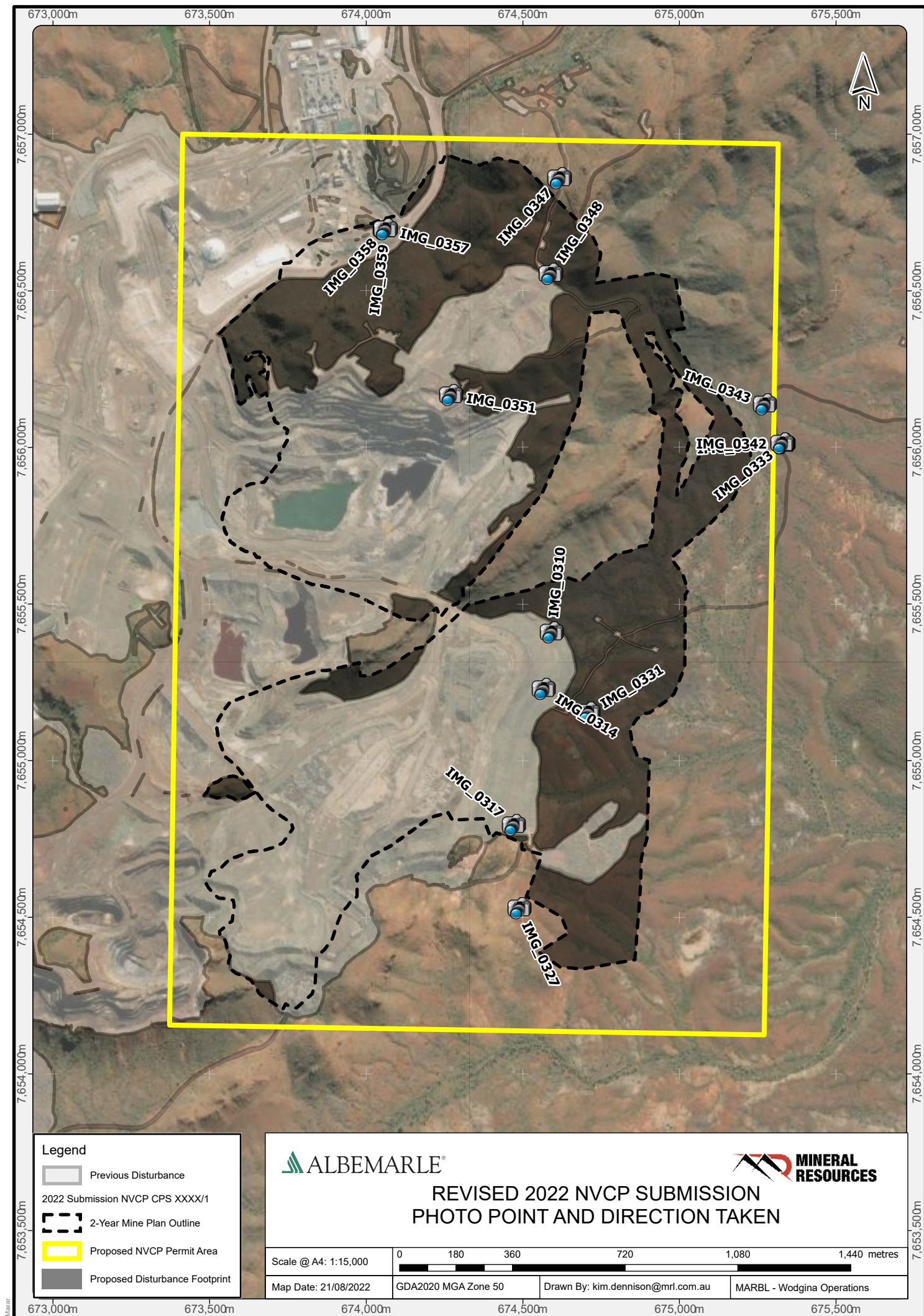




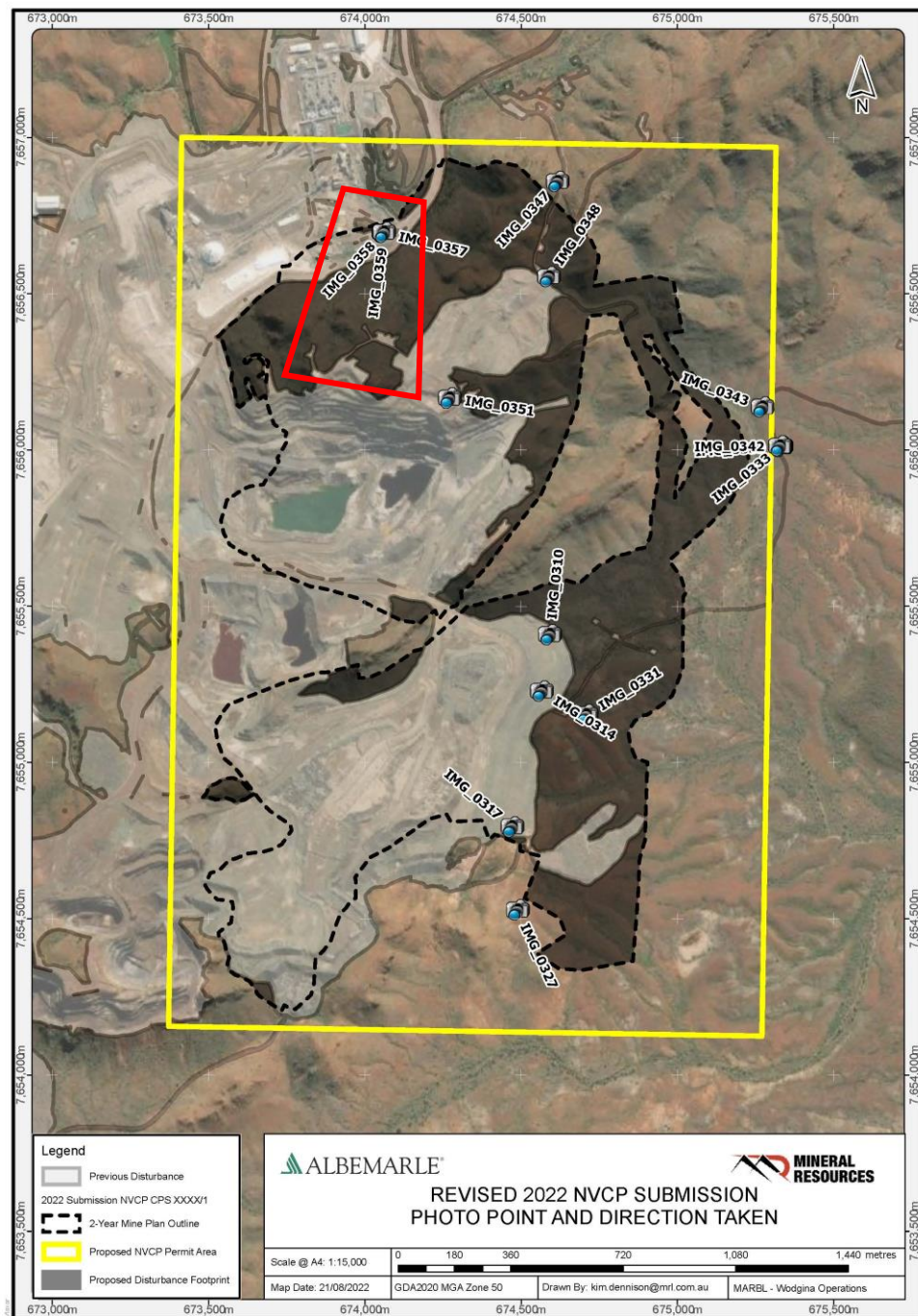


## **ATTACHMENT 8 - PHOTOGRAPHS OF PROPOSED NVCP PERMIT AREA AND GEOTAGGED LOCATION FIGURE**







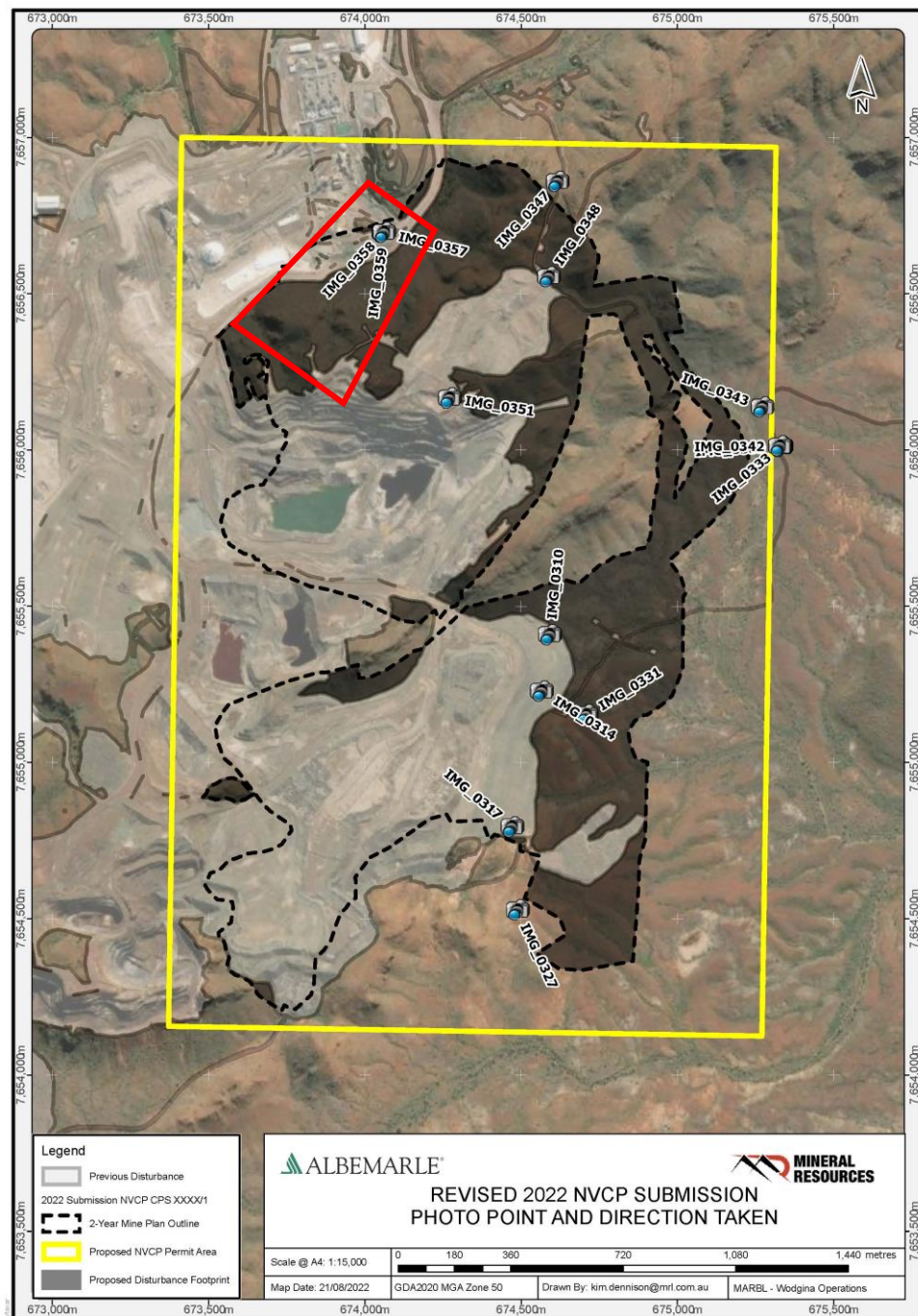


IMG\_0359

