

HOMESTEAD CREEK & CATHEDRAL GORGE

DETAILED FLORA & VEGETATION ASSESSMENT

PREPARED FOR: BHP WAIO



Spectrum
ECOLOGY & SPATIAL



© Spectrum Ecology Pty Ltd

ABN 68 615 115 243

PO Box 314 Leederville

Western Australia 6902

Ph: (08) 9317 8233

Email: info@spectrumecology.com.au



Report Details				
Project Description:	Homestead Creek & Cathedral Gorge Detailed Flora & Vegetation Assessment			
Prepared For:	BHP WAIO			
Project ID:	2247			
Version History		Author	Reviewer	Date of Issue
V1	Adam Crosby-Clark & Sarah Boys		Christopher Shaw Melissa Hay	25-August-2023
V2	Susan Murrey		Scott Hitchcock	16-February-2024
V3	Susan Murrey		Scott Hitchcock & Christopher Shaw	24-May-2024
V4	Christopher Shaw		-	30-Aug-2024

This document has been prepared to the requirements of the client identified on the cover page and no representation is made to any third party. It may be cited for the purposes of scientific research or other fair use, but it may not be reproduced or distributed to any third party by any physical or electronic means without the express permission of the client for whom it was prepared or Spectrum Ecology Pty Ltd.

TABLE OF CONTENTS

EXECUTIVE SUMMARY.....	1
1. INTRODUCTION.....	3
1.1. PROJECT BACKGROUND.....	3
1.2. PROJECT SCOPE.....	3
1.3. LEGISLATION & GUIDELINES	3
1.4. BIOREGION.....	5
1.5. CLIMATE	6
1.6. DISTURBANCE HISTORY.....	6
1.7. GEOLOGY	7
1.8. BEARD VEGETATION MAPPING	11
1.9. LAND SYSTEMS	14
1.10. SIGNIFICANT LANDS	16
1.10.1. Conservation Estate	16
1.10.2. Environmentally Sensitive Areas.....	16
1.10.3. Australian Wetlands Database.....	16
2. METHODS.....	17
2.1. DESKTOP REVIEW.....	17
2.1.1. Biological Database Searches.....	17
2.1.2. Literature Review	17
2.1.3. Likelihood of Occurrence of Significant Flora	18
2.2. SURVEY TIMING	19
2.2.1. EPA Flora Survey Timing	20
2.3. FIELD METHODS & SAMPLING EFFORT.....	21
2.3.1. Detailed Survey	21
2.3.2. Groundwater Dependent Ecosystems Monitoring	23
2.4. REPORTING & DATA ANALYSIS	24
2.4.1. Flora Nomenclature, Taxonomy & Lodgement	24
2.4.2. Vegetation Mapping.....	24
2.4.3. Vegetation Condition.....	25
2.4.4. Significant Flora & Vegetation Definitions.....	25
2.4.5. Introduced Flora, Weeds of National Significance & Declared Plant Categories.....	26
2.5. DATA FOR THE INDEX OF BIODIVERSITY SURVEYS FOR ASSESSMENT (IBSA).....	27
2.6. PROJECT TEAM & LICENCES	27
2.7. LIMITATIONS & CONSTRAINTS	28
3. RESULTS & DISCUSSION – FLORA.....	29
3.1. DESKTOP ASSESSMENT	29
3.2. FLORA.....	33
3.2.1. Species Accumulation Curve - Flora	33
3.3. SIGNIFICANT FLORA.....	34
3.3.1. Local & Regional Context of Significant Flora.....	39
3.3.2. Post-Survey Review of Desktop Assessment Flora Taxa	41
3.4. INTRODUCED FLORA	41

4. RESULTS & DISCUSSION – VEGETATION	43
4.1. DESKTOP ASSESSMENT	43
4.1.1. TEC/PECs	43
4.1.2. Literature Review Significant Vegetation	43
4.2. VEGETATION TYPES.....	44
4.3. SIGNIFICANT VEGETATION.....	54
4.3.1. Post-Survey Review of Desktop Assessment Vegetation	55
4.3.2. Local & Regional Context of Vegetation Types.....	55
4.4. VEGETATION CONDITION.....	61
5. RESULTS & DISCUSSION - GROUNDWATER DEPENDENT ECOSYSTEMS.....	63
5.1. DISTRIBUTION OF GDEs IN SURVEY AREA.....	63
5.1.1. General Vegetation Condition of GDEs.....	65
5.1.2. Visual Tree Health Assessment	68
6. CONCLUSION.....	70
6.1. FLORA.....	70
6.2. VEGETATION.....	70
6.3. GROUNDWATER DEPENDENT ECOSYSTEMS.....	70
7. REFERENCES.....	72

TABLES

Table 1.1: Surface Geology	7
Table 1.2: Beard Vegetation Sub-Associations	12
Table 1.3: Land Systems.....	14
Table 1.4: Environmentally Significant Lands within the Study Area	16
Table 2.1: Summary of Database Searches	17
Table 2.2: Previously Conducted Biological Assessments.....	17
Table 2.3: Likelihood of Occurrence Criteria	19
Table 2.4: Flora & Vegetation Survey Technique.....	21
Table 2.5: Vegetation Health Assessment for Trees (Adapted from Souter et al., 2009)	23
Table 2.6: Vegetation Condition Scale & Criteria	25
Table 2.7: Flora & Vegetation Significance Definitions	25
Table 2.8: Project Team & Licences.....	27
Table 2.9: Survey Limitations & Constraints	28
Table 3.1: Desktop Significant Flora – Recorded, High & Medium Likelihood of Occurrence.....	29
Table 3.2: Number of Flora Taxa Recorded.....	33
Table 3.3: Significant Flora.....	35
Table 3.4: Introduced Flora.....	41
Table 4.1: TECs & PECs	43
Table 4.2: Vegetation Types.....	47
Table 4.3: Potential Significant Vegetation Discussion.....	54
Table 4.4: Local & Regional Context & Discussion of Vegetation Types	57
Table 4.5: Vegetation Condition.....	61
Table 5.1: GDE & PGDE Weed Cover.....	65
Table 5.2: Vegetation Condition & Disturbances at GDE & PGDE Sites	66
Table 5.3: GDE Tree Health Visual Assessment - Average Health Ranking Scores as per Table 2.8	69

MAPS

Map 1.1: Location of the Survey Area & Significant Lands	4
Map 1.2: Surface Geology (1:500,000).....	9
Map 1.3: Surface Geology (1:250,000).....	10
Map 1.4: Beard Vegetation Sub-Associations	13
Map 1.5: Land Systems.....	15
Map 2.1: Sampling Effort	22
Map 3.1: Desktop Significant Flora – Recorded & High Likelihood	30
Map 3.2: Desktop Significant Flora – Medium Likelihood.....	31
Map 3.3: Desktop Significant Flora – Low Likelihood.....	32
Map 3.4: Priority Flora	38
Map 3.5: Introduced Flora.....	42
Map 4.1: Vegetation Types	53
Map 4.2: Vegetation Condition.....	62
Map 5.1: GDE & PGDE Monitoring Sites	64

FIGURES

Figure 1.1: IBRA Classification.....	5
Figure 2.1: Mean Temperature & Rainfall for the 12 months Preceding the Survey	19
Figure 3.1: SAC – Flora.....	33
Figure 4.1: Dendrogram of Floristic Analysis	46

APPENDICES

Appendix A: Conservation Codes.....	75
Appendix B: Flora Site Data	79
Appendix C: Likelihood of Occurrence Assessment – Flora.....	115
Appendix D: Flora Species List & Site by Species Matrix.....	119
Appendix E: Summarised Data - Sample Plants	149

EXECUTIVE SUMMARY

BHP Western Australia Iron Ore engaged Spectrum Ecology & Spatial to undertake a single-season detailed flora and vegetation assessment covering the Homestead Creek & Cathedral Gorge project area (the Survey Area). The Survey Area is located approximately 9 km north-west of Newman, Western Australia and covers approximately 3,263 ha. The project objective was to undertake a desktop assessment and single-season detailed flora and vegetation survey to describe flora and vegetation values, and to assess the presence and health of Groundwater Dependent Ecosystems (GDE) in the Survey Area. This botanical information will assist and inform future environmental approvals in the area.

The one phase (post-wet season) detailed flora and vegetation survey was undertaken over 10 days from the 9th to the 18th of May 2023, following a period of higher than usual median rainfall for the region. During the survey, a total of 47 quadrats (including eight Groundwater Dependent Ecosystem monitoring quadrats), 18 relevés, and 139.4 km of targeted traverses were sampled.

A total of 278 taxa from 41 families and 122 genera were recorded in the Survey Area. Of the 278 total, nine were introduced, all of which are classified as permitted s11 weeds under the *Biosecurity and Agriculture Management Act 2007*. The most species rich family was Fabaceae with 58 species, followed by Poaceae with 51 species. The most species rich genera were *Acacia*, with 25 species, followed by *Senna* with 13 species.

No Threatened flora were recorded or considered likely to occur within the Survey Area. Six Priority flora taxa, one novel species, and one range extension were recorded:

- Priority 2 (P2): *Eragrostis* sp. Mt Robinson (S. van Leeuwen 4109) and *Ipomoea racemigera*;
- Priority 3 (P3): *Dolichocarpa* sp. Hamersley Station (A.A. Mitchell 1479), *Indigofera gilesii*, and *Themeda* sp. Hamersley Station (M.E. Trudgen 11431);
- Priority 4 (P4): *Lepidium catapycnon*;
- Novel species: *Hibiscus* aff. *campanulatus*; and
- Range extension: *Goodenia heterochila*.

Of the significant taxa recorded, two species were considered to be locally significant, *Eragrostis* sp. Mt Robinson (S. van Leeuwen 4109) (Priority 2) and *Hibiscus* aff. *campanulatus*. These species are known from 30 km north-west and 5 to 25 km east of the Survey Area, respectively. The remaining taxa were assigned a low local and regional significance. *Triodia* sp. Mt Ella (M.E. Trudgen 12739; P3), was previously recorded in the Survey Area, but existing records could not be confirmed due to poor access. Potential habitat was traversed during the current assessment, but no new individuals of this species were recorded. One species not identified during the desktop assessment, *Dolichocarpa* sp. Hamersley Station (A.A. Mitchell 1479) (Priority 3), was recorded during the survey and was therefore assigned a 'Recorded' post-survey likelihood.

A total of 17 vegetation types were described from the Survey Area, including 11 derived from floristic analysis of quadrat data, and six additional structural groups. The majority of the Survey Area was mapped as *Triodia* hummock grassland with *Eucalyptus* low open woodland (FS TvTpPamu EgHc AbAancAi, HC TpTvAms EllHc SeggSegpAhi, HS TpTwTv Ell SeggSegpAb, FS TbrTp AbSeaoSegl Ell, SS Tp AbPISal ExHc, SA TpPamu EgEx AtenSeaoAb, MI AmAnlGoro TpTt Ch) occurring on hills, slopes, crests, and plains (in the northern section) across the Survey Area. This was followed by *Corymbia* low open woodland over mixed open tussock grassland (FP Cc AdApaPI CooHall, ME TtEaTp CoasEx AdIngSisI) across the floodplains and drainage lines on flats. Scree slopes of *Acacia inaequilatera* tall sparse shrubland, over *Triodia* open hummock grassland (HS TbrTw Ai SeggSegp) were most common in the north of the Survey Area. None of the vegetation types recorded resembled any known Threatened Ecological Communities and one vegetation type OT

AspeArlaAsel Seh Asy shares some similarities with the Priority 1 West Angeles Cracking-Clays Priority Ecological Community (PEC) but is considered unlikely to be an occurrence of this PEC. Based on the definitions of significant vegetation listed in section 2.4.4 (Environmental Protection Authority, 2016a) four vegetation types were considered significant:

- MI AmAnlGoro TpTt Ch provides refuge for the locally and regionally restricted novel taxon *Hibiscus* aff. *Campanulatus*;
- MA EvAci CcCyaSopl ApyTefc is a Potential Groundwater Dependent Ecosystem (PGDE) as it supports the potential phreatophytic species *Eucalyptus victrix*. GDEs are susceptible to impacts associated with water draw down;
- MA EcoEvAci CcCya ApyTefc is a GDE as it supports the phreatophytic species *Eucalyptus camaldulensis* subsp. *obtusa*. GDEs are susceptible to impacts associated with water draw down; and
- OT AspeArlaAsel Seh Asy is analogous to the P1 PEC West Angeles Cracking-Clays.

Vegetation condition of the Survey Area ranged from 'Excellent' to 'Poor', with the majority (62%) in 'Excellent' condition. The remaining area was in 'Very Good' (19.2%), 'Good' (6.7%) or 'Poor' (11.0) condition due to a cover of weeds species, grazing by cattle, and the presence of old drill lines and tracks. GDEs were recorded associated with the Homestead Creek in the south of the Survey Area, and PGDEs were recorded in the north of the Survey Area, associated with the Homestead tributary. The vegetation health of the four GDE and four PGDE sites were in a 'Good' condition, with a high presence of weed species **Cenchrus ciliaris* recorded across all sites. Sample trees of *Eucalyptus victrix* and *Eucalyptus camaldulensis* subsp. *obtusa* assessed as part of the GDE health survey were generally in a healthy condition, with tree canopy extent and density scores recorded as 'major' (76-90%) for all *Eucalyptus camaldulensis* subsp. *obtusa* sample trees, and 'medium' (26-75%) to 'major' for all *Eucalyptus victrix* sample trees.

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

1. INTRODUCTION

1.1. Project Background

BHP Western Australia Iron Ore (BHP WAIO) engaged Spectrum Ecology & Spatial (Spectrum) to undertake a single-season detailed flora and vegetation assessment covering the Homestead Creek & Cathedral Gorge project area (the Survey Area). The Survey Area is located approximately 9 km north-west of Newman, Western Australia (WA) and covers approximately 3,263 ha (Map 1.1).

1.2. Project Scope

The project objective was to undertake a desktop assessment and single-season detailed flora and vegetation survey to describe flora and vegetation values across the Survey Area, and to assess the presence and health of Groundwater Dependent Ecosystems (GDEs) in the Survey Area, in order to inform future environmental approvals in the area.

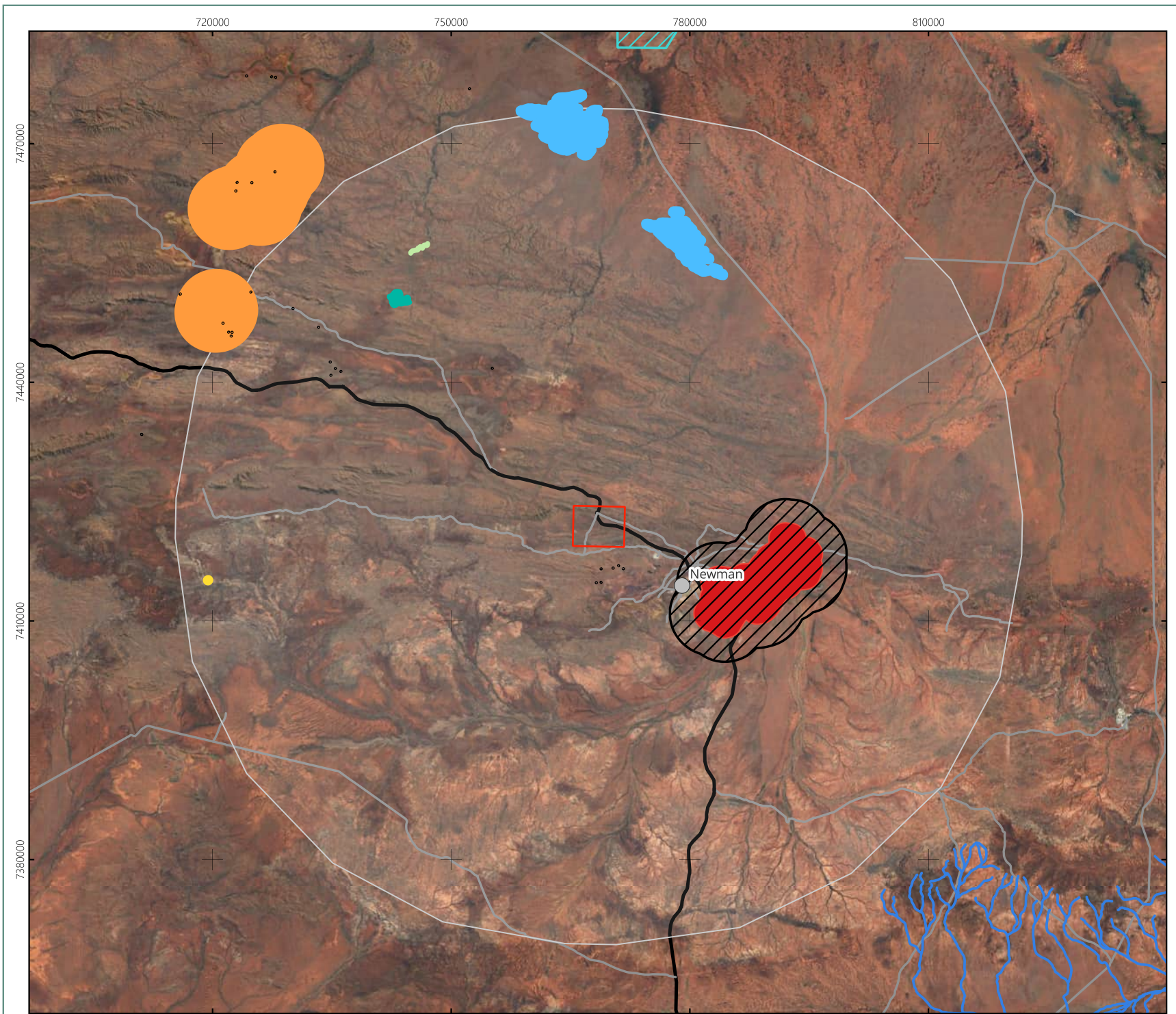
1.3. Legislation & Guidelines

Flora in WA are protected by various legislation, including:

- *Biodiversity Conservation Act 2016 – BC Act* (Department of Biodiversity Conservation and Attractions, 2016);
- *Environmental Protection Act 1986 – EP Act* (Western Australian Government, 1986); and
- *Environment Protection and Biodiversity Conservation Act 1999 – EPBC Act* (Australian Government, 1999).

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

- Environmental Protection Authority (EPA) Environmental Factor Guideline: Flora and Vegetation (EPA, 2016a);
- EPA Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016b);
- Department of Biodiversity Conservation and Attractions (DBCA) Threatened and Priority Flora Report Form – Field Manual (DBCA, 2017b);
- National Vegetation Information System (NVIS) Australian Vegetation Attribute Manual (ESCAVI, 2003);
- Latest version of BHP WAIO's Biological Survey Spatial Data Requirements s (SPR-IEN-EMS-015; BHP WAIO, 2020); and
- Latest version of BHP WAIO's Vegetation and Flora Survey Procedure (0124627; BHP WAIO, 2016)



Legend

- Survey Area
- Study Area

Significant Lands

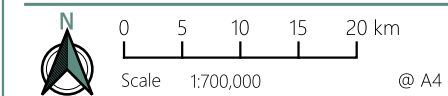
- Directory of Important Wetlands
- Ramsar Sites
- Environmentally Sensitive Area

TEC/PEC

- Ethel Gorge aquifer stygobiont community
- Weeli Wolli Spring Community
- West Angelas Cracking-Clays
- Riparian flora and plant communities of springs and river pools with high water permanence of the Pilbara Region
- Kumina Land System
- Vegetation of sand dunes of the Hamersley Range/Fortescue Valley

Roads & Major Towns

- Minor Road
- Principal Road
- Newman



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



Author: ACC

Date: 06-12-2023

Location of the Survey Area & Significant Lands

Homesead Creek & Cathedral Gorge

MAP

Prepared for
BHP WAIO

1.1

1.4. Bioregion

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

The Pilbara IBRA bioregion is made up of four sub-regions; the Chichester, Fortescue Plains, Hamersley and Roebourne. The Survey Area is in the southern section of the Pilbara within the Hamersley subregion (Figure 1.1). The Hamersley subregion is characterised as being a mountainous area of Proterozoic sedimentary ranges and plateaux, dissected by basalt, shale, and dolerite gorges (Kendrick, 2001; McKenzie, May, and McKenna, 2003). The valley floors of this subregion support low Mulga woodland over bunch grasses on fine textured soils, and ranges have *Eucalyptus leucophloia* over *Triodia brizoides* on skeletal soils (Kendrick, 2001; McKenzie, May, and McKenna, 2003).