Proposed Cassiterite Pit Expansion  
Looking South





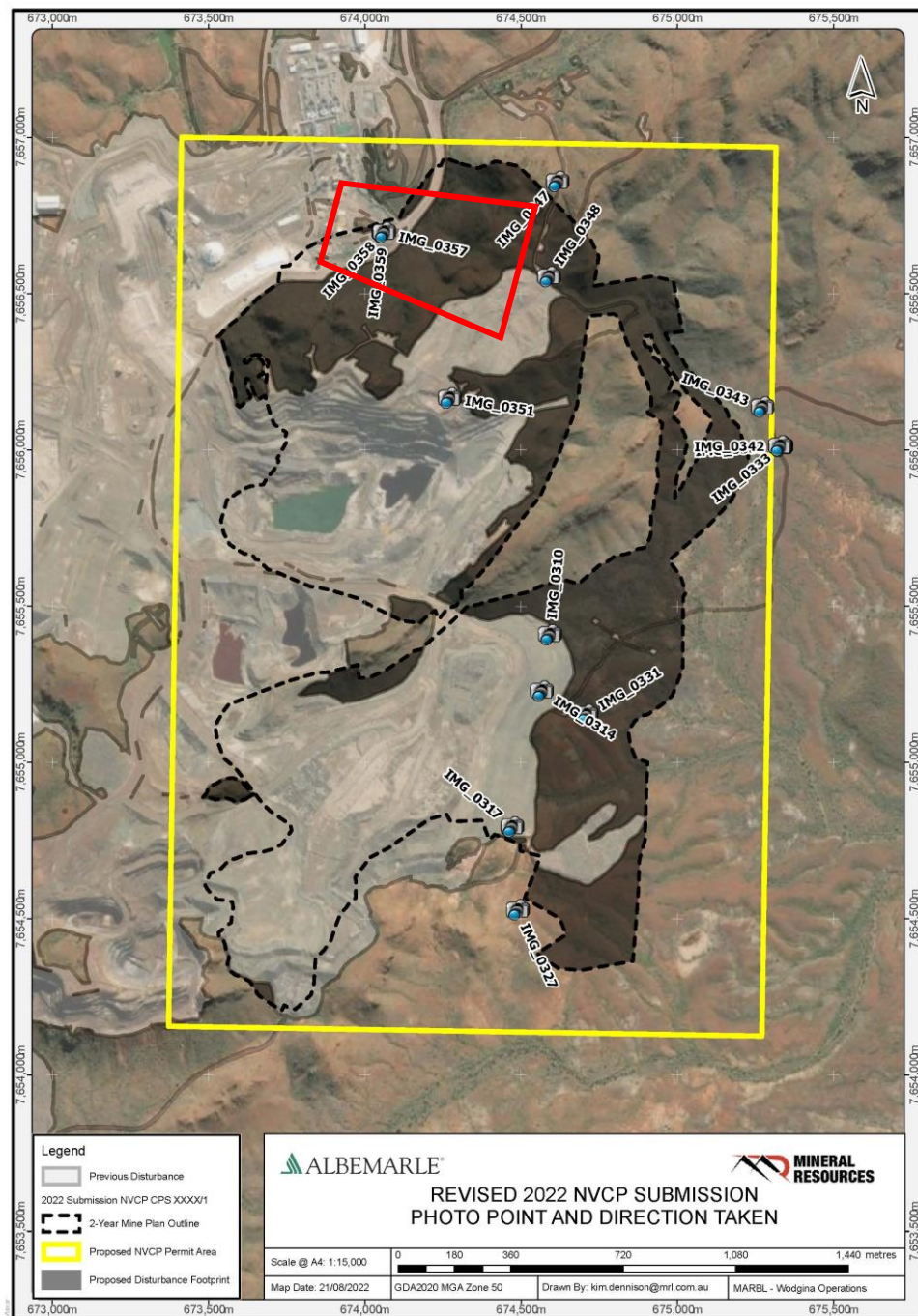


IMG\_0358

Proposed Cassiterite Pit Expansion  
Looking South West





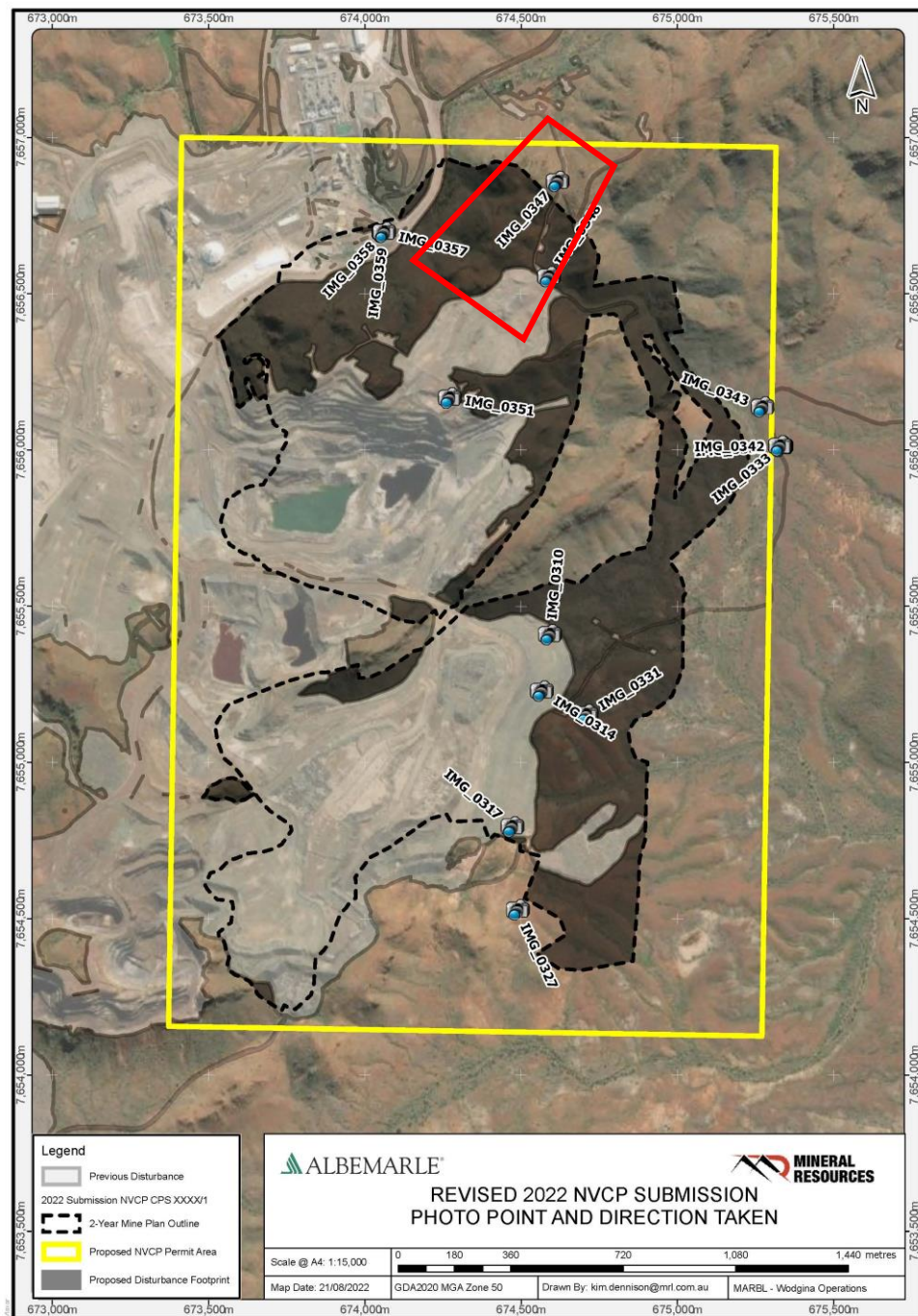


IMG\_0357

Proposed Cassiterite Pit Expansion  
 Looking South East





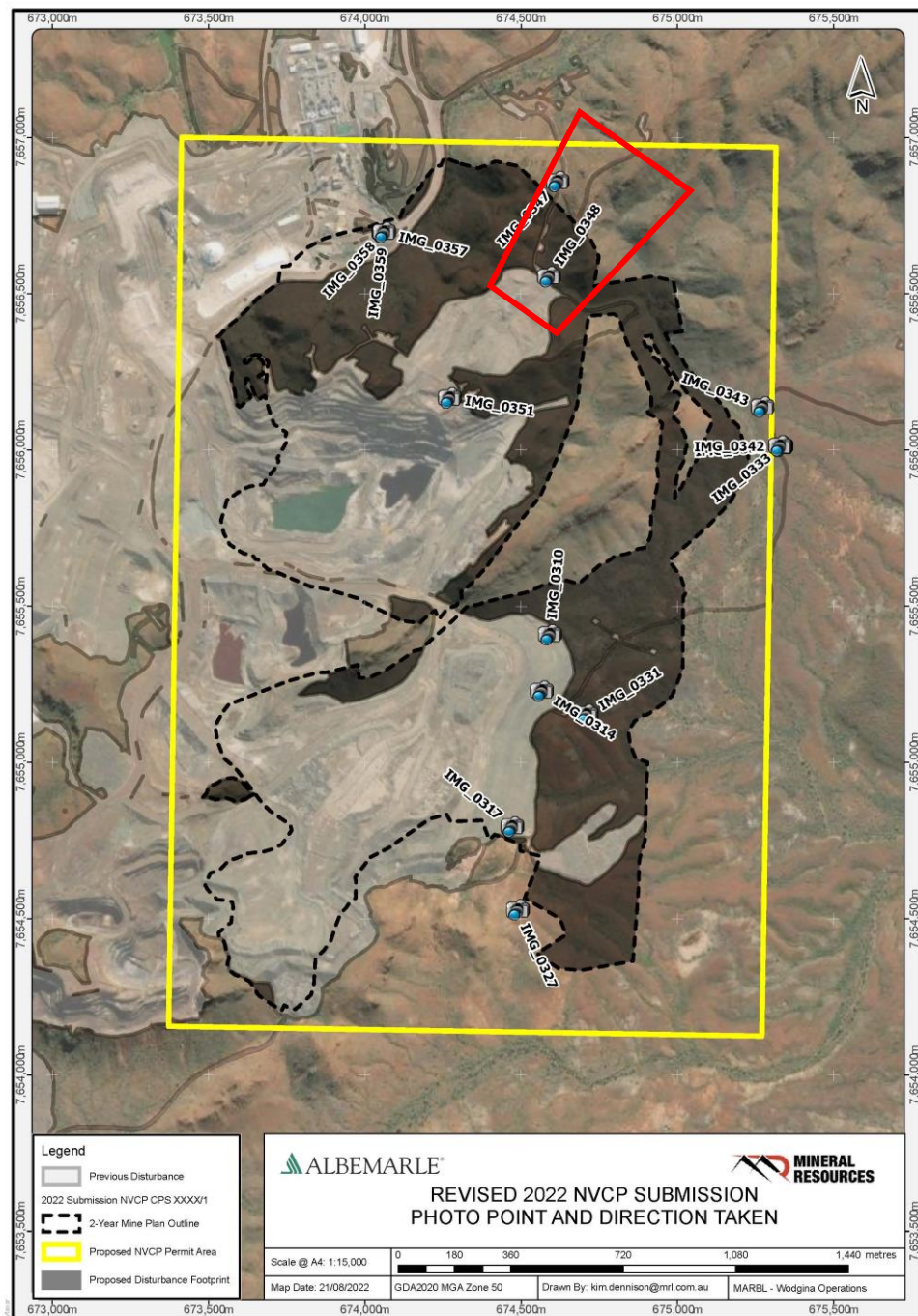


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Proposed Cassiterite Pit Expansion  
 Looking South West





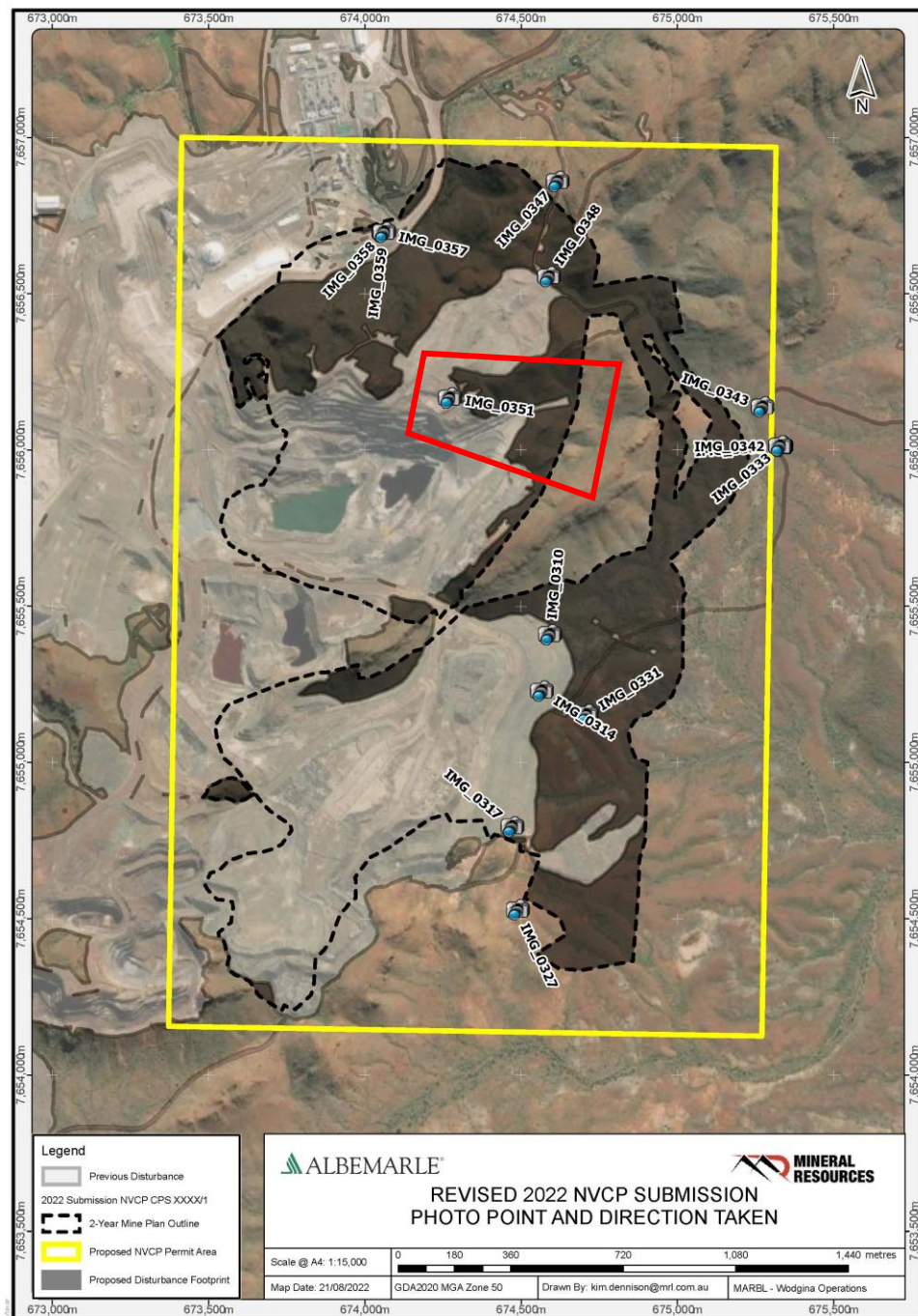