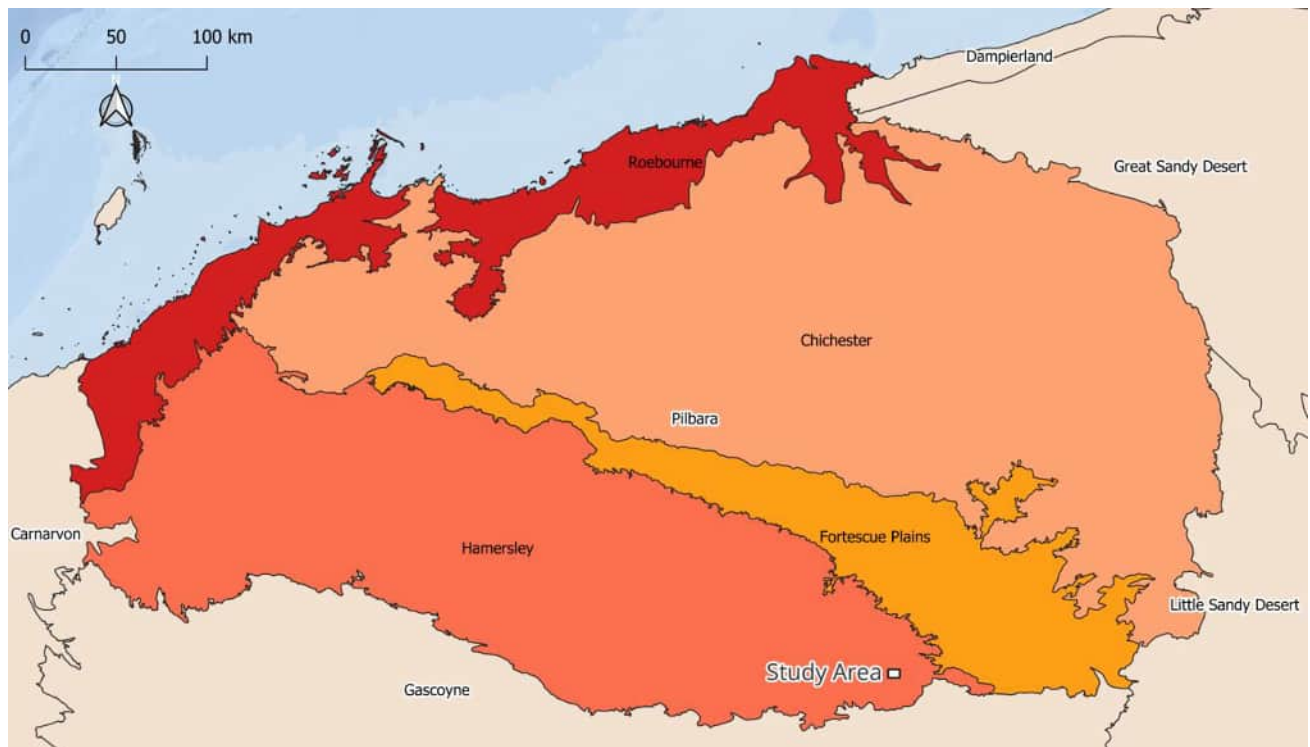


Figure 1.1: IBRA Classification

1.5. Climate

The climate of the Pilbara bioregion is classified as tropical, arid to semi-arid, with a median annual rainfall of 300 mm. Rainfall for the region can be variable, falling mainly in summer cyclonic events from December to February (Thackway and Cresswell, 1995).

Two broad climatic zones occur across the Pilbara region. Semi-desert tropical climatic conditions occur in coastal areas, as well as some higher-rainfall inland areas, which experience nine to 11 months of dry weather, with hot humid summers and warm winters. Dry desert climatic conditions occur across the remaining inland areas, which typically experience higher temperatures and lower rainfall, with hot dry summers and mild winters with up to 12 months of dry weather (Leighton, 2004). The Survey Area is located within the dry inland area.

Annual rainfall is highly variable, but generally follows an inland to coastal, and southern to northern, increasing trend (Leighton, 2004). The driest months are in spring (September to October) with tropical cyclones and local thunderstorms producing much of the summer and early Autumn rainfall (Mckenzie, Van Leeuwen and Pinder, 2009). Winter rainfall is highly variable, generally decreasing from the coast through to inland areas (Leighton, 2004).

Monthly maximum temperatures in the Pilbara region range from an average of 25°C in July to 37°C in January, while minimum temperatures range between 12°C in July and 25°C in January (Mckenzie, Van Leeuwen and Pinder, 2009). According to the Köppen-Geiger climate classification, the Survey Area has a hot desert climate (Class BWh; Peel, Finlayson, and McMahon, 2007). This classification includes arid regions where annual evaporation exceeds annual precipitation, and have a mean annual temperature $\geq 18^{\circ}\text{C}$.

1.6. Disturbance History

The dominant current and historical land uses across the Pilbara region involves grazing of native pasture, conservation, crown reserves, mining leases, and Aboriginal lands and reserves. Historically pastoralism has been the most significant land use within the Pilbara. Since the 1960's mining, predominantly iron ore, has become a significant land use with much of the Pilbara now under mining tenure (Kendrick, 2001).

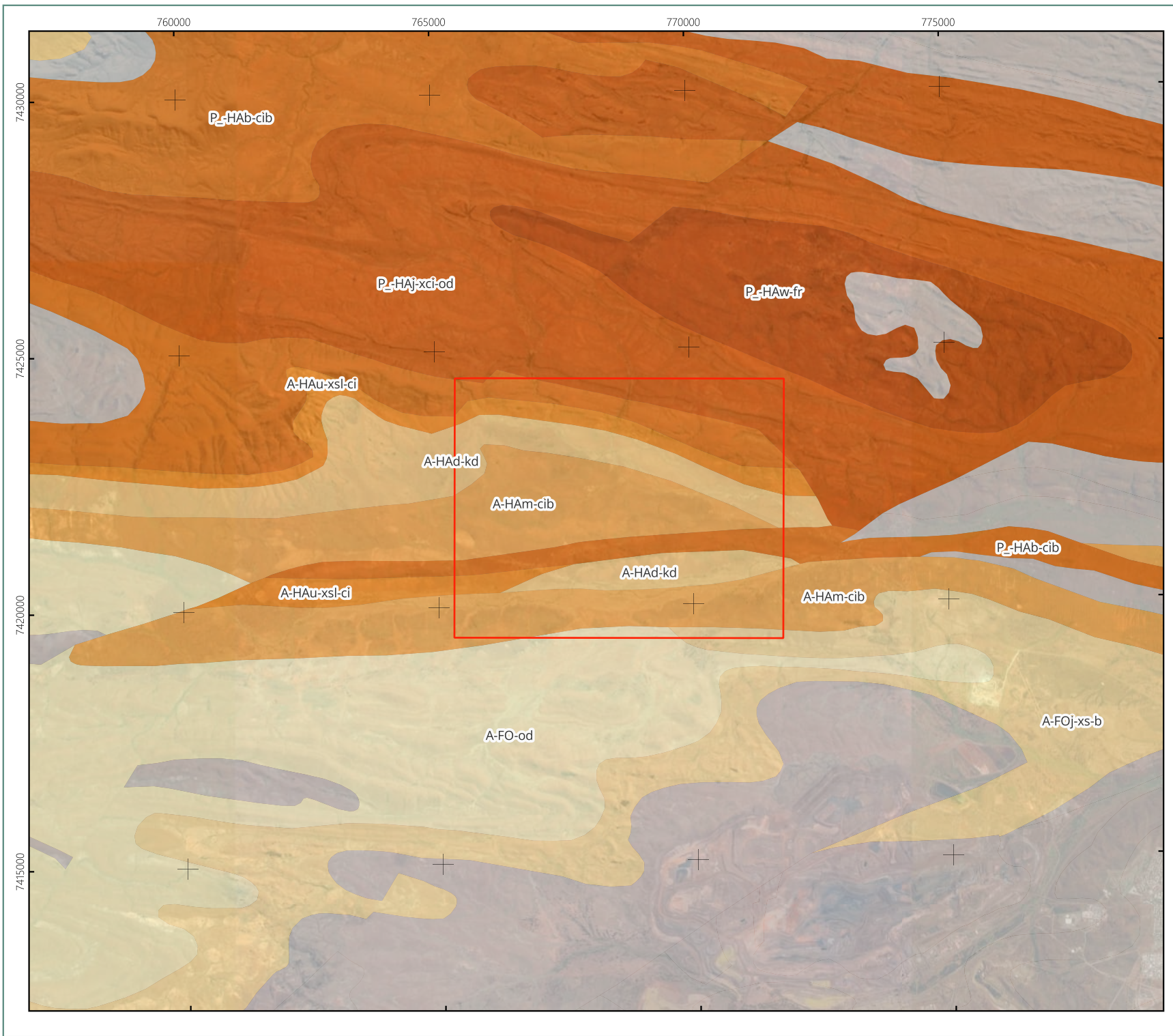
1.7. Geology

The geology of Western Australia has been mapped at a scale of 1:50,000, 1:100,000, 1:250,000, and 1:500,000 (DMIRS, 2020). The finest scale mapping for the Survey Area is 1:250,000, however, limited data for the 1:250,00 scale prevents state and regional calculations. At the 1:500,000 scale, seven units were mapped within the Survey Area. None of the geological units have over 0.3% of their total extent within the Survey Area and none appear restricted in extent. The geological units are listed in Table 1.1 and mapped on Map 1.2 and Map 1.3.

Table 1.1: Surface Geology

Unit Name	Unit Code	Description	Area in Survey Area (ha)	% of Survey Area	Total WA Extent (ha)	Total Pilbara Extent (ha)	% of Pilbara Extent Within Survey Area
1:500,000 scale geological mapping							
Brockman Iron Formation	P_-HAb-cib	Banded iron-formation, chert, mudstone, and siltstone; metamorphosed.	570.5	17.5	1,345,404	1,338,773	<0.1
Fortescue Group	A-FO-od	Dolerite dyke or sill.	48.9	1.5	269,659	267,812	<0.1
Jeerinah Formation	A-FOj-xs-b	Siliciclastic sedimentary rocks, mafic volcanic rocks, and minor felsic volcanic rocks; local carbonate rocks, chert, and dolerite sills.	42.5	1.3	652,764	636,004	<0.1
Marra Mamba Iron Formation	A-Ham-cib	Chert, banded iron-formation, mudstone, and siltstone; minor carbonate; metamorphosed.	1,348.3	41.3	523,220	520,665	0.3
Mount McRae Shale and Mount Sylvia Formation	AP_-Hau-xsl-ci	Mudstone, siltstone, chert, banded iron-formation, and dolomite; metamorphosed.	276.1	8.5	254,080	253,658	0.1
Weeli Wolli Formation	P_-Haj-xci-od	Banded iron-formation (commonly jaspilitic), mudstone, siltstone, and numerous dolerite sills; metamorphosed.	280.7	8.6	484,629	479,459	<0.1
Wittenoom Formation	A-Had-kd	Thinly bedded dolomite and dolomitic shale, with minor black chert, shale, banded iron formation and sandstone.	695.9	21.3	1,355,590	1,353,162	<0.1
1:250,000 scale geological mapping							
-	Czc	Colluvium – partly consolidated valley-fill deposits.	282.7	8.7	-	-	-
-	Fd	Metadolerite sills intruded into Fortescue Group; medium- to coarse-grained, massive grey-green rock, usually foliated.	0.5	<0.1	-	-	-
Jeerinah Formation	Fj	Interbedded mudstone, siltstone, and chert with minor felsic tuff, dolomite, and sandstone.	143.2	4.4	-	-	-

Unit Name	Unit Code	Description	Area in Survey Area (ha)	% of Survey Area	Total WA Extent (ha)	Total Pilbara Extent (ha)	% of Pilbara Extent Within Survey Area
Brockman Iron Formation	Hb	Banded iron-formation, chert, and minor shale (2490+ -20 Ma, U-Pb).	449.4	13.8	-	-	-
Wittenoom Dolomite	Hd	Dolomite; interbedded thin chert, shale, and dolomite in upper part.	11.9	0.4	-	-	-
Weeli Wolli Formation	Hj	Interlayered banded iron-formation and metadoleritic sills, minor shale.	91.7	2.8	-	-	-
-	Hjd	Medium- to coarse-grained massive grey-green metadolerite sills, usually foliated.	215.6	6.5	-	-	-
Marra Mamba Iron Formation	Hm	Chert, ferruginous chert, and banded iron-formation with minor shale.	702.1	21.5	-	-	-
Mount McRae Shale and Mount Sylvia Formation	Hs	Interbedded shale, chert, and banded iron-formation.	71.8	2.2	-	-	-
Woongarra Volcanics	Hw	Quartz - or feldspar-phyric rhyolite and rhyodacite as sills or flows; tuff and minor jaspilitic banded iron-formation (2470 +- 30 Ma, U-Pb; 2370 Ma, Rb-Sr).	0.1	<0.1	-	-	-
-	Qa	Alluvium - unconsolidated silt, sand, and gravel.	1,011.7	31.0	-	-	-
-	Qc	Colluvium - unconsolidated quartz and rock fragments in soil.	183.5	5.5	-	-	-
-	Qw	Alluvium and colluvium - red-brown sandy and clayey soil.	98.7	3.0	-	-	-

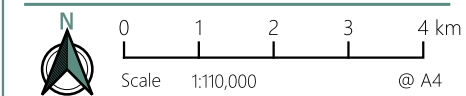


Legend

Study Area

Geological Units

- A-FO-od
- A-FOj-xs-b
- A-HAd-kd
- A-HAm-cib
- A-HAu-xsl-ci
- P-HAb-cib
- P-HAj-xci-od
- P-HAw-fr
- Unit Not Within Survey Area



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



Author: ACC

Date: 02-03-2023

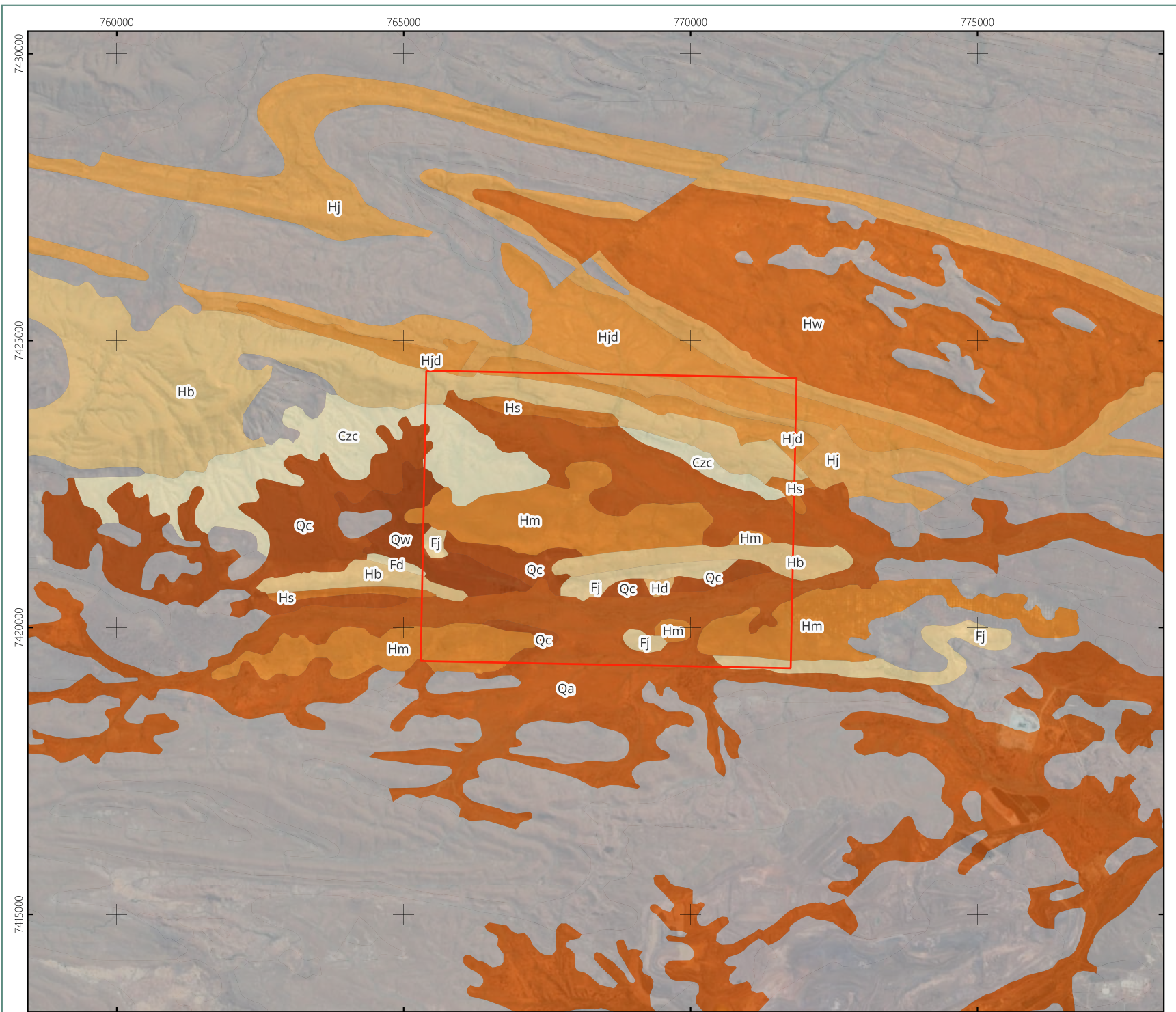
Surface Geology (1:500,000)

Homestead Creek & Cathedral Gorge

MAP

Prepared for
BHP WAIO

1.2

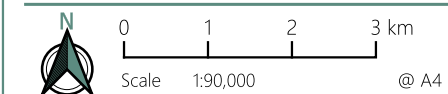


Legend

 Survey Area

Geological Units

-  Czc
-  Fd
-  Fj
-  Hb
-  Hd
-  Hj
-  Hjd
-  Hm
-  Hs
-  Hw
-  Qa
-  Qc
-  Qw
-  Units Not Within Survey Area



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



Author: SB

Date: 24-08-2023

Surface Geology (1:250,000)

Homestead Creek & Cathedral Gorge

MAP

Prepared for
BHP WAIO

1.3

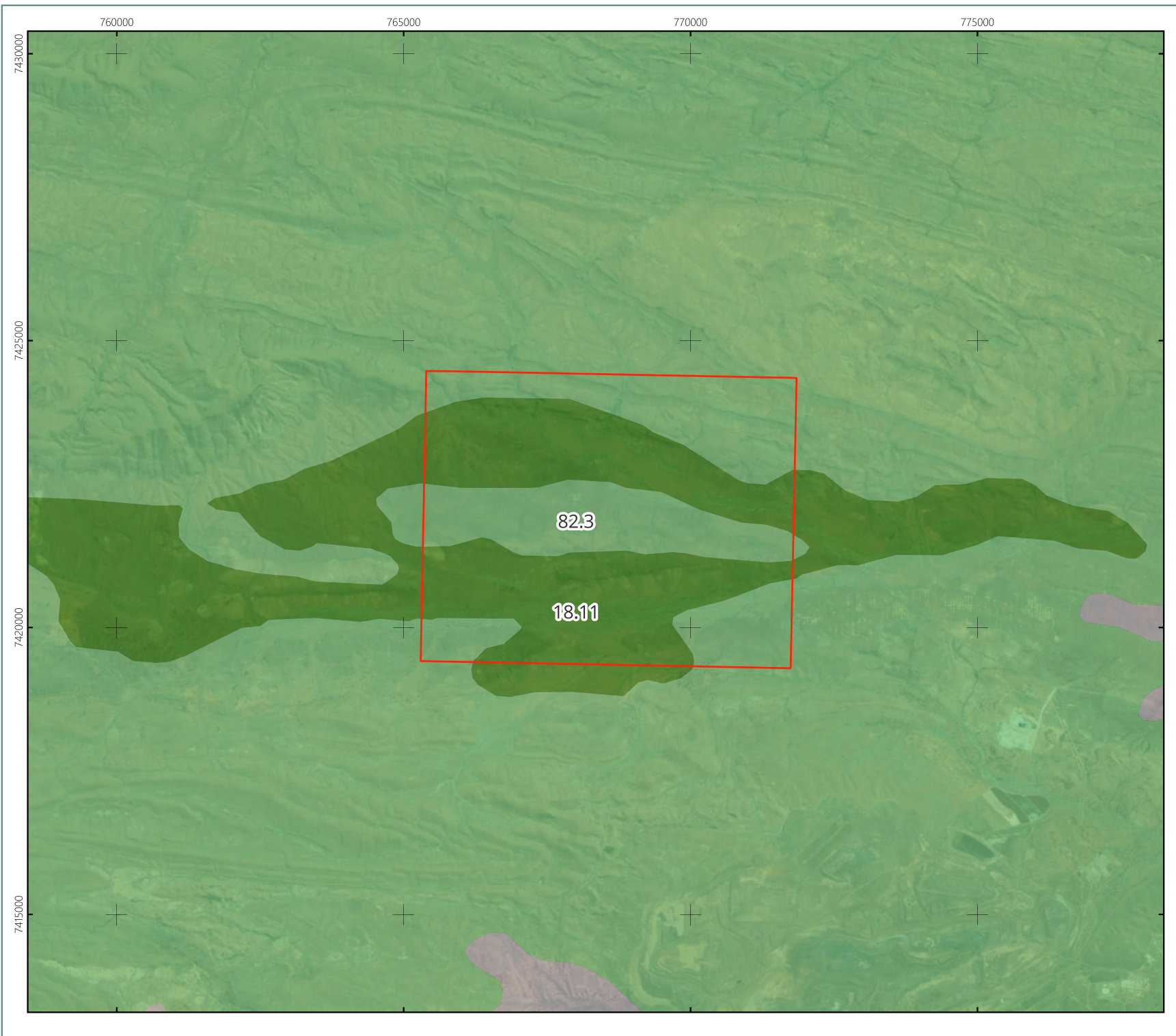
1.8. Beard Vegetation Mapping

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

Two vegetation system associations, comprising two vegetation sub-associations (SAs; including one mosaic), have been mapped within the Survey Area (Table 1.2; Map 1.4). SA18.11 was mapped as 51.6% of the Survey Area, with the remaining 48.4% of the Survey Area mapped as the mosaic SA82.3. Over 99% of the pre-European vegetation extent remains for both sub-associations. Neither of the SAs appear restricted in the Pilbara region or in Western Australia.

Table 1.2: Beard Vegetation Sub-Associations

SA	System Association	NVIS Level V Description	Area in Survey Area (ha)	% of Survey Area	Pre-European Extent WA (ha)	Current Extent WA (ha)	Current Pilbara Extent WA (ha)	% Remaining	% of Current WA Extent in Survey Area	% Current Pilbara Extent in Survey Area
18.11	Hammersley_18	<i>Acacia aneura</i> , <i>Eremophila fraseri</i> , and <i>Acacia pruinocarpa</i> tall open shrubland, over <i>Ptilotus drummondii</i> , <i>Eremophila lanceolata</i> , and <i>Brachyscome</i> sp. low open shrubland.	1,685.0	51.6	580,556	575,852	575,808	99.2	0.3	0.3
82.3	Hammersley_82	<i>Eucalyptus leucophloia</i> and <i>Eucalyptus gamophylla</i> low open woodland, over <i>Senna artemisioides</i> subsp. x <i>sturtii</i> , <i>Dodonaea viscosa</i> , and <i>Grevillea wickhamii</i> tall sparse shrubland, over <i>Triodia wiseana</i> mid open hummock grassland, with <i>Ptilotus rotundifolius</i> and <i>Acacia lycopodiifolia</i> low open shrubland.	1,577.9	48.4	2,169,997	2,157,841	2,156,547	99.4	<0.1	<0.1
		<i>Eucalyptus kingsmillii</i> , <i>Eucalyptus gamophylla</i> , and <i>Eucalyptus leucophloia</i> low open mallee woodland, over <i>Senna artemisioides</i> subsp. x <i>sturtii</i> , <i>Dodonaea viscosa</i> , and <i>Grevillea wickhamii</i> tall sparse shrubland, over <i>Triodia wiseana</i> mid open hummock grassland, with <i>Ptilotus rotundifolius</i> and <i>Acacia lycopodiifolia</i> low open shrubland.								
		<i>Eucalyptus camaldulensis</i> , <i>Eucalyptus microtheca</i> , and <i>Eucalyptus dichromophloia</i> low woodland, over <i>Hibiscus goldsworthii</i> tall sparse shrubland with <i>Arivela viscosa</i> tall sparse forbland, over <i>Swainsona stenodonta</i> , <i>Jasminum lineare</i> , and <i>Tephrosia bidwillii</i> low sparse shrubland.								



Legend

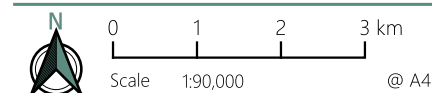
 Survey Area

Vegetation Sub Association

 18.11

 82.30

 Sub Association Not Within Survey Area



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



Author: SB

Date: 23-08-2023

Beard Vegetation Sub Associations

Homestead Creek & Cathedral Gorge

MAP

Prepared for
BHP WAIO

1.4

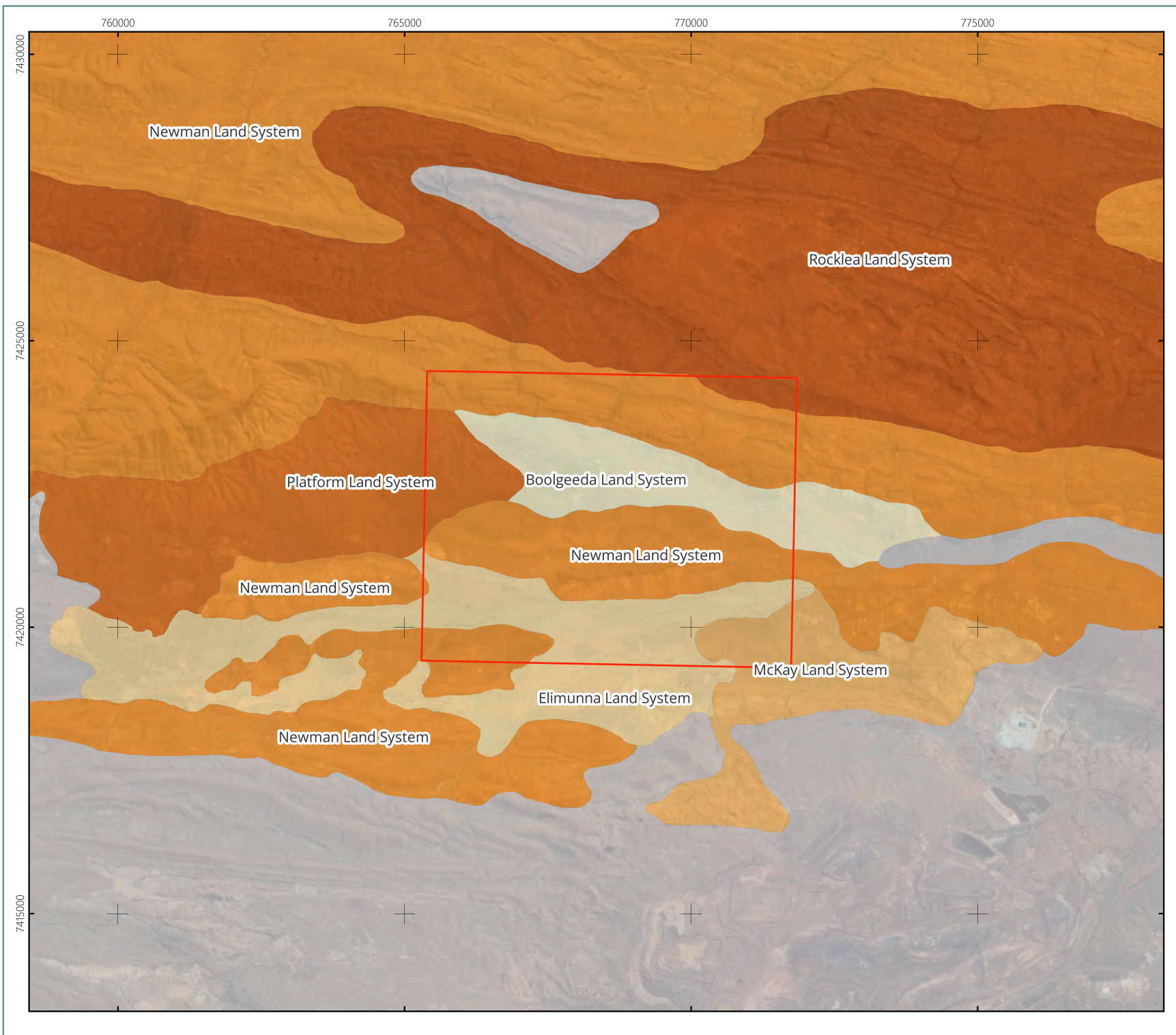
1.9. Land Systems

The land systems of Western Australia have been mapped at a scale of 1:250,000 (Department of Agriculture and Food, Western Australia 2016).

Six land systems were mapped across the Survey Area, with the dominant being the Newman land system covering 48.5% of the Survey Area (Table 1.3; Map 1.5). The next dominant type were the Boolgeeda (19.3%) and Elimunna land systems (19.2%). All land systems are well represented in the region with the Survey Areas containing less than 1.0% of each land systems extent in WA. None of the land systems appear to be restricted in extent.

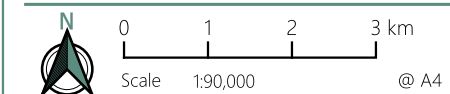
Table 1.3: Land Systems

Description	Area in Survey Area (ha)	% of Survey Area	Total WA Extent (ha)	% of Total Extent within Survey Area
Rocklea Land System: Basalt hills, plateaux, lower slopes, and minor stony plains supporting hard spinifex and occasionally soft spinifex grasslands with scattered shrubs.	70.0	2.1	2,891,992	<0.1
Platform Land System: Dissected slopes and raised plains supporting shrubby hard spinifex grasslands.	219.2	6.7	237,167	<0.1
Newman Land System: Rugged jaspilite plateau, ridges and mountains supporting hard spinifex grasslands.	1582	48.5	2,000,361	<0.1
McKay Land System: Hills, ridges, plateaux remnants, and breakaways of meta sedimentary and sedimentary rocks supporting hard spinifex grasslands with <i>Acacia</i> and occasional <i>Eucalyptus</i> .	135.8	4.2	427,291	0.3
Elimunna Land System: Stony plains on basalt supporting sparse <i>Acacia</i> and <i>Senna</i> shrublands and patchy tussock grasslands.	627.6	19.2	65,548	1.0
Boolgeeda Land System: Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or Mulga shrublands.	628.3	19.3	999,835	<0.1



Legend

- Survey Area
- Land System**
- Boolgeeda Land System
- Elimunna Land System
- McKay Land System
- Newman Land System
- Platform Land System
- Rocklea Land System
- Land System Not Within Survey Area



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



Author: SB

Date: 21-08-2023

Land System

Homestead Creek & Cathedral Gorge

MAP

Prepared for
BHP WAIO

1.5

1.10. Significant Lands

Twenty-five significant lands are located in the desktop Study Area (Survey Area plus a 50 km buffer), these are listed in Table 1.4 and displayed on Map 1.1, and are described in the following sections. Priority and Threatened Ecological Communities (PEC/TEC) are discussed in Section 4.1.

Table 1.4: Environmentally Significant Lands within the Study Area

Type	Significant Land	Distance from Survey Area (km)
TECs	Ethel Gorge aquifer stygobiont community (Critically Endangered)	7.5 km east
PECs	Vegetation of sand dunes of the Hamersley Range/Fortescue Valley (Priority 3)	30.5 km north
	Kumina Land System (Priority 3)	32.6 km north-west
	Riparian flora and plant communities of springs and river pools with high water permanence of the Pilbara Region (Priority 2)	37.3 km north-west
	West Angelas Cracking-Clays (Priority 1)	45.5 km west
	Weeli Wolli Spring Community (Priority 1)	46.2 km north-west
ESA	Within 50 m of Threatened flora	18 locations within 50 km of Survey Area

1.10.1. Conservation Estate

The Western Australian conservation estate includes land and waters vested in the Conservation and Parks Commission under the *Conservation and Land Management Act 1984*. The conservation estate is generally managed by the DBCA to protect Western Australia's biodiversity and includes national parks, nature reserves, conservation reserves, and other areas managed primarily for biodiversity conservation (Department of the Environment and Energy, 2016). No conservation reserves occur within the desktop Study Area (Table 1.4; Map 1.1).

1.10.2. Environmentally Sensitive Areas

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

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

There are 18 locations of Threatened flora within the desktop Study Area (Table 1.4; Map 1.1).

1.10.3. Australian Wetlands Database

The Australian Wetlands Database includes nationally significant wetlands (as listed in the directory of important wetlands), wetlands listed under the Ramsar convention, wetlands that are representative, rare, or unique, or wetlands that are considered of international importance (Department of the Environment and Energy, 2019). No nationally significant wetlands, including Ramsar wetlands, were mapped within the desktop Study Area (Table 1.4; Map 1.1).

2. METHODS

2.1. Desktop Review

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

2.1.1. Biological Database Searches

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

Table 2.1: Summary of Database Searches

Data Source	Custodian	Details	Buffer
Commonwealth Protected Matters Search Tool (PMST)	Department of the Environment and Energy (DoEE)	Date: 24/01/2023	50 km
NatureMap/Dandjoo species report	Department of Parks and Wildlife / Western Australian Museum (WAM)	Date: 25/01/2023	50 km
DBCA Threatened & Priority Flora Databases (Threatened and Priority Flora / WA Herbarium)	DBCA	Date: 20/01/2023 Reference: 24-0123	55 km
Threatened & Priority Ecological Community database	DBCA	Date: 01/02/2023 Reference: 33-0123	50 km
EPBC Protected Matters report (PMST)	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Date: 24/01/2023 Reference:	50 km
Index of Biodiversity Surveys and Assessments (IBSA) Database	Department of Water and Environmental Regulation (DWER)	Date: 25/01/2023	50 km

2.1.2. Literature Review

Previously conducted assessments within the desktop Study Area were reviewed for significant flora and vegetation. Reports were incorporated if they were provided by BHP WAIO, or if they were publicly available. The 18 reports incorporated into the desktop assessment are listed in Table 2.2. Four of the previous surveys in the region overlap with Survey Area: Cathedral Gorge Level 2 Flora and Vegetation Survey (Onshore Environmental Consultants, 2016), Targeted Survey for *Acacia* sp. East Fortescue (surrounding OB31; Onshore Environmental Consultants, 2015c), Myopic Exploration Lease Basic/Reconnaissance (Onshore Environmental Consultants, 2009a) and Newman to MAC Powerline Corridor Basic/Reconnaissance (Onshore Environmental Consultants, 2017).

Table 2.2: Previously Conducted Biological Assessments

Biological Assessment Name	Survey Level	Survey Timing	Distance to Survey Area
Myopic Exploration Lease Basic/Reconnaissance; (Onshore Environmental Consultants, 2009a)	Reconnaissance flora and vegetation survey, targeted flora, and vegetation survey	June 2009	0 km
Newman to MAC Powerline Corridor Basic/Reconnaissance (Onshore Environmental Consultants, 2017)	Reconnaissance flora and vegetation survey	July 2017	0 km
Cathedral Gorge Level 2 Flora and Vegetation Survey (Onshore Environmental Consultants, 2016)	Detailed flora survey	September & October 2015	0 km

Biological Assessment Name	Survey Level	Survey Timing	Distance to Survey Area
Targeted Survey for <i>Acacia</i> sp. East Fortescue (surrounding OB31; Onshore Environmental Consultants, 2015c)	Targeted flora survey	March 2015	0 km east
Rhodes Ridge Detailed Flora and Vegetation Survey - Field Visit 2 (Astron, 2022)	Detailed flora and vegetation survey	July 2019	20 km north-west
Rhodes Ridge Detailed Flora and Vegetation Survey - Field Visit 1 (Astron, 2019b)	Detailed flora and vegetation survey	June 2019	20 km north-west
Roy Hill Consolidated Vegetation Report (Strategen JBS&G, 2020)	Flora and vegetation literature review	April 2020	31 km north-east
Rhodes Ridge Targeted Flora Survey Oct 2019 & Feb 2020 (Rio Tinto, 2020)	Targeted flora survey	October 2019 & February 2020	20 km north-west
Rhodes Ridge - Targeted Flora Survey, July/August 2019 (Astron, 2019a)	Targeted flora survey	July – August 2019	20 km north-west
Rhodes Ridge - Priority Flora Searches, June 2021 (Astron, 2021)	Targeted flora survey	June 2021	20 km north-west
Rhodes Ridge - Giles Point and Bakers Road Upgrades Targeted Flora Survey (AECOM, 2021)	Targeted flora survey	February 2021	16 km north-west
Rhodes Ridge Targeted Flora Survey Dec 2020 (AECOM, 2020)	Targeted flora survey	October 2020	6 km south-west
Eastern Ridge (OB23/24/25) Flora and Vegetation Assessment (ENV Australia, 2012)	Single-season, detailed flora, and vegetation survey	April & July 2011	6 km east
Orebody 42/43 Flora, Vegetation and Fauna Assessment, ENV Australia Pty. Ltd. (ENV Australia, 2011)	Detailed flora survey	December 2010	20 km east
Orebody 19 Level 2 Flora and Vegetation Survey (Onshore Environmental Consultants, 2015d)	Detailed flora survey	March & September 2013	38 km east
Fortescue River Riparian Flora and Vegetation Survey (Onshore Environmental Consultants, 2015a)	Detailed flora survey	July 2015	21 km east
BHP WAO Jimblebar <i>Eremophila capricornica</i> Targeted Flora Survey (Biologic, 2021)	Targeted flora survey	July 2020	40 km south-east
Homestead Creek Flora and Vegetation Survey (Spectrum Ecology & Spatial, 2021)	Detailed flora survey	March & August - September 2021 & February 2022	10 km east
<i>Hibiscus</i> aff. <i>campanulatus</i> Targeted Survey – Cathedral Gorge (Spectrum Ecology & Spatial, 2022)	Targeted flora survey	July 2022	5 km east
East Ophthalmia & Ninga Detailed Flora & Vegetation Survey (Spectrum Ecology & Spatial, 2023)	Detailed flora survey	March - April & August 2022	23 km east

2.1.3. Likelihood of Occurrence of Significant Flora

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

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

A likelihood of occurrence assessment was then conducted using the criteria listed in Table 2.3. This included assessing the distance of the record from the project (historical database records considered not accurate

were excluded if required), presence of appropriate habitats within the Survey Area (using geology, vegetation mapping, and/or aerial imagery).

Table 2.3: Likelihood of Occurrence Criteria

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

2.2. Survey Timing

The one phase (post-wet season) assessment was undertaken over 10 days from the 9th to the 18th of May. Monthly climate data was sourced from the nearest Bureau of Meteorology station with complete data (Newman Airport #7176), located approximately 19 km south-east of the Survey Area (Bureau of Meteorology, 2022). Rainfall recorded 12 months prior to the survey and median monthly rainfall are presented in Figure 2.1.

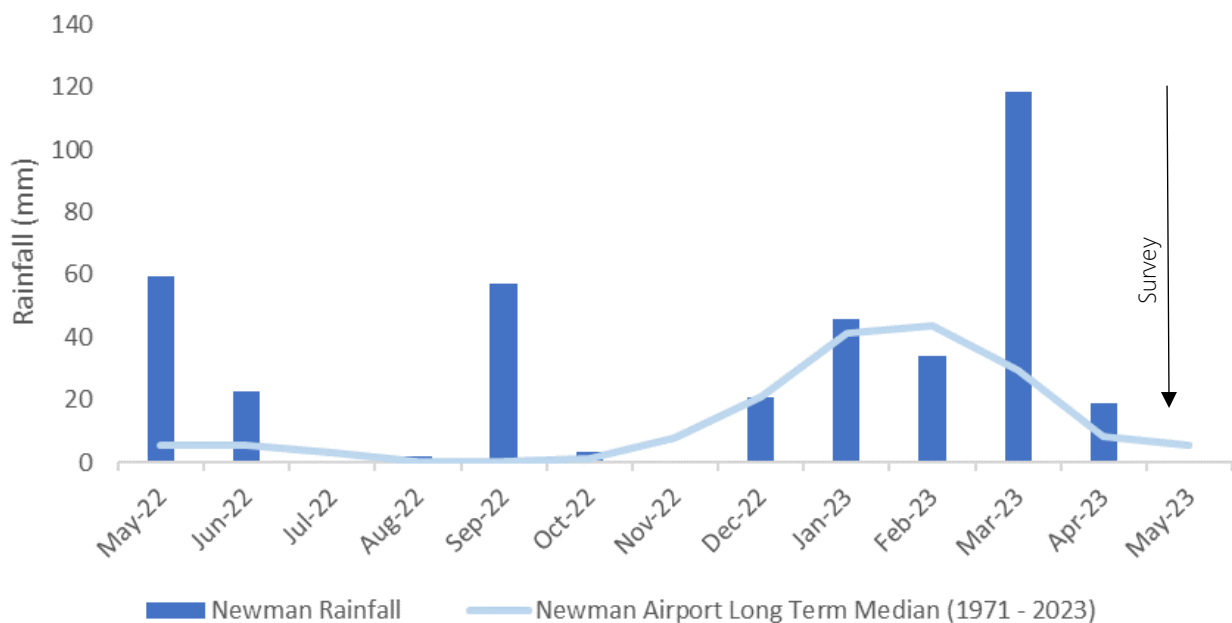


Figure 2.1: Mean Temperature & Rainfall for the 12 months Preceding the Survey

The following rainfall was recorded at Newman Airport prior to the survey:

- The 12 months preceding the field survey (May 2022 to April 2023) recorded 382.8 mm of rainfall, 167.0 mm (77.4%) higher than the sum of the long-term annual median of 215.8 mm; and
- The three months preceding the field survey (February 2023 – April 2023) recorded 171.4 mm of rainfall, 90.0 mm (110.6%) higher than the sum of the long-term annual median for the same three months (81.4 mm).