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Proposed Cassiterite Pit Expansion  
 Looking North East







IMG\_0351

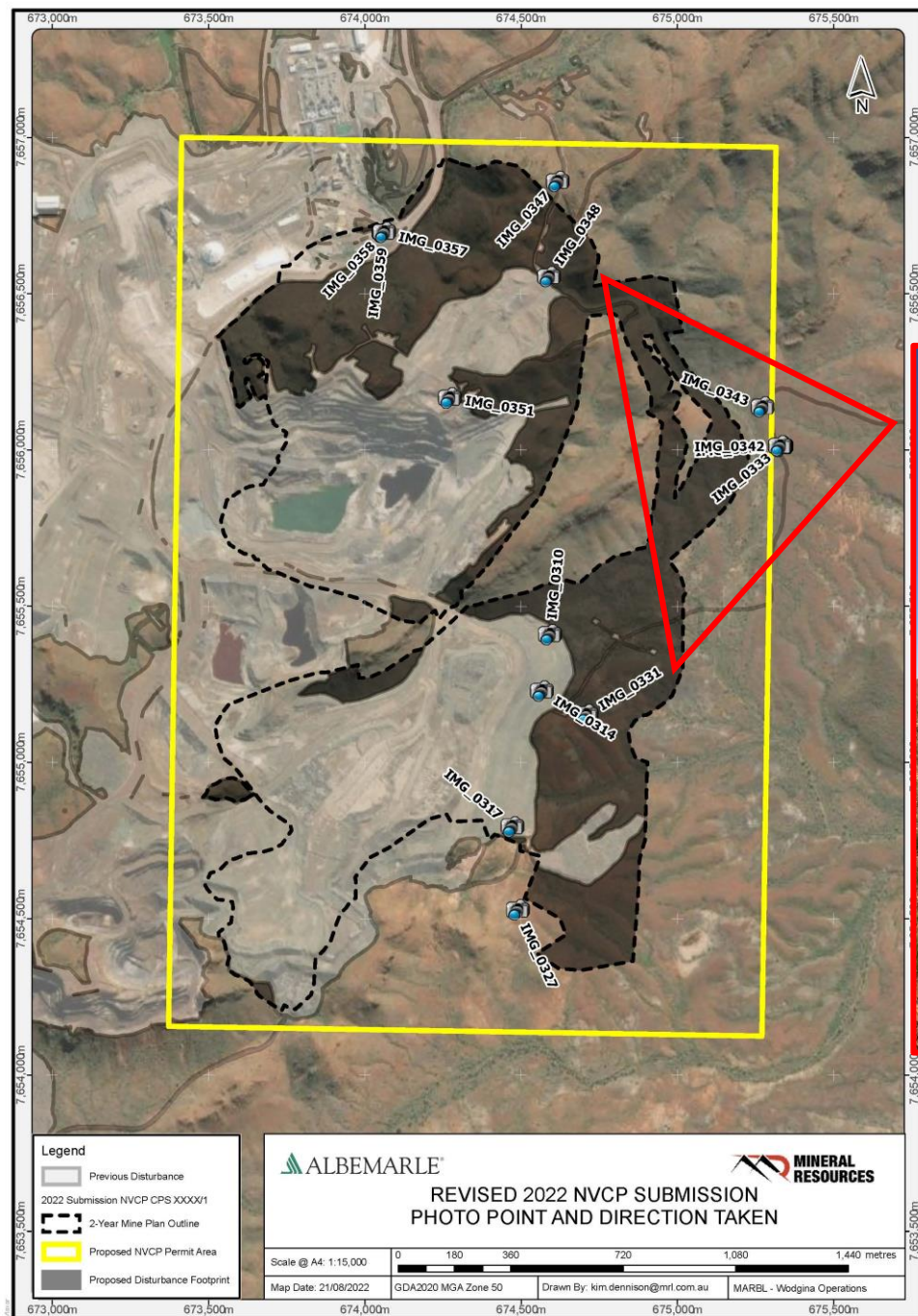
Proposed Cassiterite Pit Expansion  
 Looking East



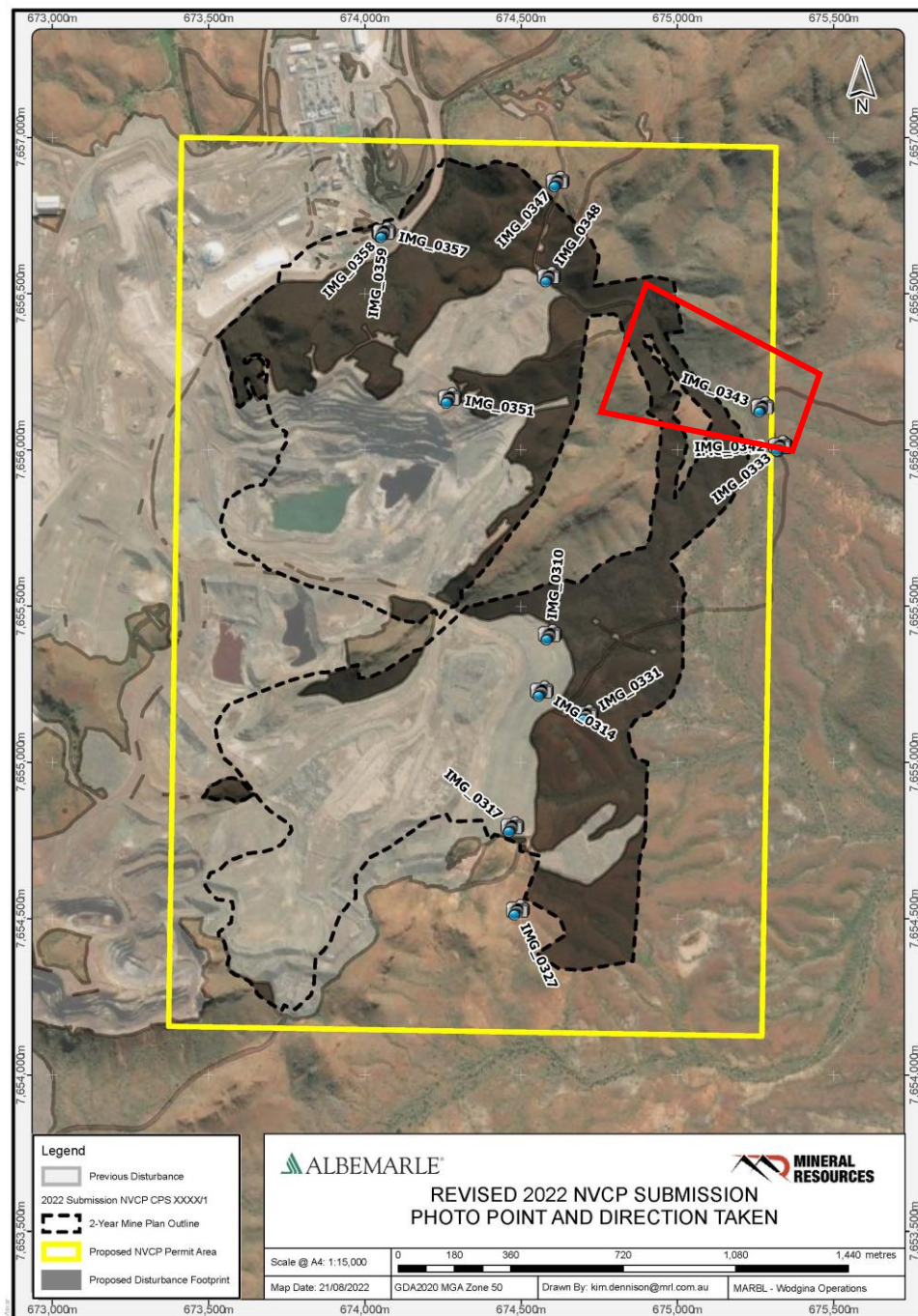


IMG\_0342

Proposed Haul Road Panorama  
Looking South West to North West





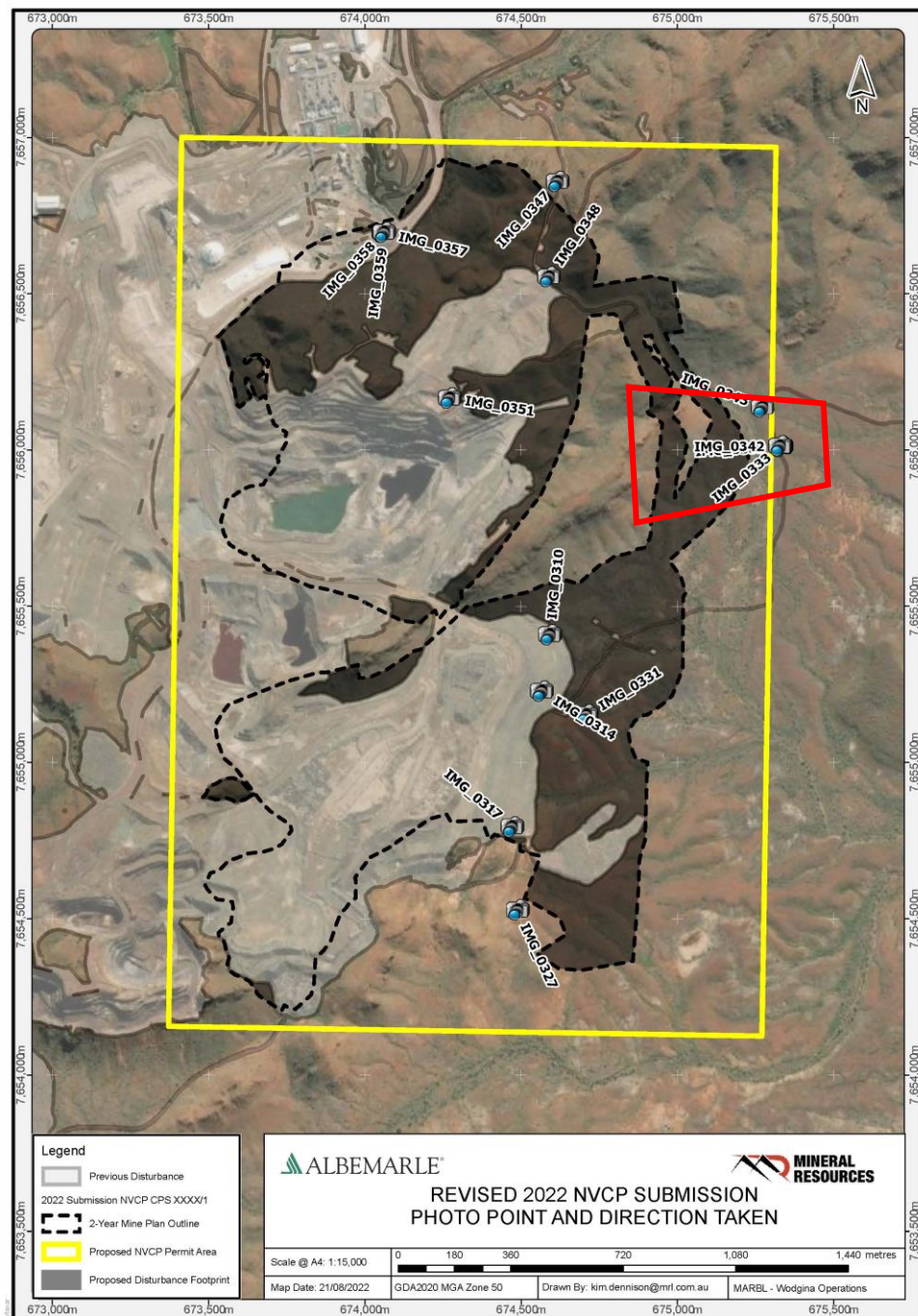


IMG\_0343