2.2.1. EPA Flora Survey Timing

The Pilbara bioregion is considered part of the Eremaean Botanical Province and recommendations are to conduct the primary flora and vegetation survey in Autumn from March – June and the secondary survey following winter rains (EPA 2016b). The field survey timing was conducted in accordance with EPA recommended timing for the primary survey following a period of higher than usual median rainfall for the region.

2.3. Field Methods & Sampling Effort

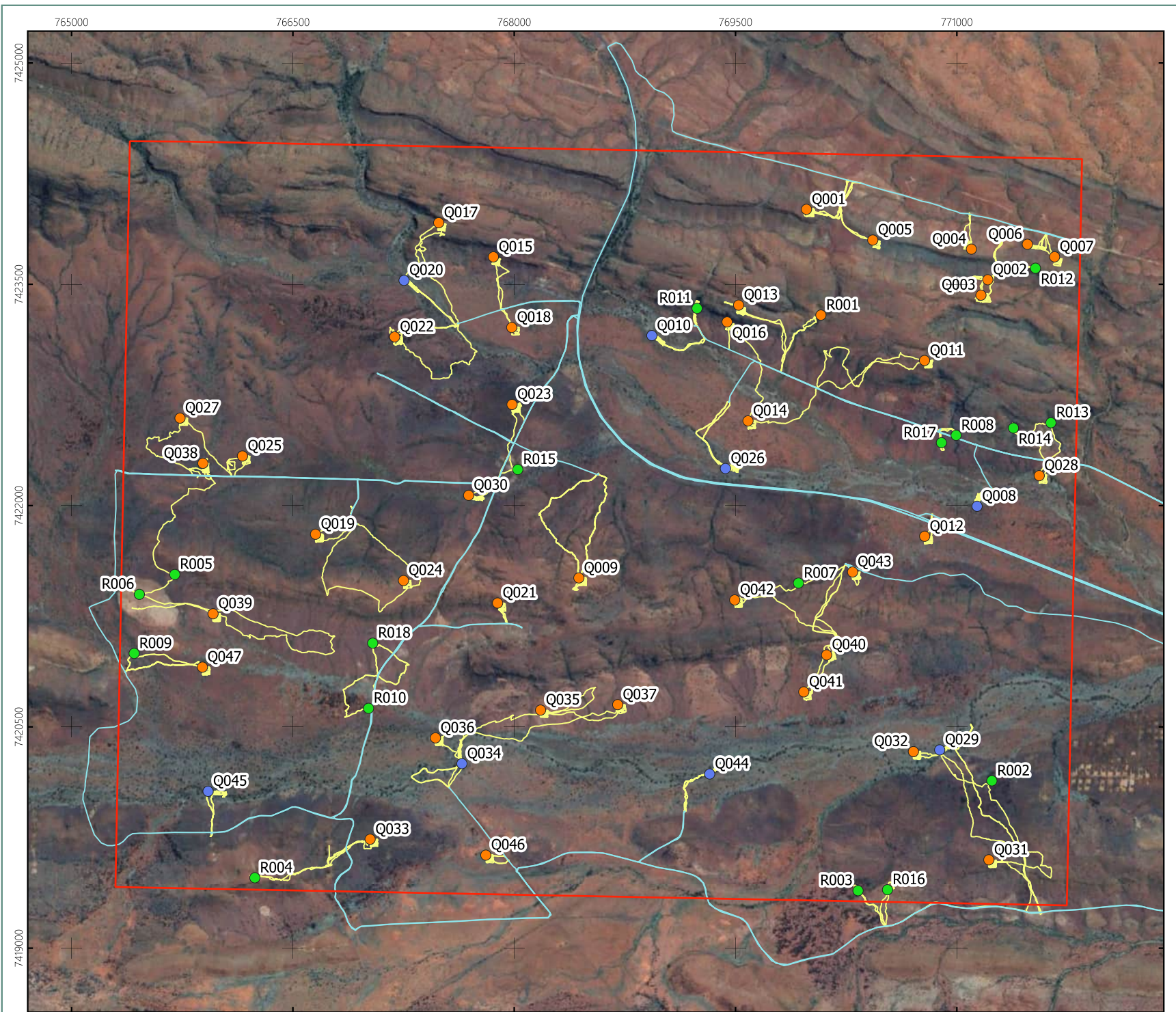
2.3.1. Detailed Survey

A single-phase detailed flora and vegetation assessment and basic targeted survey for significant flora was undertaken at the Survey Area. The survey was completed by two botanists over a 10-day period.

There were 47 quadrats (including eight GDE monitoring quadrats), 18 relevés, and 139.4 km of targeted traverses sampled during the assessment (Map 2.1). This was considered appropriate for a detailed level survey as stipulated in the technical guidance (Environmental Protection Authority, 2016b); these techniques are described in Table 2.4. Comprehensive flora site data collection information is included in Appendix B.

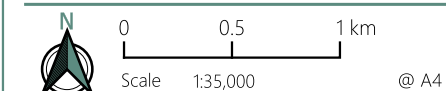
Table 2.4: Flora & Vegetation Survey Technique

Technique	Application & Purpose
Quadrats	Quadrats are comprehensive survey technique for gathering information for detailed flora and vegetation survey. Each vegetation unit must be represented by a minimum of three quadrats where possible and have at least one corner permanently marked. Information collected at each quadrat include: • Site code, date; GPS coordinates; botanist; • Size and shape of quadrat (quadrats are 50 x 50 m or 2,500 m² for Pilbara IBRA region); • Photograph from north-west corner; • Landform, including; slope, aspect, soil description and rock type; • Time since fire (quadrats are not sampled if quadrats have a recent fire history); • Vegetation condition (quadrats are not installed if not in a 'Good' or better condition (section 2.4.3); • Description of disturbance types; • Vegetation description (NVIS Level V); • Comprehensive species list, canopy cover (%) and height (m).
Relevés	Relevés are a low intensity survey technique for gathering information where vegetation is in 'Degraded' or 'Completely Degraded' vegetation condition, recently burnt areas, or where it is too unsafe to survey using a quadrat (cliff faces etc.). Information collected at each relevé includes: • Site code, date, GPS coordinates, botanist; • A photograph; • Vegetation condition and disturbances (including fire); • Landform including; slope, soil, rock type, aspect; • Vegetation description (NVIS Level V); • Dominant species list, canopy cover (%) and height (m); and • Significant flora, weeds.
Traverses	A traverse is an unmarked route along which data is collected. Traverses are useful for identifying the boundaries and characteristics of vegetation types, selecting sites for detailed survey, and targeting significant flora or vegetation. Information recorded along a traverse is as for the relevé, with the addition of noting vegetation changes and relationships between vegetation and substrate.
Opportunistic Sampling	Flora and vegetation not recorded through other sampling methods is opportunistically sampled as encountered in the Survey Area.



Legend

- Survey Area
- Quadrat
- Quadrat - GDE monitoring
- Relevé
- Traverses
- Vehicle Tracks



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



Author: SB

Date: 23-08-2023

Sampling Effort

Homestead Creek & Cathedral Gorge

MAP

Prepared for
BHP WAIO

2.1

2.3.2. Groundwater Dependent Ecosystems Monitoring

Groundwater dependent ecosystems comprise of species that rely directly on groundwater (Sommer and Froend, 2011). In the Pilbara region of Western Australia, *Melaleuca argentea* and *Eucalyptus camaldulensis* are known to have a moderate to high dependence on groundwater, while *Eucalyptus victrix* has a low to moderate dependence. The presence of these species can therefore be used to infer if an ecosystem is a GDE or a potential GDE (McLean, 2014)

Monitoring the health of GDEs and potential GDEs consisted of establishing 2,500m² quadrats along the Homestead Creek and Homestead tributary in the Survey Area. Quadrats were sampled as per Table 2.4 and in addition, 10 sample keystone monitoring tree species (*Eucalyptus camaldulensis* and *Eucalyptus victrix*) per monitoring quadrat were marked with a labelled tag. For each sample tree the following was recorded:

- Coordinates;
- Species;
- Photograph;
- Approximate height; and
- Visual assessment of the tree health of each tree (Table 2.5).

Table 2.5: Vegetation Health Assessment for Trees (Adapted from Souter et al., 2009)

Assessment Type	Score	Health Ranking	Health Rating / Description
Crown extent & density	0	0%	None
	1	1-10%	Minimal
	2	11-25%	Sparse
	3	26-75%	Medium
	4	76-90%	Major
Epicormic growth	1	Absent	Effect is not visible
	2	Scarce	Effect is present within the assessable crown but not readily visible
	3	Common	Effect is clearly visible through the assessable crown
New tip growth scores	1	Absent	Effect is not visible
	2	Scarce	Effect is present within the assessable crown but not readily visible
	3	Common	Effect is clearly visible through the assessable
Reproduction scores	1	Absent	Effect is not visible
	2	Scarce	Effect is present within the assessable crown but not readily visible
	3	Common	Effect is clearly visible through the assessable
Leaf die off	1	Absent	Effect is not visible
	2	Scarce	Effect is present within the assessable crown but not readily visible
	3	Common	Effect is clearly visible through the assessable
Presence of Mistletoe	1	Absent	Effect is not visible
	2	Scarce	Effect is present within the assessable crown but not readily visible
	3	Common	Effect is clearly visible through the assessable
Bark condition	0	Intact	Intact bark
	1	Minor	Minor cracks
	2	Moderate	Moderate bark cracks
	3	Extensive	Extensive bark cracks
	4	Absent	Long-term dead tree

2.4. Reporting & Data Analysis

2.4.1. Flora Nomenclature, Taxonomy & Lodgement

Flora nomenclature used in this report is consistent with the Western Australian Herbarium's plant census, provided on FloraBase (Western Australian Herbarium, 2023) and is current at the time of report preparation.

At least one specimen of each flora taxon was collected in order to confirm all species recorded during the assessment and to investigate suspected species that are considered significant.

Specimens were identified using the appropriate taxonomic keys and where required, relevant taxonomic experts at the Western Australian Herbarium were consulted. Specimens were vouchered with the Western Australian Herbarium as per guidance; when they represent new populations of Threatened or Priority flora, new occurrences of TECs or PECs, individuals that have atypical characteristics, or bioregional range extensions. Species which could not be identified to species level were reported as sp. indeterminant and included in the counts if they were considered a unique species from others identified during the survey, conversely indeterminant species were excluded if they were likely to be the same as other collections.

2.4.2. Vegetation Mapping

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

The vegetation types were defined floristically, where quadrats were statistically classified according to similarities in species composition. The statistical analysis was performed in R Core Team (R Core Team, 2021). using the "stats" and "vegan" (Oksanen *et al.*, 2019) packages. Dissimilarity indices were calculated using the vegdist function with the Jaccard index on a binary species matrix. Hierarchical clustering was performed using the hclust function using the 'average' or unweighted pair group with arithmetic mean (UPGMA) method. Figures of the hierarchical clustering were produced using the "dendextend" package (Galili, 2015).

Sites were excluded from the analysis if they were sampled on mosaic vegetation. A total of 45 quadrats and one relevé (R001) were used in the analysis. The following data preparation steps were undertaken prior to the floristic analysis:

- Subspecies and varieties were combined where sterile/poor material made it difficult to differentiate;
- Annual taxa and herbs were removed;
- Only taxa with their taxonomy resolved to at least species level were included;
- Species which are not easily distinguished when sterile or juvenile were combined:
 - *Acacia pachyacra* and *Acacia tenuissima* were combined;
 - *Aristida inaequiglumis* and *Aristida latifolia* were combined;
 - *Chrysopogon fallax* and *Sorghum plumosum* were combined; and
 - *Hakea lorea* subsp. *lorea* and *Hakea chordophylla* were combined.

2.4.3. Vegetation Condition

Vegetation condition was recorded at quadrats, relevés, and where other areas of different vegetation condition were observed. The vegetation condition was updated during the current survey using the scale recommended for the Eremaean Botanical Province as shown in Table 2.6 EPA, 2016b).

Table 2.6: Vegetation Condition Scale & Criteria

Condition	Disturbance Criteria – Eremaean Botanical Province
Excellent	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor	Still retains basic vegetation structure or ability to regenerate it after obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires, or aggressive weeds.
Degraded	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with multiple weed species present including very aggressive species.
Completely Degraded	Areas that are completely or almost completely without native species in the structure of their vegetation, i.e. areas that are cleared or “parkland cleared” with their flora comprising weed or crop species with isolated native trees or shrubs.

2.4.4. Significant Flora & Vegetation Definitions

As defined by the Environmental Factor Guideline (EPA, 2016a), flora and vegetation can be considered significant for a range of reasons (Table 2.7; Appendix A). Significant flora and vegetation recorded during the assessment are then further considered at a local and regional scale to further contextualise the survey results. Considerations used to determine the local and regional significance of flora and vegetation recorded at the Survey Area are listed in Table 2.7.

Table 2.7: Flora & Vegetation Significance Definitions

Significant Definitions (EPA, 2016a)		Local & Regional Significance
Flora	- Being identified as Threatened (state listed WC Act and/or nationally listed EPBC Act). - Being identified as Priority species: Priority 1 to 4, (DBCA, 2019). - Locally endemic or association with a restricted habitat type (e.g. surface water or groundwater dependant 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.	Local
		- Flora taxon well known from the local area. - Landforms/habitat the flora taxon occurs on are widespread through the local area. - Flora taxon occurs across multiple landforms and habitats.
		- Flora taxon not well known from the local area. - Landforms/habitat the flora taxon occurs are restricted through the local area. - Flora taxon only occurs on one habitat type that is restricted.
		Regional
		- Flora taxon's known distribution extends over the IBRA region or subregion. - Flora taxon's known distribution may span over multiple IBRA regions.
		- Flora taxon's known distribution is only known from few locations across the IBRA region. - May be common in the local area, but only known from this area within the region or subregion.

Significant Definitions (EPA, 2016a)		Local & Regional Significance	
Vegetation	- Identified as TEC (state listed WC Act and/or nationally listed EPBC Act). - Identified as PEC (DBCA, 2023) - 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. - Vegetation that is highly disturbed can reduce the significance.	Local	
		- Vegetation types mapped extent is widespread across the Survey Area or local area. - Landforms/habitat the vegetation type occurs on are widespread in the local area.	
		- Vegetation types mapped extent is restricted in the Survey Area. - Landforms/habitat the vegetation type occurs on are restricted in the local area. - Vegetation types provides habitat for locally significant flora taxa.	
		Regional	
		- Determined by comparing vegetation types to the best available data source. This can include state-wide vegetation mapping (Beard), region specific (if available), land system and/or geology mapping. - Vegetation types are matched with regional mapping units that are widespread throughout the region.	
		- Vegetation types are matched with mapping that is restricted throughout the region. - Vegetation type provides habitat for regionally significant flora taxa.	

2.4.4.1. BHP WAIO Conservation Significant Community

BHP WAIO define a 'Conservation Significant Community' as "Communities listed under the Federal Environment Protection and Biodiversity Conservation Act 1999 or endorsed by the Minister for Environment as Threatened Ecological Communities, communities listed as Priority Ecological Communities by the Department of Parks and Wildlife, or communities recognised as Environmentally Sensitive Areas by the Department of Parks and Wildlife" (BHP WAIO, 2016). The BHP WAIO definition varies from the Environmental Factor Guideline (EPA, 2016a) and both definitions have been evaluated separately.

2.4.5. Introduced Flora, Weeds of National Significance & Declared Plant Categories

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

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

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

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

2.6. Project Team & Licences

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

Table 2.8: Project Team & Licences

Staff	Qualification	Role	Project Tasks	Years of Experience	Flora Licence
Melissa Hay	BSc (Hons)	Principal Botanist	Report reviews	17	FB62000006-2
Dr Chris Shaw	PhD	Senior Botanist	Field survey, data management & analysis	7	FB62000241
Sarah Boys	BSc (Hons)	Botanist	Field survey, data management & analysis, reporting	5	FB62000386
Adam Crosby-Clark	BSc	Botanist	Reporting	3	FB620000349
Dr Udani Sirisena	PhD	Taxonomist	Plant identification	11	NA

2.7. Limitations & Constraints

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

Table 2.9: Survey Limitations & Constraints

Limitation	Constraint	Comment
Availability of the contextual information at a regional and local scale.	No	Beard vegetation, geology and land system mapping were used to determine regional significance of vegetation types. Database searches provided detailed information, adequate to guide field survey design, and effort for the flora survey. There were multiple assessments conducted within and in the vicinity of the Survey Area and have been included in the desktop assessment.
Competency/experience of the consultant carrying out the survey including experience in bioregion surveyed.	No	The project was overseen by Principal Botanist Melissa Hay who has extensive knowledge and experience conducting flora and fauna surveys the Pilbara region of Western Australia. The flora survey was led by Senior Botanist Dr Chris Shaw who has suitable knowledge and 7+ years' experience conducting botanical surveys in the Pilbara region of Western Australia.
Timing/weather/season/cycle.	No	The field survey timing was considered appropriate for a flora and vegetation survey conducted in the Pilbara region, where the appropriate timing is Autumn (March to May). There was higher than median rainfall at the Survey Area in the three months and year prior to the survey, providing optimal conditions for flora species growth.
Disturbances (e.g., fire, flood, accidental human intervention) which affected results of survey.	No	No disturbances were recorded at the Survey Area that have affected the results of the flora assessment.
Remoteness and/or access problems.	Minor	Access to the north-west of the Survey Area was restricted due to a lack of maintained tracks. As a result, approximately 250 ha (7.7%) of the Survey Area could not be assessed. To account for this, quadrat selection was reassessed to ensure that the vegetation types expected to be in this area were comparatively surveyed throughout the remainder of the Survey Area.
Survey effort and extent.	No	The 47 quadrats, and 18 relevés recorded from the Survey Area were sufficient to map and classify the vegetation for a detailed level survey. All floristic groups had a sufficient number of sites sampled, except for OT AspeArlaAsel Seh Asy, HP TmTp AaAayApr PtoErff, and HC TvAms CddHc, which only had one quadrat sampled per unit. These units were minor in their extent across the Survey Area.
Proportion of flora recorded and/or collected, any identification issues.	No	At least one specimen of every flora species encountered was collected for confirmation. SAC analysis suggested that 67% of the taxa expected to be present were recorded within quadrats and additional eight taxa were recorded in relevés and opportunistic sampling. Plants were identified by the Taxonomist Udani Sirisena who has botanical and taxonomic experience throughout Western Australia and is particularly experienced in the Pilbara region.