Proposed Haul Road  
Looking North West





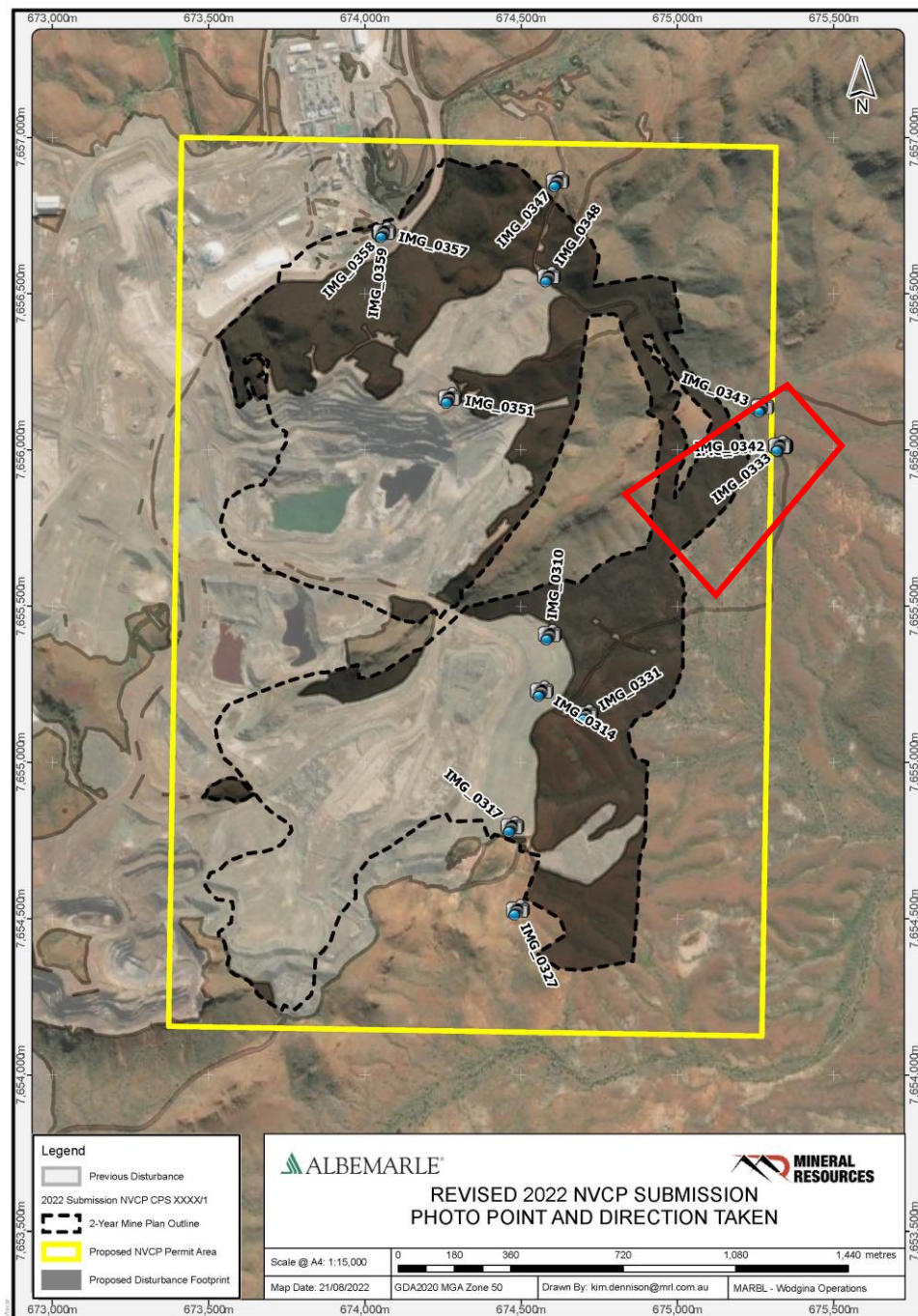


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Proposed Haul Road  
 Looking West