3. RESULTS & DISCUSSION – FLORA

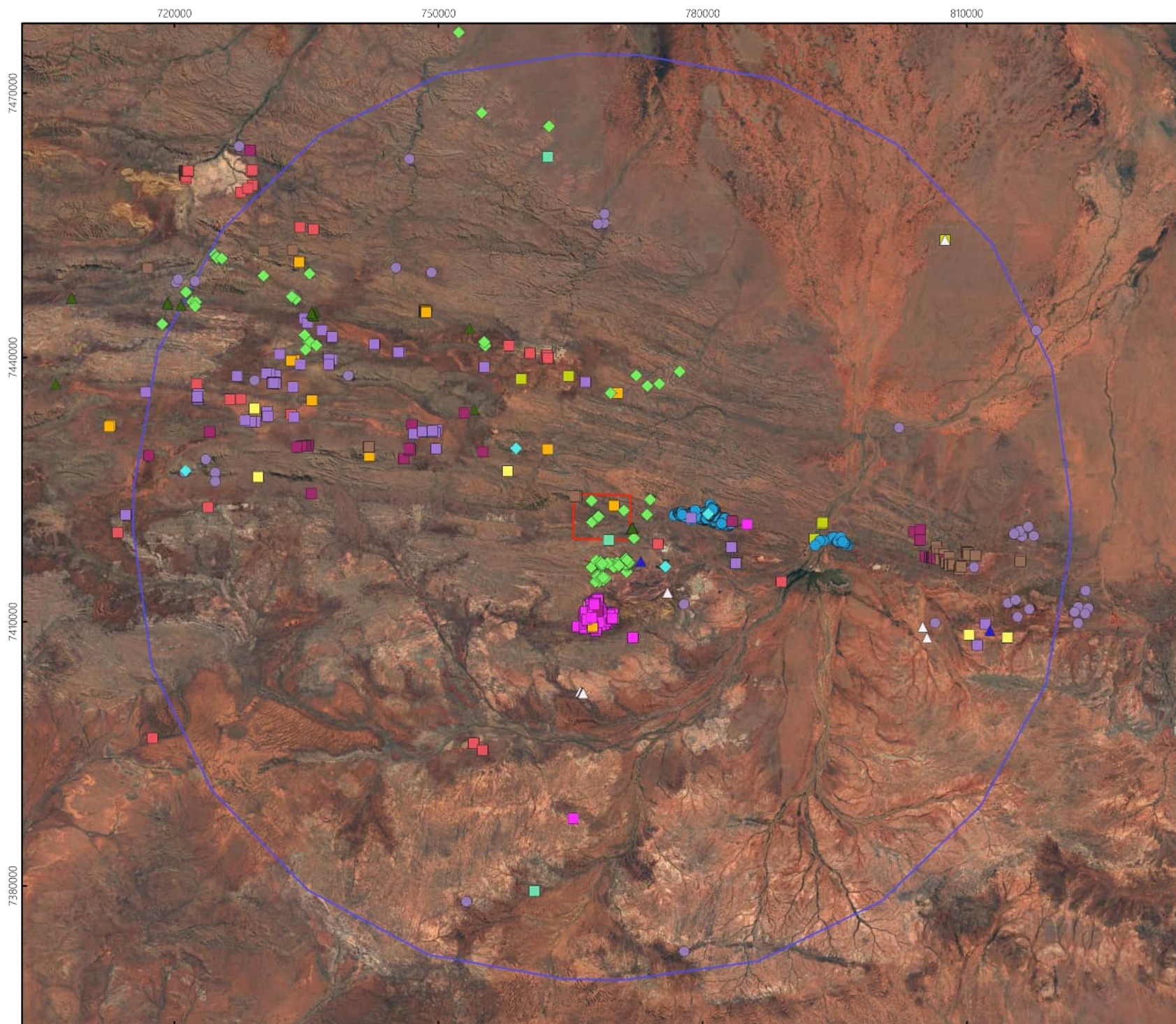
3.1. Desktop Assessment

No Threatened flora species were reported from within the Survey Area during the desktop assessment. Potential habitat for Threatened species was not identified within the Survey Area during the desktop assessment.

A total of 46 significant flora taxa were recorded during the desktop assessment. Three significant taxa were previously recorded in the Survey Area. Twelve taxa were considered to have a 'High' likelihood and 10 were considered to have a 'Medium' likelihood of occurrence within the Survey Area (Table 3.1; Map 3.1; Map 3.2). The remaining 21 taxa were assigned a 'Low' (Map 3.3) or 'Very Low' likelihood of occurrence and are listed in Appendix C.

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

Likelihood	Status	Taxa	Longevity	Lifeform
Recorded	P3	<i>Indigofera gilesii</i>	Perennial	Shrub
	P3	<i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739)	Perennial	Hummock Grass
	P4	<i>Lepidium catapycnon</i>	Perennial	Shrub
High	P2	<i>Ipomoea racemigera</i>	Annual	Climber
	P2	<i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i>	Annual	Herb
	P2	<i>Aristida lazardis</i>	Perennial	Herb
	P3	<i>Gymnanthera cunninghamii</i>	Perennial	Shrub
	P3	<i>Streptoglossa</i> sp. Cracking clays (S. van Leeuwen <i>et al.</i> PBS 7353)	Annual	Herb
	P3	<i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwen 4684)	Annual/Perennial	Herb
	P3	<i>Isotropis parviflora</i>	Perennial	Shrub
	P3	<i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727)	Annual	Herb
	P3	<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	Perennial	Herb
	P3	<i>Eremophila naaykensis</i>	Perennial	Shrub
	P4	<i>Eremophila magnifica</i> subsp. <i>magnifica</i>	Perennial	Shrub
	-	<i>Hibiscus</i> aff. <i>campanulatus</i>	Perennial/Annual	Shrub
Medium	P1	<i>Paranotis</i> sp. Pilbara (H. Ajduk HAOP04a)	Annual	Herb
	P3	<i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794)	Perennial	Shrub
	P3	<i>Acacia subtiliformis</i>	Perennial	Shrub
	P3	<i>Goodenia purpurascens</i>	Annual/Perennial	Herb
	P3	<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)	Perennial	Other Grass
	P3	<i>Grevillea saxicola</i>	Perennial	Shrub
	P3	<i>Eremophila magnifica</i> subsp. <i>velutina</i>	Perennial	Shrub
	P3	<i>Eremophila rigida</i>	Perennial	Shrub
	P4	<i>Acacia bromilowiana</i>	Perennial	Tree
	P4	<i>Eremophila youngii</i> subsp. <i>lepidota</i>	Perennial	Shrub



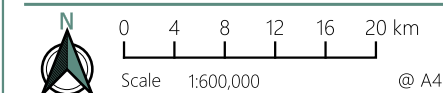
Legend

Survey Area

Study Area

Desktop Flora

- ▲ P2 - *Aristida lazaridis*
- ▲ P2 - *Euphorbia inappendiculata* var. *inappendiculata*
- △ P2 - *Ipomoea racemigera*
- P3 - *Aristida jerichoensis* var. *subspinulifera*
- P3 - *Eremophila naaykensis*
- P3 - *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727)
- P3 - *Gymnanthera cunninghamii*
- P3 - *Indigofera gilesii*
- P3 - *Isotropis parviflora*
- P3 - *Streptoglossa* sp. Cracking clays (S. van Leeuwen et al. PBS 7353)
- P3 - *Triodia* sp. Mt Ella (M.E. Trudgen 12739)
- P3 - *Vittadinia* sp. Coondewanna Flats (S. van Leeuwen 4684)
- ◆ P4 - *Eremophila magnifica* subsp. *magnifica*
- ◆ P4 - *Lepidium catapycnon*
- Novel - *Hibiscus* aff. *campanulatus*



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

Spectrum
ECOLOGY • SPATIAL

Author: ACC

Date: 21-08-2023

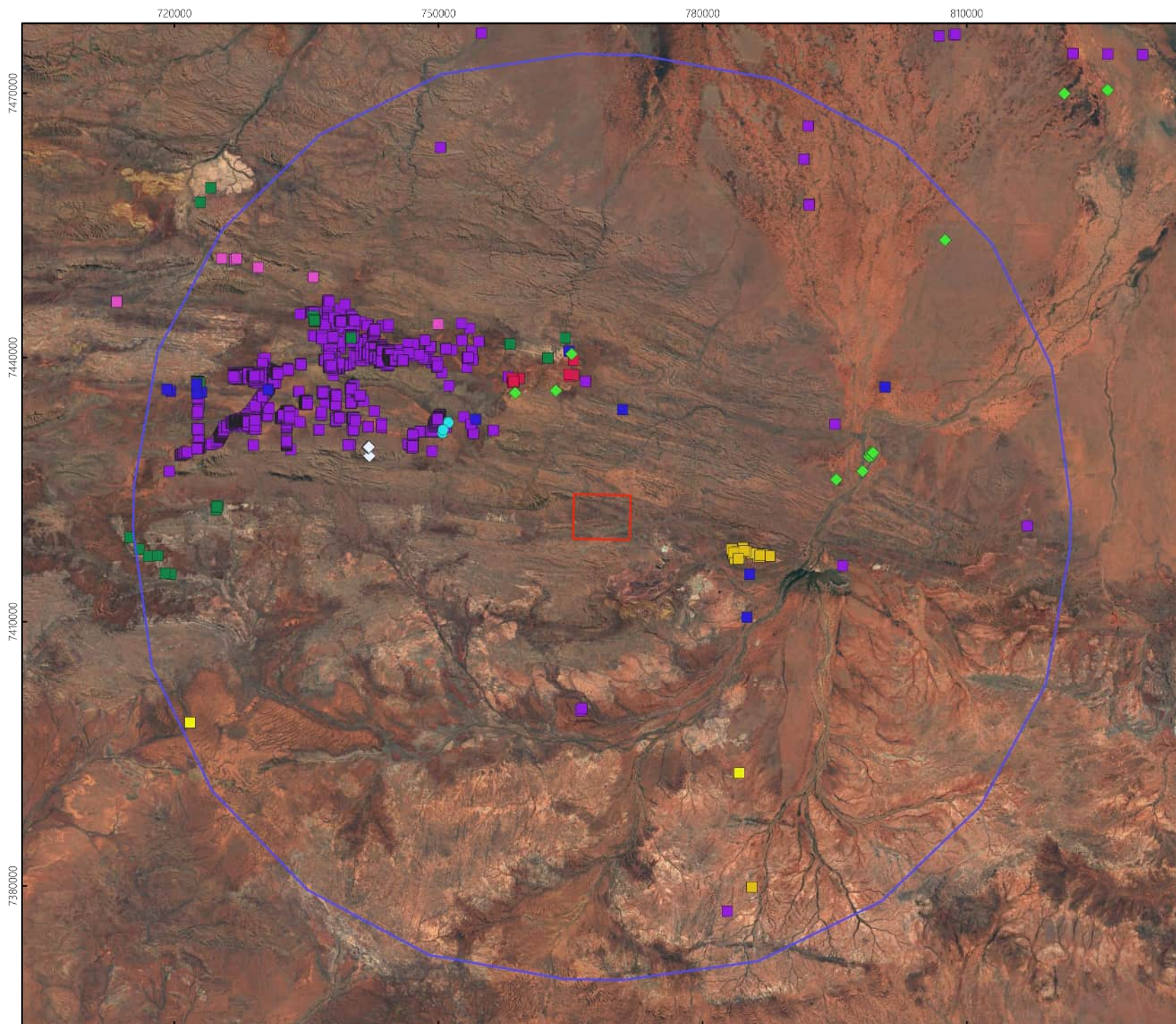
Desktop - Significant Flora - Recorded and High Likelihood

Homestead Creek & Cathedral Gorge

MAP

Prepared for
BHP WAIO

3.1



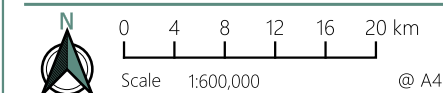
Legend

Survey Area

Study Area

Desktop Flora

- P1 - *Paranotis* sp. Pilbara (H. Ajduk HAOP04a)
- P3 - *Acacia subtiliformis*
- P3 - *Eremophila magnifica* subsp. *velutina*
- P3 - *Eremophila rigida*
- P3 - *Goodenia purpurascens*
- P3 - *Grevillea saxicola*
- P3 - *Rhagodia* sp. Hammersley (M. Trudgen 17794)
- P3 - *Themeda* sp. Hammersley Station (M.E. Trudgen 11431)
- ◊ P4 - *Acacia bromilowiana*
- ◆ P4 - *Eremophila youngii* subsp. *lepidota*



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



Author: ACC

Date: 08-08-2023

Desktop - Significant Flora - Medium Likelihood

Homestead Creek & Cathedral Gorge

MAP

Prepared for
BHP WAIO

3.2

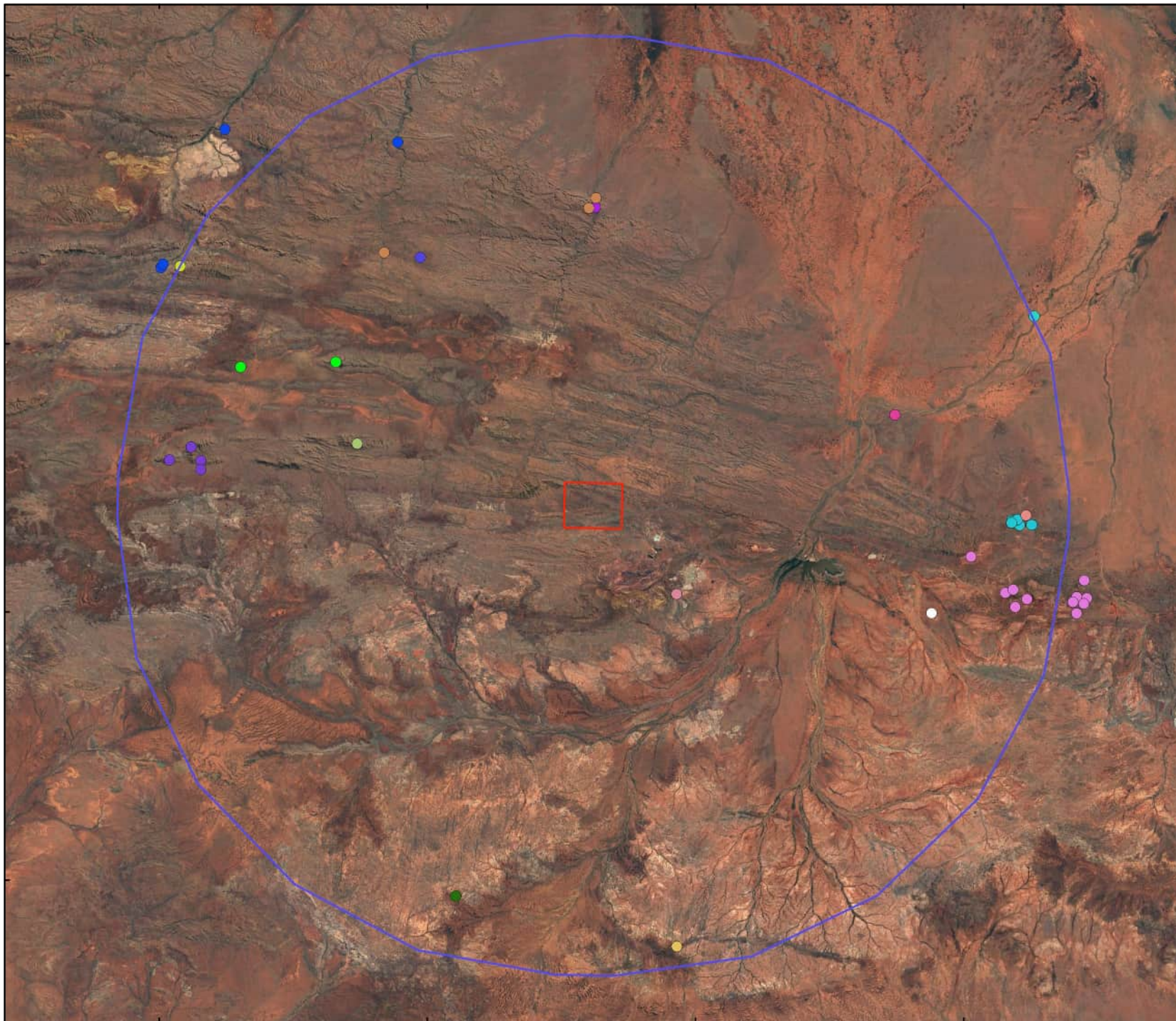
720000 750000 780000 810000

7470000

7440000

7410000

7380000



Legend

Survey Area

Study Area

Significant Flora

- P1 - *Acacia corusca*
- P1 - *Eremophila capricornica*
- P1 - *Eremophila rhexos*
- P2 - *Eragrostis* sp. Mt Robinson (S. van Leeuwen 4109)
- P2 - *Eremophila* sp. West Angelas (S. van Leeuwen 4068)
- P2 - *Goodenia hartiana*
- P2 - *Hibiscus* sp. Gurinbiddy Range (M.E. Trudgen MET 15708)
- P2 - *Oxalis* sp. Pilbara (M.E. Trudgen 12725)
- P3 - *Amaranthus centralis*
- P3 - *Crotalaria smithiana*
- P3 - *Dampiera metallorum*
- P3 - *Maireana prosthocochaeta*
- P3 - *Rostellularia adscendens* var. *latifolia*
- P3 - *Stylidium weeliwolli*
- P3 - *Swainsona thompsoniana*
- P4 - *Goodenia berringbinensis*
- P4 - *Sida* sp. Barlee Range (S. van Leeuwen 1642)



0 4 8 12 16 20 km

Scale 1:600,000

@ A4

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



Author: ACC

Date: 25-08-2023

Desktop - Significant Flora - Low Likelihood

Homestead Creek & Cathedral Gorge

MAP

Prepared for
BHP WAIO

3.3

3.2. Flora

A total of 278 taxa from 41 families and 122 genera were recorded within the Survey Area and are listed in Appendix D. The most species rich family was Fabaceae, with 58 taxa, followed by Poaceae with 51 species. The most species rich genera were *Acacia* with 25 taxa, followed by *Senna* with 13 taxa. Of the 278 taxa recorded, seven were significant flora taxa and nine were introduced flora taxa (Table 3.2).

Table 3.2: Number of Flora Taxa Recorded

Total Taxa	Native	Introduced	Total Families	Most Common Families	Total Genera	Most Common Genera	Most Common Taxa Based on % of Quadrats
278	269	9	41	Fabaceae – 58 Poaceae – 51 Malvaceae – 35 Myrtaceae – 15	122	<i>Acacia</i> – 25 <i>Senna</i> – 13 <i>Sida</i> – 10 <i>Eremophila</i> – 9	<i>Triodia pungens</i> – 93.6% <i>Senna artemisioides</i> subsp. <i>oligophylla</i> – 59.6% <i>Paraneurachne muelleri</i> – 59.6% * <i>Cenchrus ciliaris</i> – 51.1%

3.2.1. Species Accumulation Curve - Flora

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

A species accumulation curve is presented in Figure 3.1, which was plotted using the *specaccum* function in the *vegan* package in R v.4 (R Core Team, 2021). The improved Chao 2 non-parametric species richness estimator (Chiu *et al.*, 2014) was determined at 390 species (95% CI [334, 487]), suggesting that 67.4% of flora species were recorded during the survey, based on the 263 taxa recorded within the 47 quadrats and one relevé (R001). Should the additional taxa recorded during opportunistic collections and relevés be included in the total, it is suggested that 71.2% of the flora taxa were collected during the assessment.

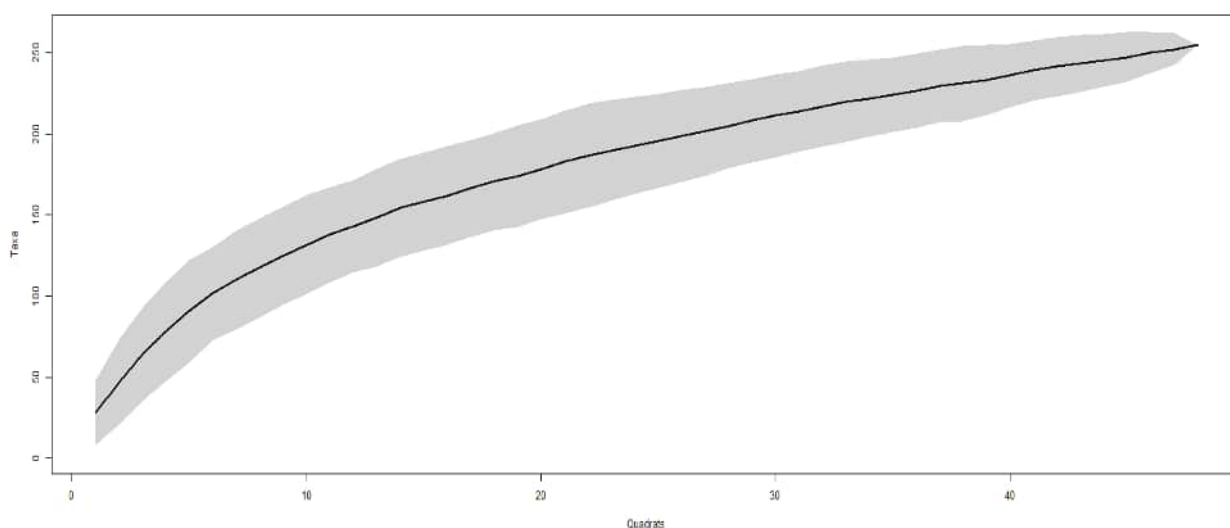


Figure 3.1: SAC – Flora

3.3. Significant Flora

No Threatened flora taxa were recorded or considered likely to occur in the Survey Area during the assessment. Six Priority flora taxa, one novel species and one range extension were recorded within the Survey Area (Table 3.3, Map 3.4):

- Priority 2 (P2): *Eragrostis* sp. Mt Robinson (S. van Leeuwen 4109) *Ipomoea racemigera*;
- Priority 3 (P3): *Dolichocarpa* sp. Hamersley Station (A.A. Mitchell 1479), *Indigofera gilesii*, and *Themeda* sp. Hamersley Station (M.E. Trudgen 11431);
- Priority 4 (P4): *Lepidium catapycnon*;
- Novel species: *Hibiscus* aff. *campanulatus*; and
- Range extension: *Goodenia heterochila*.