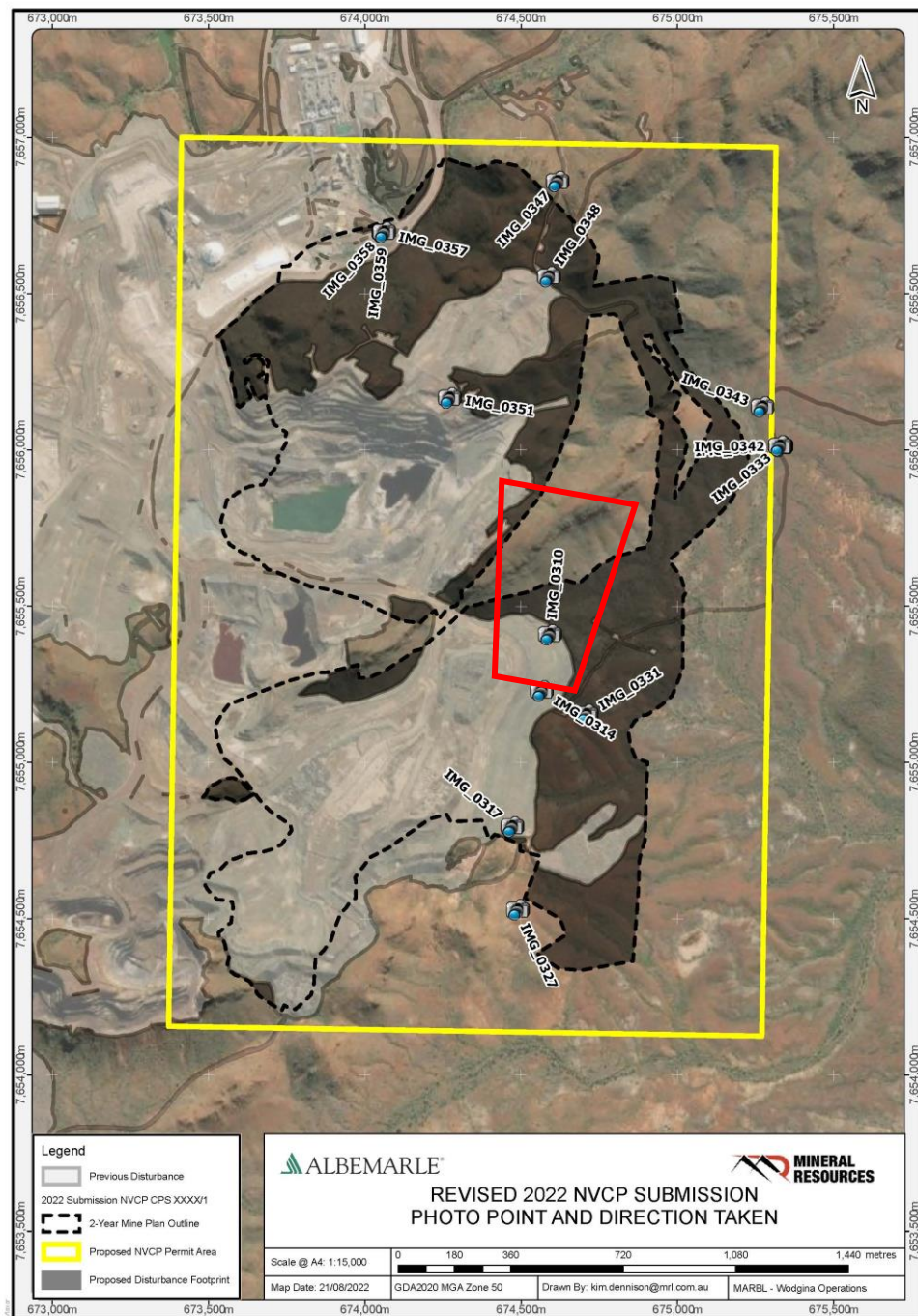


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Proposed Haul Road and Soil Stockpile  
 Looking South West







IMG\_0310

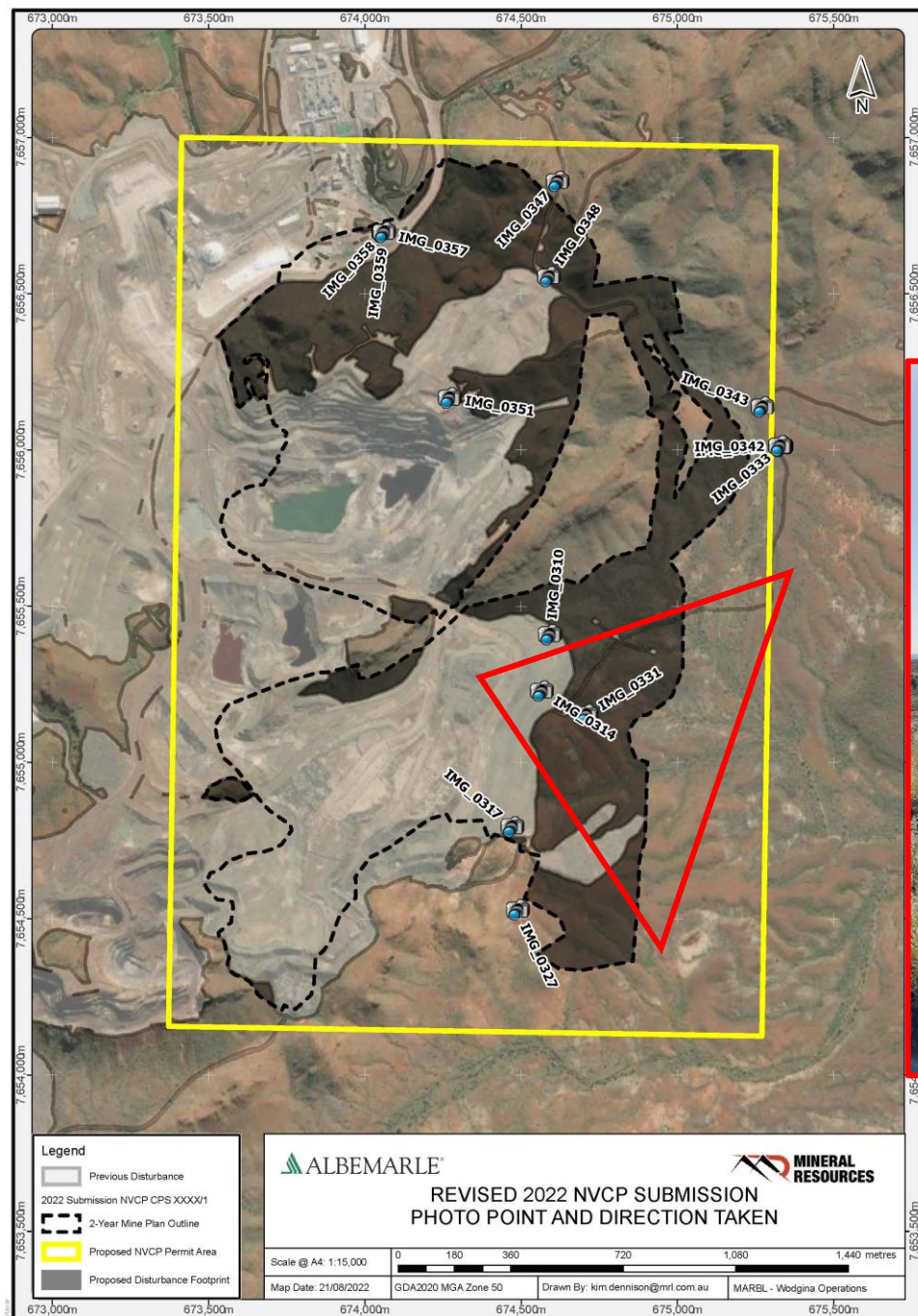
Proposed Eastern Waste Landform Extension  
Looking North East



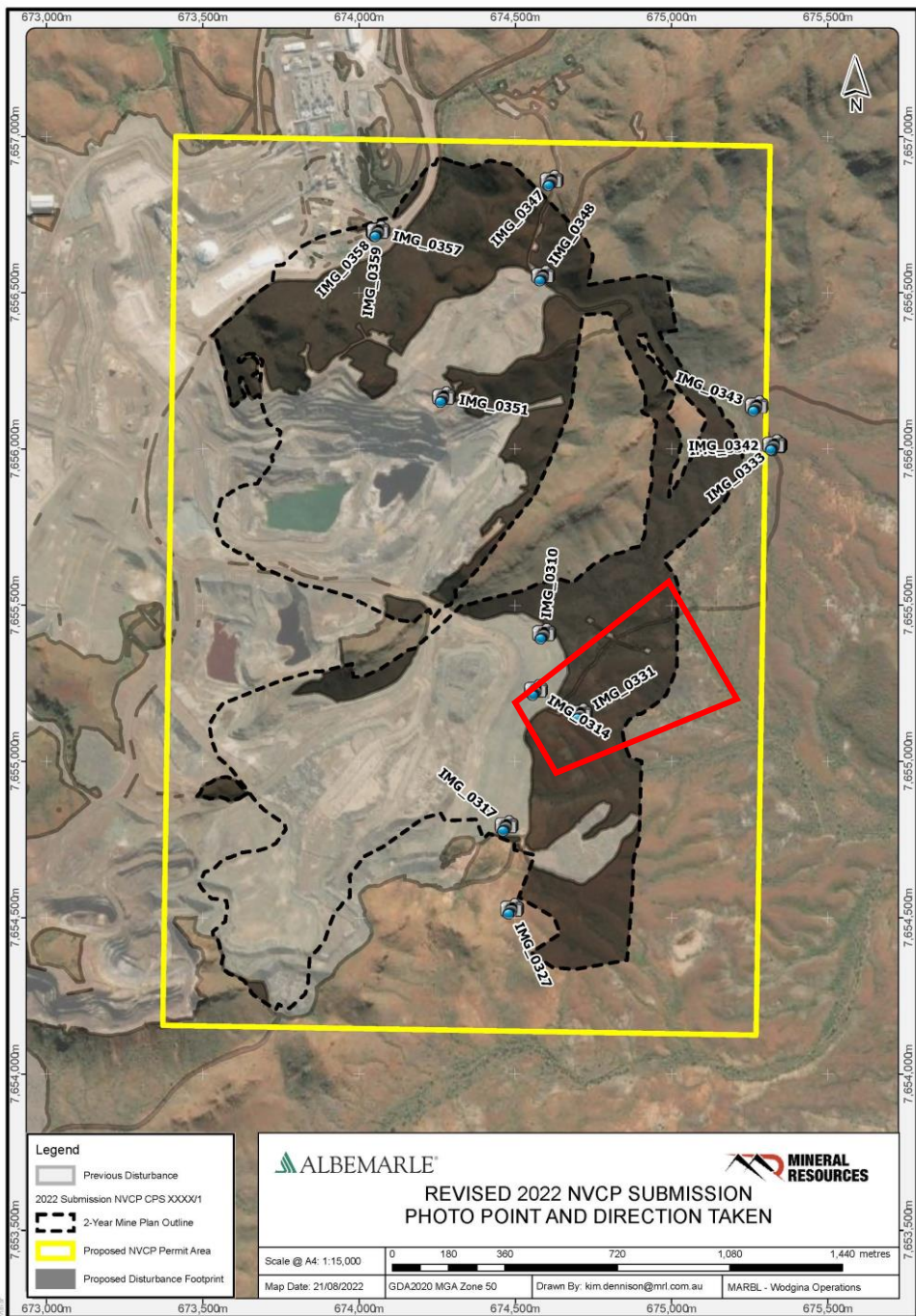


IMG\_0314

Proposed Eastern Waste Landform Extension Panorama  
Looking North East to South East





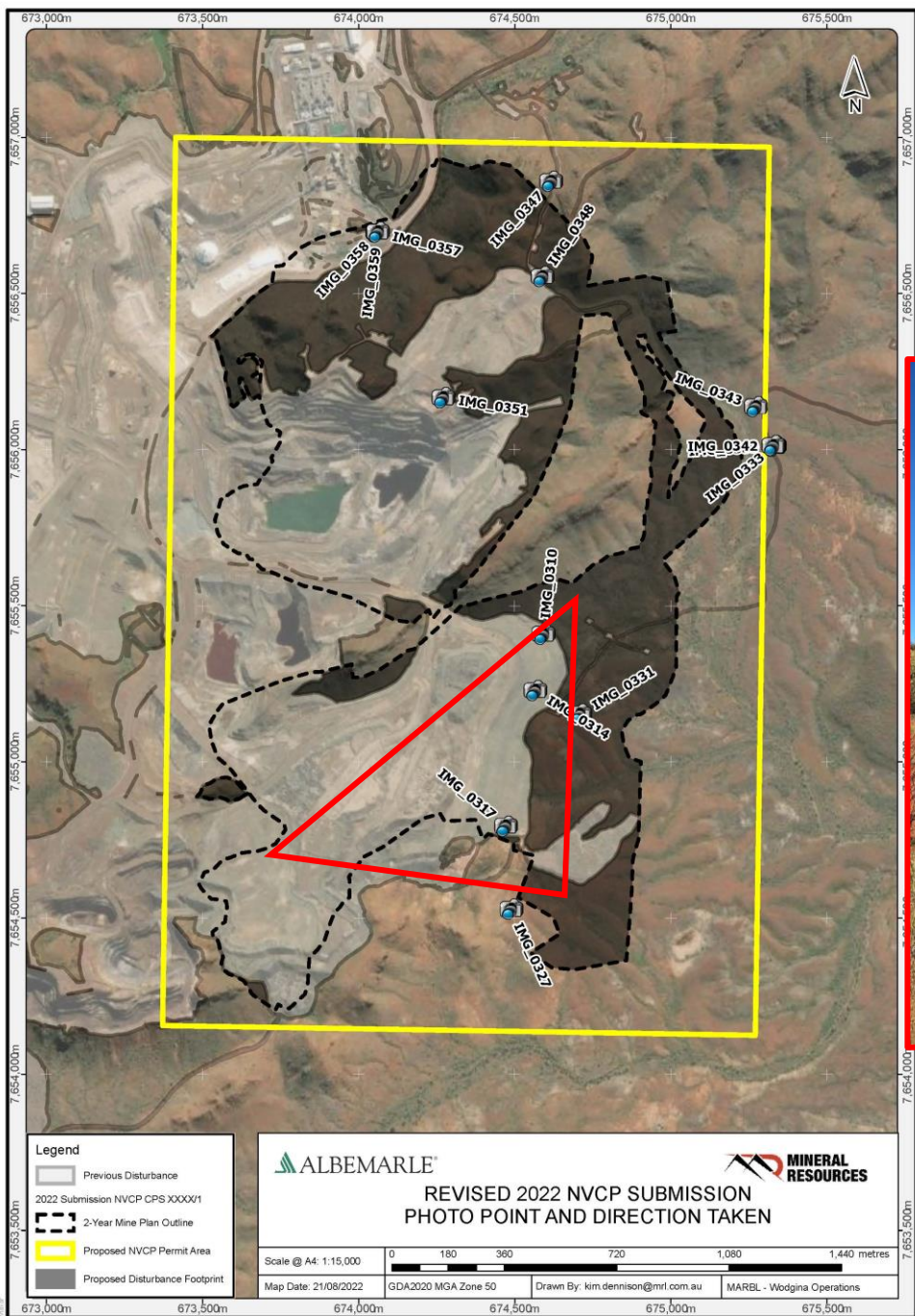


IMG\_0331

Proposed Eastern Waste Landform Extension  
 Looking North East







IMG\_0317

Proposed Eastern Waste Landform Extension Panorama  
Looking West to North





IMG\_0327

Proposed Soil Stockpiles Panorama  
Looking East to South