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

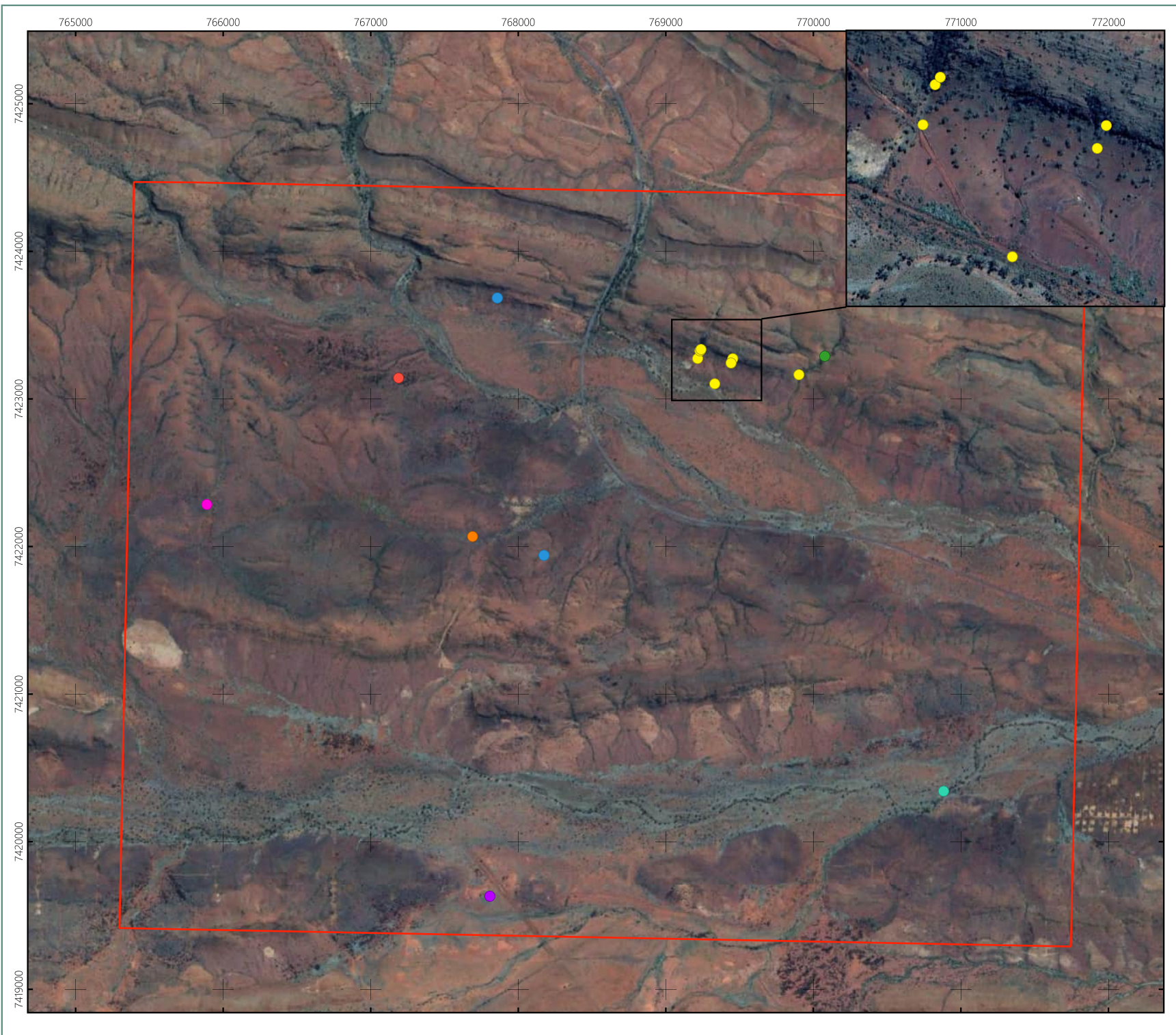
Table 3.3: Significant Flora

Status	Taxon	Description of Plants in Survey Area	Landforms in Survey Area	# of Individuals Recorded	Known Distribution ¹	Local & Regional Distribution	Photograph
P2	<i>Eragrostis</i> sp. Mt Robinson (S. van Leeuwen 4109)	Perennial grass to 0.4 m.	Dark brown to black sandy clay plain with abundant gravel ironstone.	4		Local: Known from one location in the local area (within 50km of Survey Area). Regional: Only known from within the Pilbara IBRA region.	
P2	<i>Ipomoea racemigera</i>	Climbing herb to 0.1 m.	Orange-brown sandy clay creek bank.	2		Local: Known from three locations in the local area. Regional: Known from within the Pilbara, Gascoyne, and Ord Victoria Plain IBRA regions.	
P3	<i>Dolichocarpa</i> sp. Hamersley Station (A.A. Mitchell 1479)	Erect herb to 0.1 m, flowering blue to purple.	Brown cracking clay plain with sparse ironstone gravel.	2		Local: Not known from the local area. Nearest records are from ~92km north-west of the Survey Area. Regional: Widespread within the Pilbara bioregion.	Image unavailable.

Status	Taxon	Description of Plants in Survey Area	Landforms in Survey Area	# of Individuals Recorded	Known Distribution ¹	Local & Regional Distribution	Photograph
P3	<i>Indigofera gilesii</i>	Shrub to 1 m.	Ironstone gorge with red-orange to brown clay soils.	7		Local: Known from multiple locations in the local area. Regional: Known from many scattered locations throughout the Pilbara, Gascoyne, Great Victorian Desert, and Murchison IBRA regions.	
P3	<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)	Blue-green tussock grass to 1 m.	Dark brown clay drainage line.	150		Local: Known from four locations in the local area. Regional: Widespread within the Pilbara bioregion.	
P4	<i>Lepidium catapycnon</i>	Branching shrub to 0.2 m with zig-zagging stems.	Stony ironstone slopes and minor hill drainage.	12		Local: Known from four locations in the Survey Area, and multiple locations within the local area. Regional: Widespread with the southern Pilbara bioregion.	

Status	Taxon	Description of Plants in Survey Area	Landforms in Survey Area	# of Individuals Recorded	Known Distribution ¹	Local & Regional Distribution	Photograph
Novel species	<i>Hibiscus</i> aff. <i>campanulatus</i>	Erect shrub 0.3 - 1.5 m high. Flowers purple with a distinctive purple spot at base of petal/corolla.	South facing steep slopes, gorges and gullies and drainage lines.	336	-	Local: Many records 5 km east of the Survey Area. Despite the number of records, this taxon is only known from one local population, of which the individuals recorded in this survey may be a continuation of. Regional: Large population known only from 5 km east of the Survey Area in the Pilbara bioregion.	

¹Maps supplied by The Australasian Virtual Herbarium (Council of Heads of Australasian Herbaria, 2023)

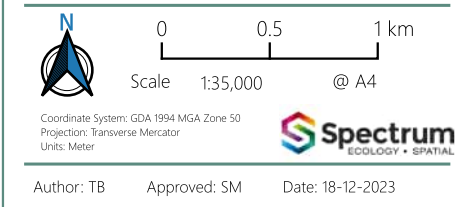


Legend

 Survey Area

Significant Flora Recorded

-  P2: *Eragrostis* sp. Mt Robinson (S. van Leeuwen 4109)
-  P2: *Ipomoea racemigera*
-  P3: *Dolichocarpa* sp. Hamersley Station (A.A. Mitchell 1479)
-  P3: *Indigofera gilesii*
-  P3: *Themeda* sp. Hamersley Station (M.E. Trudgen 11431)
-  P4: *Lepidium catapycnon*
-  Novel Taxon: *Hibiscus* aff. *campanulatus*
-  Range Extension: *Goodenia heterochila*



Significant Flora

Homestead Creek & Cathedral Gorge

3.3.1. Local & Regional Context of Significant Flora

Eragrostis sp. Mt Robinson (S. van Leeuwen 4109; P2) was recorded in Mulga woodland on clay plains, with four individuals recorded at one location. *Eragrostis* sp. Mt Robinson (S. van Leeuwen 4109) is previously known from one location in the local area, 30 km north-west of the Survey Area, where it was found on low, rocky hills with 2.0% cover (Western Australian Herbarium, 2023). It is known from only four locations in the Pilbara IBRA region and is considered locally significant.

Ipomoea racemigera (P2) was recorded along the bank of the Homestead Creek, with two individuals recorded from one location. *Ipomoea racemigera* is previously known from four locations in the local area, with records from 7 km to 35 km south to south-east of the Survey Area along creeks. *Ipomoea racemigera* is known from within the Pilbara, Gascoyne, and Ord Victoria Plain IBRA regions, and is not considered locally or regionally significant.

Dolichocarpa sp. Hamersley Station (A.A. Mitchell 1479; P3) was recorded on cracking clay plains, with two individuals recorded at one location. The species is not known from within the local area, with the nearest records 92 km north-west of the Survey Area, where it has been recorded on red-brown cracking clays with some pebbles (Western Australian Herbarium, 2023). *Dolichocarpa* sp. Hamersley Station (A.A. Mitchell 1479) is known only from the Pilbara IBRA region and is therefore not considered regionally significant but is considered locally significant due to the lack of records within the local area.

Indigofera gilesii (P3) was recorded in an ironstone gorge, with seven individuals recorded in one location, from near the desktop record within the Survey Area. *Indigofera gilesii* is known from this single location in the Survey Area, and from ten locations in the local area, with records to the north, south and west (Western Australian Herbarium, 2023). The closest records to the Survey Area are 6 km north-west (uncommon in a rocky gorge) and 8 to 10 km south (multiple individuals in rocky gorges). *Indigofera gilesii* is known from the Pilbara, Murchison, Gascoyne, and Great Victorian Desert IBRA regions, and is not considered locally or regionally significant.

Themeda sp. Hamersley Station (M.E. Trudgen 11431; P3) was recorded in a drainage line on dark brown clay, with 150 individuals recorded in one location. *Themeda* sp. Hamersley Station (M.E. Trudgen 11431) is previously known from five locations in the local area, at approximately 14 km north-west (2.0% cover on a red-brown loam valley floor) (Western Australian Herbarium, 2023), 16 records 10 km north (BHP database—no abundance or habitat information) and 14 records 16 km south-west (Ecologia, 2008). *Themeda* sp. Hamersley Station (M.E. Trudgen 11431) is widespread across the Pilbara IBRA region, on red-brown clay loam soils, low in the landscape, and is not considered locally or regionally significant.

Lepidium catapycnon (P4) was recorded on rocky slopes and minor hill drainage, with 12 individuals recorded in two locations. *Lepidium catapycnon* is known from four locations within the Survey Area (Onshore Environmental Consultants, 2009b, 2016), two of which were confirmed in this survey. It is also known from many locations 0.5 to 5 km south and west of Survey Area on rocky hillsides with skeletal red-brown loam soils. Regionally, it is widespread in the south of the Pilbara IBRA region. It is not considered locally or regionally significant.

Hibiscus aff. *campanulatus*, a novel species, was recorded on south facing steep slopes, gorges and gullies and drainage lines with 336 individuals recorded over ten locations. This novel taxon was recently recorded during a detailed flora and vegetation survey by Onshore Environmental (Onshore Environmental Consultants, 2016) approximately 6 km east of the Survey Area. The closest previously known records are located 5 km to the east of Survey Area (Spectrum, 2022), with the furthest records 25 km to the east. It is not known whether this is one continuous population or if there are multiple populations. *Hibiscus* aff.

campanulatus is considered to be local and regional significance as these are the only known records of the novel species. The individuals recorded during the current survey may be a continuation of the most western known population or may be a secondary population.

3.3.2. Post-Survey Review of Desktop Assessment Flora Taxa

Three Priority flora, *Indigofera gilesii* (P3), *Lepidium catapycnon* (P4), and *Triodia* sp. Mt Ella (M.E. Trudgen 12739; P3), were previously recorded in the Survey Area during the desktop assessment (Appendix C). Previous records of *Indigofera gilesii* (P3) and *Lepidium catapycnon* (P4) were visited and confirmed, however the records of *Triodia* sp. Mt Ella (M.E. Trudgen 12739; P3) in the north-west of the Survey Area could not be confirmed due to a lack of access in the area and the species occurring on rough terrain which is difficult to traverse. Other suitable habitat within the survey area was traversed but no other individuals of *Triodia* sp. Mt Ella (M.E. Trudgen 12739) were recorded during the survey.

All Priority flora assigned a pre-survey likelihood of 'High' retained their 'High' likelihood post-survey as matching habitat was found for all species in the Survey Area. This excludes *Ipomoea racemigera* which was initially assigned a 'High' likelihood but was recorded during the Survey. Of the Priority flora assigned a 'Medium' pre-survey likelihood, all retained their likelihood post-survey as there was suitable habitat in the Survey Area, except for *Acacia subtiliformis* (P3) which was assigned a post-survey likelihood of 'Low', as the species was not found on the calcrete substrate recorded in the Survey Area (vegetation type SS Tp AbPISal ExHc).

One species not identified during the desktop assessment was recorded during the survey. *Dolichocarpa* sp. Hamersley Station (A.A. Mitchell 1479; P3) is not known from within 90+ km of the Survey Area and therefore was not included in the pre-survey likelihood of occurrence assessment. Its post-survey likelihood has therefore been assigned as 'Present'. All significant flora post-survey likelihood are detailed in Appendix C.

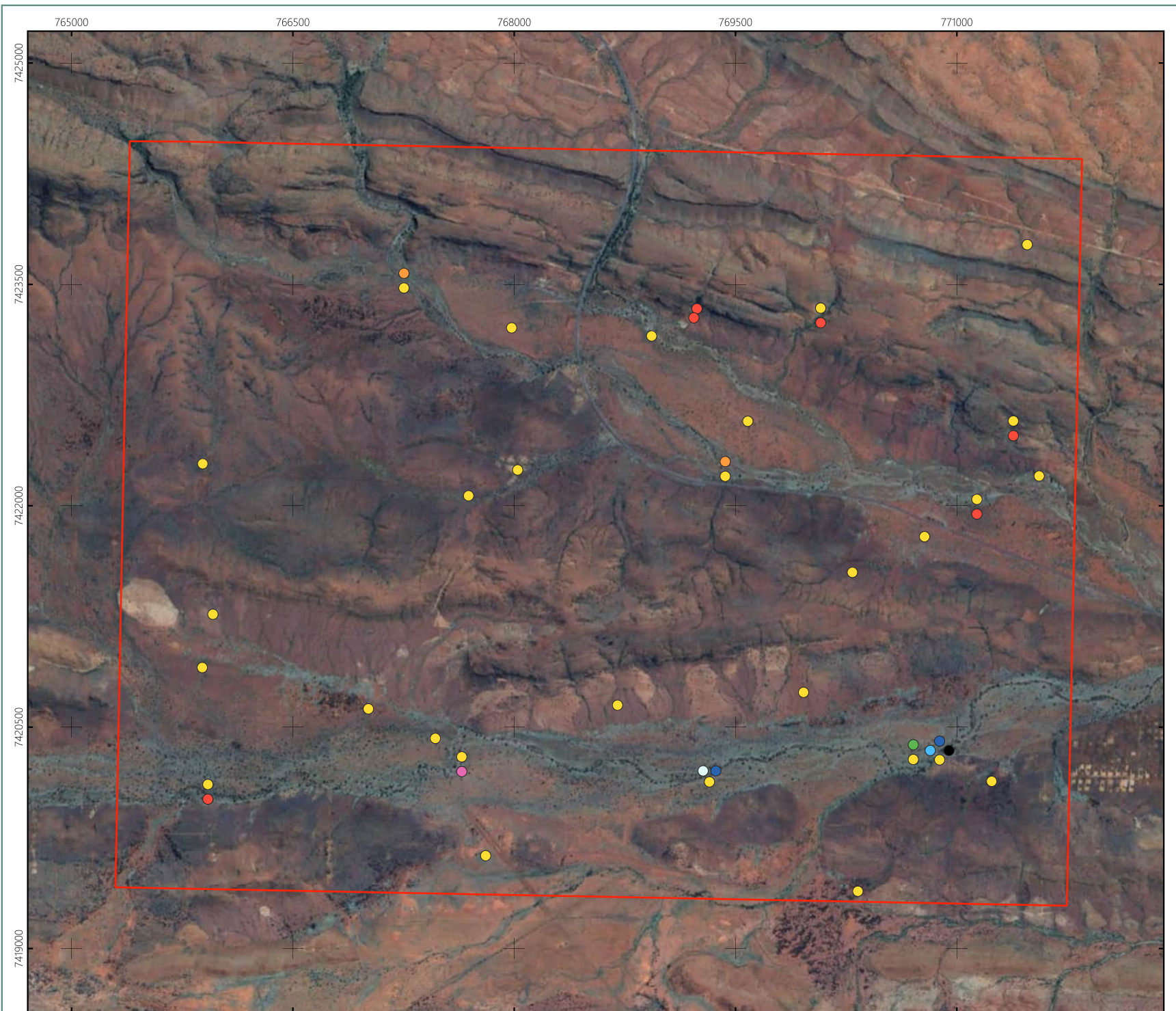
3.4. Introduced Flora

Nine introduced flora species were recorded at the Survey Area all of which are classified as permitted s11 weeds under the BAM Act. Of the introduced flora species recorded, **Cenchrus ciliaris* was the most prevalent across the Survey Area, particularly along creek lines, Mulga plains, and floodplains, and was the dominant understory species in one vegetation type (MA EvAci CcCyaSopl ApyTefc).

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

Table 3.4: Introduced Flora

Species	Abundance at the Survey Area	Environmental Significance
<i>*Bidens bipinnata</i>	132 individuals from six locations in gorges and one creek bank in the north of the Survey Area.	Permitted - s11
<i>*Bothriochloa pertusa</i>	One individual from one location along the Homestead Creek.	Permitted - s11
<i>*Cenchrus ciliaris</i>	6,834 individuals from multiple locations across the Survey Area.	Permitted - s11
<i>*Cenchrus setiger</i>	130 individuals from two locations along the northern creek.	Permitted - s11
<i>*Echinochloa colona</i>	Five individuals from one location along the Homestead Creek.	Permitted - s11
<i>*Malvastrum americanum</i>	Eight individuals from two locations along the Homestead Creek.	Permitted - s11
<i>*Sonchus oleraceus</i>	One individual from one location along the Homestead Creek.	Permitted - s11
<i>*Tribulus terrestris</i>	One individual from one location along the Homestead Creek.	Permitted - s11
<i>*Vachellia farnesiana</i>	One individual from one location along the Homestead Creek.	Permitted - s11

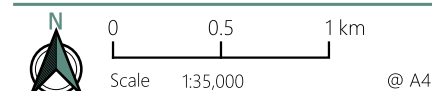


Legend

 Survey Area

Introduced Flora

-  *Bidens bipinnata*
-  *Bothriochloa pertusa*
-  *Cenchrus ciliaris*
-  *Cenchrus setiger*
-  *Echinochloa colona*
-  *Malvastrum americanum**
-  *Sonchus oleraceus*
-  *Tribulus terrestris*
-  *Vachellia farnesiana*



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



Author: SM

Date: 25-01-2024

Introduced Flora

Homestead Creek & Cathedral Gorge

MAP

Prepared for
BHP WAIO

3.5

4. RESULTS & DISCUSSION – VEGETATION

4.1. Desktop Assessment

4.1.1. TEC/PECs

No TECs or PECs were identified within the Survey Area during the desktop assessment. Six PECs and one TEC were identified as occurring within the Study Area (Map 1.1). Ethel Gorge aquifer stygobiont community occurs within 10 km of the Survey Area and is listed as Critically Endangered (DBCAs, 2023). However, Ethel Gorge aquifer stygobiont community is not a floristic community and therefore is not within the scope of this assessment. The remaining PECs are more than 30 km from the Survey Area and are not related to land systems or vegetation associations occurring within the Survey Area.

Therefore, the PECs were assigned a 'Low' likelihood of occurrence (Table 4.1; Map 1.1).

Table 4.1: TECs & PECs

Pre-survey Likelihood	Status	Name	Distance from Survey Area
Low	TEC – CR	Ethel Gorge aquifer stygobiont community	7.5 km
	PEC – P1	West Angelas Cracking-Clays	45.5 km
	PEC – P1	Weeli Wolli Spring Community	46.2 km
	PEC – P2	Riparian flora and plant communities of springs and river pools with high water permanence of the Pilbara Region	37.3 km
	PEC – P3	Vegetation of sand dunes of the Hamersley Range/ Fortescue Valley	30.5 km
	PEC – P3	Kumina Land System	32.6 km
	PEC – P3	Narbung Land System	38.9 km

4.1.2. Literature Review Significant Vegetation

Vegetation closely resembling the Priority 3 PEC Narbung Land System, described as “alluvial wash plains with prominent internal drainage supporting Snakewood and Mulga shrublands with halophytic low shrubs”, was identified during previously conducted flora surveys within 50 km of the Survey Area (Strategen JBS&G, 2020; Table 4-1). This land system was not recorded within the Survey Area, nor was its associated vegetation.

4.2. Vegetation Types

A total of 17 vegetation types were described from the Survey Area, including 11 derived from floristic analysis of quadrat data (Figure 4.1), and six additional structural groups, from both quadrat and relevé data (Table 4.2; Map 4.1).

The hills and slopes were grouped into five floristic groups (FS TvTpPamu EgHc AbAancAi, HC TpTvAms EllHc SeggSegpAhi, HS TpTwTv Ell SeggSegpAb, HS TbrTw Ai SeggSegp, and HC TvAms CddHc), and two structural groups (FS TbrTp AbSeaoSegl Ell, SS Tp AbPISal ExHc). The FS TvTpPamu EgHc AbAancAi floristic group was the most dominant in the Survey Area (23.4%) and was characterised by lower slopes supporting *Eucalyptus gamophylla* mid open mallee woodland with *Triodia* low open hummock grasslands. The HC TpTvAms EllHc SeggSegpAhi floristic group was the second most dominant in the Survey Area (20.7%) and was characterised by hills and crests supporting *Triodia vanleeuwenii* open hummock grasslands with *Eucalyptus leucophloia* subsp. *leucophloia* low open woodland. The HS TbrTw Ai SeggSegp floristic group (6.7%) was characterised by scree slopes supporting *Acacia inaequilatera* tall sparse shrubland, over *Triodia brizoides* and *Triodia wiseana* low open hummock grassland. The HC TvAms CddHc floristic group (3.1%) was characterised by hills and crests to the west of the Survey Area which supported *Corymbia deserticola* subsp. *deserticola* and *Hakea chordophylla* low open woodland, over *Triodia vanleeuwenii* low open hummock grassland.

The HS TpTwTv Ell SeggSegpAb floristic group (7.6%) was characterised by slopes and low hills with *Triodia pungens* low open hummock grassland with *Eucalyptus leucophloia* subsp. *leucophloia* low open woodland. The structural groups FS TbrTp AbSeaoSegl Ell (1.7%) and SS Tp AbPISal ExHc (0.2%) differed from the HS TpTwTv Ell SeggSegpAb floristic group by the understorey species for FS TbrTp AbSeaoSegl Ell (*Triodia brizoides* low sparse hummock grassland), and the overstorey for SS Tp AbPISal ExHc (*Eucalyptus xerothermica* and *Hakea chordophylla* low open woodland). FS TbrTp AbSeaoSegl Ell occurred on low undulating slopes with quartz, and SS Tp AbPISal ExHc on low rises with calcrete gravel.

The plains were grouped into four floristic groups (SA TpPamu EgEx AtenSeaoAb, OT AspeArlaAsel Seh Asy, and HP TmTp AaAayApr PtoErff), and two additional structural groups (SS TpDibEua AprAa ApaPI and ME TtCcTp EtEx AdIngSivg). The SA TpPamu EgEx AtenSeaoAb floristic group (5.3%) was characterised by brown sandy clay plains in the north of the Survey Area which support *Eucalyptus gamophylla* and *Eucalyptus xerothermica* low open woodland, over *Triodia pungens* mid open hummock grassland. The SS TpDibEua AprAa ApaPI structural group (1.9%) differed to the SA TpPamu EgEx AtenSeaoAb vegetation type by the overstorey of *Acacia pruinocarpa* and *Acacia aptaneura* low open woodland which occurred on brown stony clay plains. The ME TtCcTp EtEx AdIngSivg structural group (0.4%) which occurred on brown clay drainage on flats also differed in the overstorey, which was characterised by *Eucalyptus trivalva* and *Eucalyptus xerothermica* low woodlands. The OT AspeArlaAsel Seh Asy floristic group (2.9%) was characterised by *Astrelba pectinata*, *Aristida latifolia*, and *Astrelba elymoides* mid tussock grassland on clay plains in the south of the Survey Area. The HP TmTp AaAayApr PtoErff floristic group (2.5%) was characterised by Mulga woodlands with *Triodia melvillei* open hummock grasslands on dark brown clay plains.

The drains and floodplains were grouped into three floristic groups (FP Cc AdApaPI CooHall, MA EvAci CcCyaSopl ApyTefc, and MA EvAci CcCyaSopl ApyTefc), and three additional structural groups (ME TtEaTp CoasEx AdIngSisl, MA EcoEvAci CcCya ApyTefc, and MA EvAci CcCyaSopl ApyTefc). The FP Cc AdApaPI CooHall floristic group (15.0%) was characterised by floodplains supporting *Corymbia opaca* and *Hakea lorea* subsp. *lorea* low open woodland, over *Cenchrus ciliaris* mid open tussock grassland. The ME TtEaTp CoasEx AdIngSisl structural group (2.3%) was characterised by *Corymbia aspera* and *Eucalyptus xerothermica* low open woodland with *Themeda triandra* and *Eulalia aurea* mid open tussock grassland on

brown clay drainage lines on flats. The DMI AmAnlGoro TpTt Ch 2 floristic group (3.0%) was characterised by gorges and minor drainage lines on hills supporting a tall open shrubland of *Acacia monticola*, *Androcalva luteiflora*, and *Gossypium robinsonii*, with *Corymbia hamersleyana* and +/-*Eucalyptus leucophloia* subsp. *leucophloia* low open woodland. The MA EvAci CcCyaSopl ApyTefc floristic group (1.6%) was characterised by *Eucalyptus victrix* and *Acacia citrinoviridis* low woodland over open mixed tussock grassland on the northern major drainage lines. The MA EcoEvAci CcCya ApyTefc floristic group (0.7%) differed from MA EvAci CcCyaSopl ApyTefc in the presence of *Eucalyptus camaldulensis* subsp. *obtusata* and sparse tussock grassland understorey and occurred on the southern major drainage lines.

Areas which were cleared for roads and infrastructure were mapped as 'Cleared' and not assigned a vegetation type.

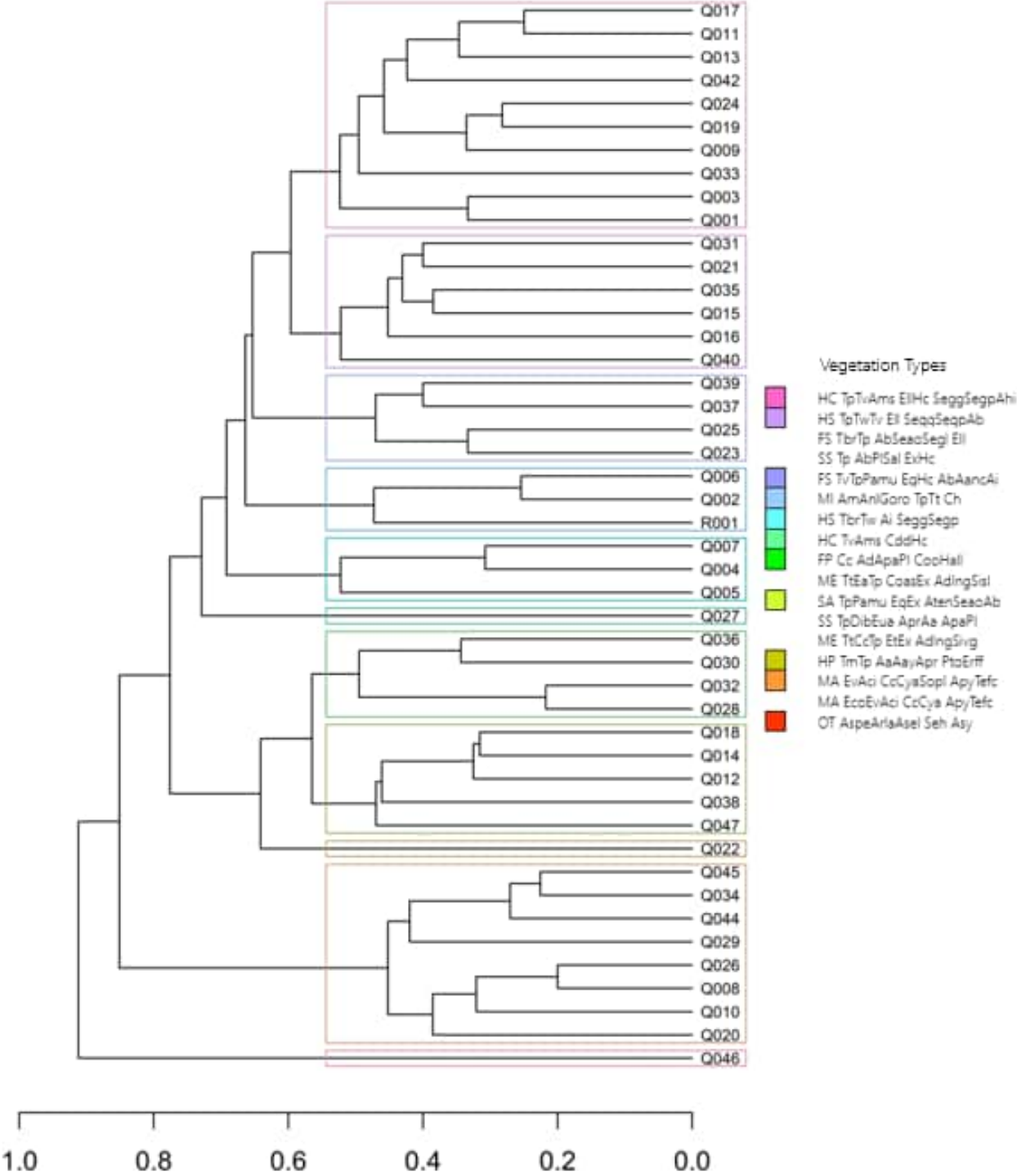


Figure 4.1: Dendrogram of Floristic Analysis

Table 4.2: Vegetation Types

Vegetation Code & Description (NVIS)	Associated Species	Landform	Sites	Area & %	Representative Photo
Hills & Slopes					
BHP: FS TvTpPamu EgHc AbAancAi Very Open Hummock Grassland of <i>Triodia vanleeuwenii</i> and <i>T. pungens</i> with Scattered Tussock Grasses of <i>Paraneurachne muelleri</i> with Open Woodland of <i>Eucalyptus gamophylla</i>, <i>Hakea chordophylla</i> with Very Open Shrubland of <i>Acacia bivenosa</i>, <i>A. ancistrocarpa</i>, and <i>A. inaequilatera</i> on red-orange to brown sandy clay with ironstone on lower slopes. NVIS: <i>Eucalyptus gamophylla</i> and <i>Hakea chordophylla</i> low open woodland, over <i>Acacia bivenosa</i>, <i>Acacia ancistrocarpa</i>, and <i>Acacia inaequilatera</i> mid sparse shrubland, over <i>Triodia vanleeuwenii</i> and <i>Triodia pungens</i> low open hummock grassland, with <i>Paraneurachne muelleri</i> low sparse tussock grassland.	<i>Acacia pachyacra</i>, <i>Acacia rhodophloia</i>, <i>Amphipogon sericeus</i>, <i>Duperreya commixta</i>, <i>Indigofera monophylla</i>, <i>Soda arenicola</i>, <i>Triodia pungens</i>	Red-orange to brown sandy clay with ironstone on lower slopes.	Q023 Q025 Q037 Q039 Q041 Q043 R017 R018	765.4 ha 23.4%	
BHP: HC TpTvAms EllHc SeggSegpAhi Open Hummock Grassland of <i>Triodia pungens</i> and <i>T. vanleeuwenii</i> with Very Open Tussock Grassland of <i>Amphipogon sericeus</i> with Low Open Woodland of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> and <i>Hakea chordophylla</i>, with Open Shrubland of <i>Senna glutinosa</i> subsp. <i>glutinosa</i> and <i>S. glutinosa</i> subsp. <i>pruinosa</i>, and <i>Acacia hilliana</i> on red-orange to brown rocky ironstone hills and crests. NVIS: <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> and <i>Hakea chordophylla</i> low open woodland, over <i>Senna glutinosa</i> subsp. <i>glutinosa</i> and <i>Senna glutinosa</i> subsp. <i>pruinosa</i> mid sparse shrubland, with <i>Acacia hilliana</i> low sparse shrubland, over <i>Triodia vanleeuwenii</i> and <i>Triodia pungens</i> low open hummock grassland, with <i>Amphipogon sericeus</i> low open tussock grassland.	<i>Acacia spondylophylla</i>, <i>Eriachne lanata</i>, <i>Acacia adoxa</i> var. <i>adoxo</i>, <i>Corymbia hamersleyana</i>, <i>Scaevola browniana</i> subsp. <i>browniana</i>, <i>Eriachne mucronata</i>, <i>Dampiera candidans</i>, <i>Goodenia triodiophila</i>	Red-orange to brown clay soils on rocky ironstone hills and crests.	Q001 Q003 Q009 Q011 Q013 Q017 Q019 Q024 Q042 R004 R012	675.3 ha 20.7%	
BHP: HS TpTwTv Ell SeggSegpAb Open Hummock Grassland of <i>Triodia pungens</i>, <i>T. wiseana</i>, and <i>T. vanleeuwenii</i> with Low Open Woodland of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> with Open Shrubland of <i>Senna glutinosa</i> subsp. <i>glutinosa</i>, <i>S. glutinosa</i> subsp. <i>pruinosa</i>, and <i>Acacia bivenosa</i> on red-orange to brown rocky ironstone upper and mid slopes. NVIS: <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> low open woodland, over <i>Senna glutinosa</i> subsp. <i>glutinosa</i>, <i>Senna glutinosa</i> subsp. <i>pruinosa</i>, and <i>Acacia bivenosa</i> mid sparse shrubland, over <i>Triodia pungens</i> (+/- <i>Triodia wiseana</i> and <i>Triodia vanleeuwenii</i>) low open hummock grassland.	<i>Acacia bivenosa</i>, <i>Eriachne mucronata</i>, <i>Eremophila latrobei</i>, <i>Lepidium catapycnon</i> (P4), <i>Ptilotus astrolasius</i>, <i>Ptilotus obovatus</i>, <i>Senna glutinosa</i> subsp. <i>x. luerssenii</i>, <i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925), <i>Solanum lasiophyllum</i>, <i>Triodia brizoides</i>	Red-orange to brown rocky ironstone upper and mid slopes.	Q015 Q016 Q021 Q031 Q033 Q040 R005	248.4 ha 7.6%	

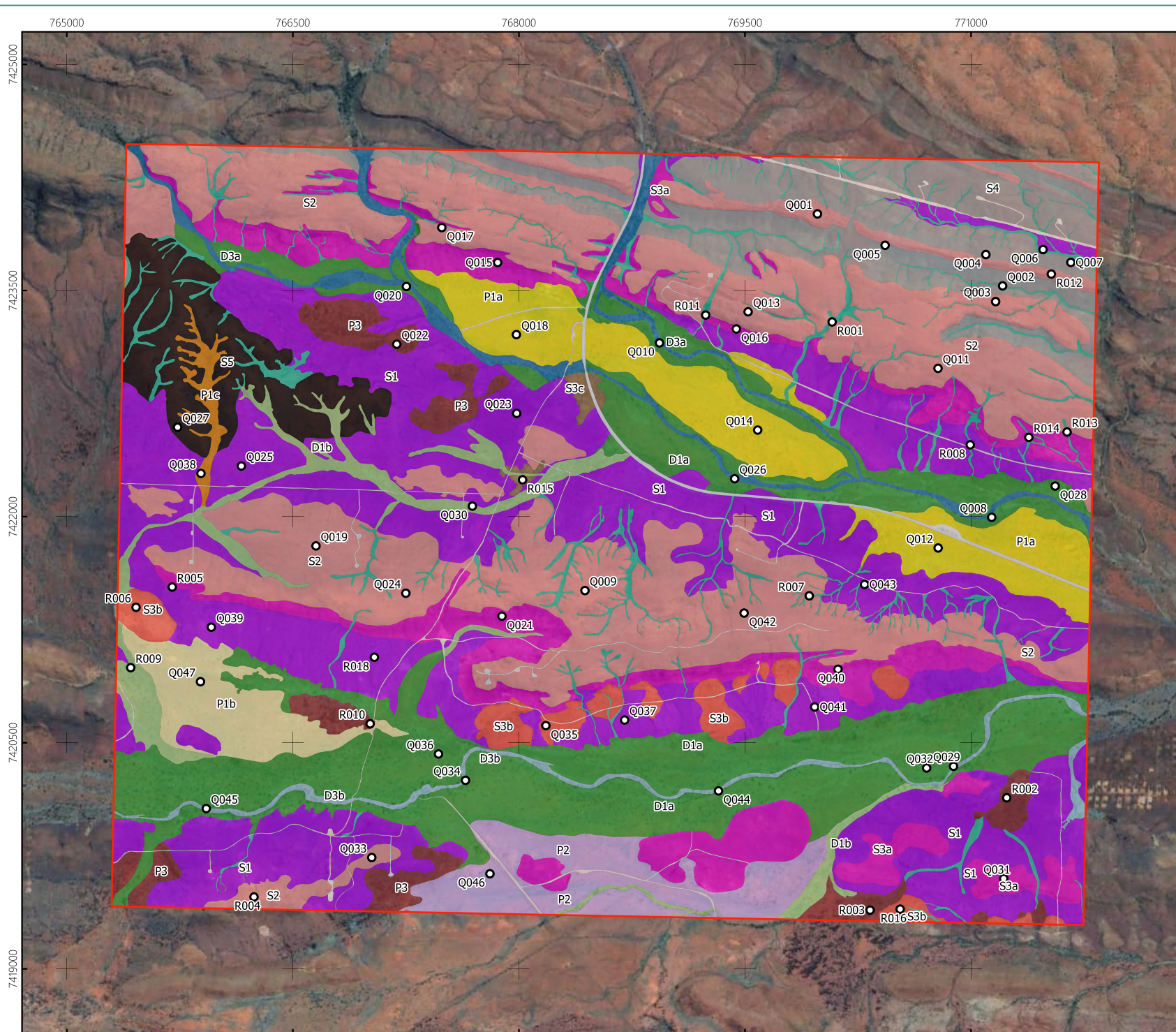
Vegetation Code & Description (NVIS)	Associated Species	Landform	Sites	Area & %	Representative Photo
BHP: FS TbrTp AbSeaoSegl Ell Very Open Hummock Grassland of <i>Triodia brizoides</i> and <i>T. pungens</i> with Low Open Shrubland of <i>Acacia bivenosa</i>, <i>Senna artemisioides</i> subsp. <i>oligophylla</i>, and <i>S. glutinosa</i> subsp. <i>x. luerssenii</i> with Scattered Low Trees of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> on red-orange to brown clay soils with ironstone and quarts on low undulating hills. NVIS: <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> low open woodland, over <i>Acacia bivenosa</i>, <i>Senna artemisioides</i> subsp. <i>oligophylla</i>, and <i>Senna glutinosa</i> subsp. <i>x. luerssenii</i> low sparse shrubland, over <i>Triodia brizoides</i> and <i>Triodia pungens</i> low sparse hummock grassland.	<i>Triodia angusta</i> , <i>Triodia wiseana</i> , <i>Ptilotus australasicus</i>	Red-orange to brown clay soils with ironstone and quarts on low undulating hills.	Q035 R006 R016	54.4 ha 1.7%	
BHP: SS Tp AbPISal ExHc Open Tussock Grassland of <i>Triodia pungens</i> with Open Shrubland of <i>Acacia bivenosa</i>, <i>Petalostylis labicheoides</i> and <i>Santalum lanceolatum</i> with Low Open Woodland of <i>Eucalyptus xerothermica</i> and <i>Hakea chordophylla</i> on orange-brown sandy clay loam soils with calcrete gravel. NVIS: <i>Eucalyptus xerothermica</i> and <i>Hakea chordophylla</i> low open woodland, over <i>Acacia bivenosa</i>, <i>Petalostylis labicheoides</i>, and <i>Santalum lanceolatum</i> mid sparse shrubland, over <i>Triodia pungens</i> low open tussock grassland.	* <i>Cenchrus ciliaris</i> , <i>Eremophila longifolia</i> , <i>Ptilotus astrolasius</i> , <i>Ptilotus obovatus</i> , <i>Sida fibulifera</i>	Orange-brown sandy clay loam soils on rises with calcrete gravel.	R015	7.0 ha 0.2%	
BHP: HS TbrTw Ai SeggSegp Very Open Hummock Grassland of <i>Triodia brizoides</i> and <i>T. wiseana</i> with Tall Sparse Shrubland of <i>Acacia inaequilatera</i> with Low Scattered Shrubs of <i>Senna glutinosa</i> subsp. <i>glutinosa</i> and <i>S. glutinosa</i> subsp. <i>pruinosa</i> on red-orange to brown rocky ironstone scree slopes. NVIS: <i>Acacia inaequilatera</i> tall sparse shrubland, over <i>Senna glutinosa</i> subsp. <i>glutinosa</i> and <i>Senna glutinosa</i> subsp. <i>pruinosa</i> low sparse shrubland, over <i>Triodia brizoides</i> and <i>Triodia wiseana</i> low open hummock grassland.	<i>Acacia spondylophylla</i> , <i>Paraneurachne muelleri</i> , <i>Ptilotus astrolasius</i> , <i>Senna artemisioides</i> subsp. <i>oligophylla</i> , <i>Triodia wiseana</i>	Red-orange to brown rocky ironstone scree slopes.	Q004 Q005 Q007	218.4 ha 6.7%	

Vegetation Code & Description (NVIS)	Associated Species	Landform	Sites	Area & %	Representative Photo
BHP: HC TvAms CddHc Open Hummock Grassland of <i>Triodia vanleeuwenii</i> with Scattered Tussock Grasses of <i>Amphipogon sericeus</i> with Scattered Low Trees of <i>Corymbia deserticola</i> subsp. <i>deserticola</i> and <i>Hakea chordophylla</i> on light brown clay soils on rocky ironstone hills. NVIS: <i>Corymbia deserticola</i> subsp. <i>deserticola</i> and <i>Hakea chordophylla</i> low open woodland, over <i>Triodia vanleeuwenii</i> low open hummock grassland, with <i>Amphipogon sericeus</i> low sparse tussock grassland.	<i>Acacia adsurgens</i> , <i>Acacia inaequilatera</i> , <i>Triodia pungens</i>	Light brown clay soils on rocky ironstone hills.	Q027	99.7 ha 3.1%	
Plains					
BHP: SA TpPamu EgEx AtenSeaoAb Open Hummock Grassland of <i>Triodia pungens</i> with Scattered Tussocks of <i>Paraneurachne muelleri</i> with Low Open Woodland of <i>Eucalyptus gamophylla</i> and <i>E. xerothermica</i> with Open Shrubland of <i>Acacia tenuissima</i>, <i>Senna artemisioides</i> subsp. <i>oligophylla</i> and <i>A. bivenosa</i> on orange to brown sandy clay plains. NVIS: <i>Eucalyptus gamophylla</i> and <i>Eucalyptus xerothermica</i> low open woodland, over <i>Acacia tenuissima</i>, <i>Senna artemisioides</i> subsp. <i>oligophylla</i>, and <i>Acacia bivenosa</i> mid sparse shrubland, over <i>Triodia pungens</i> mid open hummock grassland, with <i>Paraneurachne muelleri</i> sparse tussock grassland.	<i>Acacia adsurgens</i> , <i>Acacia dictyophleba</i> , <i>Eragrostis eriopoda</i> , <i>Ptilotus astrolasius</i> , <i>Hibiscus sturtii</i> , <i>Jasminum didymum</i> subsp. <i>lineare</i> , <i>Sida</i> sp. L (A.M. Ashby 4202)	Orange to brown sandy clay plains.	Q012 Q014 Q018	171.7 ha 5.3%	
BHP: SS TpDibEua AprAa ApaPI Open Hummock Grassland of <i>Triodia pungens</i> with Very Open Tussock Grassland of <i>Digitaria brownii</i> and <i>Eulalia aurea</i> with Low Open Woodland of <i>Acacia pruinocarpa</i> and <i>A. aptaneura</i> with Tall Open Shrubland of <i>A. pachyacra</i> and <i>Petalostylis labicheoides</i> on brown stony clay plains. NVIS: <i>Acacia pruinocarpa</i> and <i>Acacia aptaneura</i> low open woodland, over <i>Acacia pachyacra</i> and <i>Petalostylis labicheoides</i> tall sparse shrubland, over <i>Triodia pungens</i> mid open hummock grassland, with <i>Digitaria brownii</i> and <i>Eulalia aurea</i> mid sparse tussock grassland.	<i>Acacia dictyophleba</i> , <i>Ptilotus australasicus</i> , <i>Senna artemisioides</i> subsp. <i>oligophylla</i>	Brown stony clay plains.	Q047	62.1 ha 1.9%	

Vegetation Code & Description (NVIS)	Associated Species	Landform	Sites	Area & %	Representative Photo
BHP: ME TtCcTp EtEx AdIngSivg Open Tussock Grassland of <i>Themeda triandra</i> and <i>*Cenchrus ciliaris</i>, with Open Hummock grassland of <i>Triodia pungens</i> with Low Woodland of <i>Eucalyptus trivalva</i> and <i>Eucalyptus xerothermica</i> with Low Open Shrubland of <i>Sida</i> sp. L (A.M. Ashby 4202) on brown clay drainage lines on flats. NVIS: <i>Eucalyptus trivalva</i> and <i>Eucalyptus xerothermica</i> low woodland, over <i>Sida</i> sp. L (A.M. Ashby 4202) low sparse shrubland, over <i>Themeda triandra</i> and <i>*Cenchrus ciliaris</i> mid open tussock grassland, with <i>Triodia pungens</i> mid sparse hummock grassland.	<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>, <i>Sorghum plumosum</i>, <i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431; P3)	Brown clay drainage lines on flats.	Q038	12.6 ha 0.4%	
BHP: OT AspeArlaAsel Seh Asy Tussock Grassland of <i>Astrebla pectinata</i>, <i>Aristida latifolia</i>, and <i>Astrebla elymoides</i> with Scattered Low Shrubs of <i>Senna hamersleyensis</i> with Scattered Shrubs of <i>Acacia synchronicia</i> on brown cracking clay plains with sparse ironstone gravel. NVIS: <i>Acacia synchronicia</i> mid sparse shrubland, over <i>Senna hamersleyensis</i> low sparse shrubland, over <i>Astrebla pectinata</i>, <i>Aristida latifolia</i>, and <i>Astrebla elymoides</i> mid tussock grassland.	<i>Chrysopogon fallax</i>, <i>Eragrostis setifolia</i>, <i>Eragrostis xerophila</i>, <i>Dichanthium sericeum</i> subsp. <i>humilius</i>, <i>Iseilema vaginiflorum</i>	brown cracking clay plains with sparse ironstone gravel.	Q046	93.2 ha 2.9%	
BHP: HP TmTp AaAayApr PtoErff Open Hummock Grassland of <i>Triodia melvillei</i> and <i>T. pungens</i> with Low Open Woodland of <i>Acacia aptaneura</i>, <i>A. ayersiana</i>, and <i>A. pruinocarpa</i> with Open Shrubland of <i>Ptilotus obovatus</i> and <i>Eremophila forrestii</i> subsp. <i>forrestii</i> on dark brown clay plains. NVIS: <i>Acacia aptaneura</i>, <i>Acacia ayersiana</i>, and <i>Acacia pruinocarpa</i> low woodland, over <i>Ptilotus obovatus</i> and <i>Eremophila forrestii</i> subsp. <i>forrestii</i> mid sparse shrubland, over <i>Triodia melvillei</i> and <i>Triodia pungens</i> mid open hummock grassland.	<i>*Cenchrus ciliaris</i>, <i>Eragrostis</i>?sp. Mt Robinson (S. van Leeuwen 4109; P2), <i>Hakea lorea</i> subsp. <i>lorea</i>, <i>Hibiscus burtonii</i>, <i>Rhagodia eremaea</i>, <i>Senna artemisioides</i> subsp. <i>helmsii</i>, <i>Senna artemisioides</i> subsp. <i>oligophylla</i>, <i>Sorghum plumosum</i>	Dark brown clay plains.	Q022 R002 R003 R010	80.8 2.5%	

Vegetation Code & Description (NVIS)	Associated Species	Landform	Sites	Area & %	Representative Photo
Drains & Flood Plains					
BHP: FP Cc AdApaPl CoaHall Open Tussock Grassland of <i>*Cenchrus ciliaris</i> with Tall Open Shrubland <i>Acacia dictyophleba</i>, <i>A. pachyacra</i> and <i>Petalostylis labicheoides</i> with Low Scattered Trees of <i>Corymbia opaca</i> and <i>Hakea lorea</i> subsp. <i>lorea</i> on brown sandy clay floodplains. NVIS: <i>Corymbia opaca</i> and <i>Hakea lorea</i> subsp. <i>lorea</i> low open woodland, over <i>Acacia dictyophleba</i>, <i>Petalostylis labicheoides</i>, and <i>Acacia pachyacra</i> tall open shrubland, over <i>*Cenchrus ciliaris</i> mid open tussock grassland.	<i>Themeda triandra</i>, <i>Sida</i> sp. L (A.M. Ashby 4202), <i>Salsola australis</i>, <i>Bonamia erecta</i>, <i>Polymeria calycina</i>, <i>Cleome viscosa</i>	Brown sandy clay floodplains.	Q028 Q032 Q036	490.2 ha 15.0%	
BHP: ME TtEaTp CoasEx AdIngSisI Open Tussock Grassland of <i>Themeda triandra</i> and <i>Eulalia aurea</i>, with Open Hummock grassland of <i>Triodia pungens</i> with Low Open woodland of <i>Corymbia aspera</i> and <i>Eucalyptus xerothermica</i> with Open Shrubland of <i>Acacia dictyophleba</i>, <i>Indigofera georgei</i> and <i>Sida</i> sp. L (A.M. Ashby 4202) on brown clay drainage lines on flats. NVIS: <i>Corymbia aspera</i> and <i>Eucalyptus xerothermica</i> low open woodland, over <i>Acacia dictyophleba</i>, <i>Indigofera georgei</i>, and <i>Sida</i> sp. L (A.M. Ashby 4202) mid sparse shrubland, over <i>Themeda triandra</i> and <i>Eulalia aurea</i> mid open tussock grassland, with <i>Triodia pungens</i> mid sparse hummock grassland.	<i>Androcalva loxophylla</i>, <i>Goodenia stellata</i>, <i>Paraneurachne muelleri</i>, <i>Sorghum plumosum</i>	Brown clay drainage lines on flats.	Q030 R009	76.6 ha 2.3%	
BHP: MI AmAnIGoro TpTt Ch High Shrubland of <i>Acacia monticola</i>, <i>Androcalva luteiflora</i>, and <i>Gossypium robinsonii</i> with Very Open Hummock Grassland of <i>Triodia pungens</i> and Very Open Tussock Grassland of <i>Themeda triandra</i> with Low Open Woodland of <i>Corymbia hamersleyana</i> on red-orange to brown sandy clay soils with large ironstone boulders in gorges and minor drainage lines on hills. NVIS: <i>Corymbia hamersleyana</i> and +/- <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> low open woodland, over <i>Acacia monticola</i>, <i>Androcalva luteiflora</i>, and <i>Gossypium robinsonii</i> tall open shrubland, over <i>Triodia pungens</i> mid open hummock grassland, with <i>Themeda triandra</i> mid sparse tussock grassland.	<i>Acacia ancistrocarpa</i>, <i>Acacia bivenosa</i>, <i>Acacia tumida</i>, <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>, <i>Hibiscus</i> aff. <i>campanulatus</i>, <i>Indigofera monophylla</i>, <i>Indigofera gilesii</i> (P3), <i>Lepidium catapycnon</i> (P4), <i>Petalostylis labicheoides</i>, <i>Santalum lanceolatum</i>, <i>Senna glutinosa</i> subsp. <i>glutinosa</i>	Red-orange to brown sandy clay soils with large ironstone boulders in gorges and minor drainage lines on hills.	Q002 Q006 R001 R007 R008 R011 R013 R014	97.2 ha 3.0%	

Vegetation Code & Description (NVIS)	Associated Species	Landform	Sites	Area & %	Representative Photo
BHP: MA EvAci CcCyaSopl ApyTefc Low Woodland of <i>Eucalyptus victrix</i> and <i>Acacia citrinoviridis</i> with Open Tussock Grassland of <i>*Cenchrus ciliaris</i>, <i>Cymbopogon ambiguus</i>, and <i>Sorghum plumosum</i> with Open Shrubland of <i>A. pyrifolia</i> and <i>Tephrosia rosea</i> var. Fortescue creeks (M.I.H. Brooker 2186) on orange-brown sandy clay creek lines. NVIS: <i>Eucalyptus victrix</i> and <i>Acacia citrinoviridis</i> low woodland, over <i>Acacia pyrifolia</i> and <i>Tephrosia rosea</i> var. Fortescue creeks (M.I.H. Brooker 2186) low sparse shrubland, over <i>*Cenchrus ciliaris</i>, <i>Cymbopogon ambiguus</i>, and <i>Sorghum plumosum</i> mid open tussock grassland.	<i>Androcalva luteiflora</i>, <i>Boerhavia coccinea</i>, <i>Cleome viscosa</i>, <i>Eragrostis tenellula</i>, <i>Euphorbia biconvexa</i>, <i>Euphorbia tannensis</i> subsp. <i>eremophila</i>, <i>Evolvulus alsinoides</i>, <i>Nellica maderaspatensis</i>	Red-orange to brown sandy clay creek lines.	Q029 Q034 Q044 Q045	51.1 ha 1.6%	
BHP: MA EcoEvAci CcCya ApyTefc Woodland of <i>Eucalyptus camaldulensis</i> subsp. <i>obtus</i>, <i>E. victrix</i>, and <i>Acacia citrinoviridis</i> with Very Open Tussock Grassland of <i>*Cenchrus ciliaris</i> and <i>Cymbopogon ambiguus</i> with Open Shrubland of <i>A. pyrifolia</i> and <i>Tephrosia rosea</i> var. Fortescue creeks (M.I.H. Brooker 2186) on red-orange to brown sandy clay creek lines. NVIS: <i>Eucalyptus camaldulensis</i> subsp. <i>obtus</i> and <i>Eucalyptus victrix</i> mid woodland, with <i>Acacia citrinoviridis</i> low woodland, over <i>Acacia pyrifolia</i> and <i>Tephrosia rosea</i> var. Fortescue creeks (M.I.H. Brooker 2186) low sparse shrubland, over <i>*Cenchrus ciliaris</i> and <i>Cymbopogon ambiguus</i> mid sparse tussock grassland.	<i>Acacia dictyophleba</i>, <i>Acacia maitlandii</i>, <i>*Cenchrus setiger</i>, <i>Cyperus vaginatus</i>, <i>Enneapogon lindleyanus</i>, <i>Eragrostis mucronata</i>, <i>Evolvulus alsinoides</i>, <i>Gossypium robinsonii</i>, <i>Ipomoea racemigera</i> (P2). <i>Indigofera linifolia</i>, <i>Petalostylis labicheoides</i>, <i>Santalum lanceolatum</i>	Orange-brown sandy clay creek lines.	Q008 Q010 Q020 Q026	23.5 ha 0.7%	
Completely degraded or cleared land.	-	-	-	38.6 ha 1.2%	-



Legend

 Survey Area

Vegetation Types

 Cleared

 D1a

 D1b

 D2

 D3a

 D3b

 P1a

 P1b

 P1c

 P2

 P3

 S1

 S2

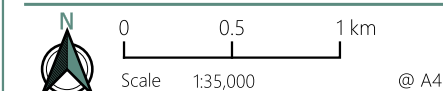
 S3a

 S3b

 S3c

 S4

 S5



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



Author: SB

Date: 25-08-2023

Vegetation Types

Homestead Creek & Cathedral Gorge

MAP

Prepared for
BHP WAIO

4.1

4.3. Significant Vegetation

One vegetation type (OT AspeArlaAsel Seh Asy) shares some similarities with the Priority 1 PEC West Angeles Cracking-Clays which is described as “Open tussock grasslands of *Astrelba pectinata*, *A. elymoides*, *Aristida latifolia*, in combination with low scattered shrubs of *Sida fibulifera*, on basalt (Jeerinah Formation) derived cracking-clay loam depressions and flowlines. Occurs throughout the central and eastern Hamersley Range from near Tom Price east to Newman” (DBCA, 2023). Vegetation type OT AspeArlaAsel Seh Asy is characterised by a tussock grassland of *Astrelba pectinata*, *A. elymoides* and *Aristida latifolia* which matches the species descriptors in the DBCA PEC notice (DBCA, 2023). The vegetation type was recorded on brown cracking clay plains, however only 1.6% (1.51 ha) was mapped on the Jeerinah Formation and the site description shows ironstone gravel on the surface and not Basalt as per the DBCA PEC notice. It is therefore unlikely that this VT constitutes part of the PEC. None of the remaining vegetation types recorded within the Survey Area resembles any known TEC or PEC communities.

None of the vegetation types matched the BHP WAIO definition of a Conservation Significant Community (BHP WAIO, 2016; Section 2.4.4.1).

Based on the definitions of significant vegetation listed in section 2.4.4 (Environmental Protection Authority, 2016a) the following vegetation types may be considered to have significance (Table 4.3):

- MI AmAnlGoro TpTt Ch may provide refuge for the locally and regionally restricted novel taxon *Hibiscus* aff. *Campanulatus*;
- MA EvAci CcCyaSopl ApyTefc is a Potential Groundwater Dependent Ecosystem (PGDE) as it supports the potential phreatophytic species *Eucalyptus victrix*. GDEs are susceptible to impacts associated with water draw down; and
- MA EcoEvAci CcCya ApyTefc is a GDE as it supports the phreatophytic species *Eucalyptus camaldulensis* subsp. *obtus*. GDEs are susceptible to impacts associated with water draw down. MA EcoEvAci CcCya ApyTefc also provides refuge for the Priority taxon *Ipomoea racemigera* (P2).

Table 4.3: Potential Significant Vegetation Discussion

Significance	Vegetation Type	Details
Identified as TEC	-	-
Identified as PEC	-	-
Restricted distribution^	ME TtCcTp EtEx AdIngSivg	Drainage line on flat with a restricted distribution in Survey Area (12.6 ha, 0.4%), however this vegetation type is a structural vegetation type associated with P1, which is the most widespread in the Survey Area, additionally, the dominant and associated species of this vegetation type are common throughout the Pilbara bioregion, indicating that ME TtCcTp EtEx AdIngSivg is likely to occur outside of the Survey Area. Therefore, this unit is not considered significant.
	SS Tp AbPISal ExHc	Calcrete plain with a restricted distribution in Survey Area (7.0 ha, 0.2%), however this vegetation type is a structural vegetation type associated with HS TpTwTv Ell SeggSeggAb, which is the most widespread in the Survey Area, additionally, the dominant and associated species of this vegetation type are common throughout the Pilbara bioregion, indicating that SS Tp AbPISal ExHc is likely to occur outside of the Survey Area. Therefore, this unit is not considered significant.
	MA EcoEvAci CcCya ApyTefc	Major drainage line with a restricted distribution in Survey Area (23.5 ha, 0.7%), however, this vegetation type is associated with the Beard Vegetation Association (BVA) 18.11 which is widespread and therefore not considered significant.

Significance	Vegetation Type	Details
Degree of historical impact from threatening processes	-	-
A role as a refuge	HS TpTwTv Ell SeggSegpAb	Provides refuge for the Priority taxon <i>Lepidium catapycnon</i> (P4), however this species is not considered restricted to this vegetation type or the Survey Area as it's known from many locations in the local area and is widespread across the south of the Pilbara IBRA region and the vegetation type is therefore not considered significant.
	ME TtCcTp EtEx AdIngSivg	Provides refuge for the Priority taxon <i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431; P3), however this species is not considered restricted to this vegetation type or the Survey Area as it's known from many locations in the local area and is widespread across the Pilbara IBRA region and is therefore not considered significant.
	HP TmTp AaAayApr PtoErff	Provides refuge for the locally significant Priority taxon <i>Eragrostis</i> sp. Mt Robinson (S. van Leeuwen 4109; P2).
	MI AmAnlGoro TpTt Ch	Provides refuge for the Priority taxa <i>Indigofera gilesii</i> (P3) and <i>Lepidium catapycnon</i> (P4), and the novel taxon <i>Hibiscus</i> aff. <i>campanulatus</i> . <i>Indigofera gilesii</i> (P3) and <i>Lepidium catapycnon</i> (P4) are not considered locally or regionally restricted taxon, but <i>Indigofera gilesii</i> (P3) is considered restricted to this vegetation type. The novel taxon <i>Hibiscus</i> aff. <i>campanulatus</i> may be considered locally and regionally significant, and as the majority of records of this taxon were found in this vegetation type, it may also be considered significant.
	MA EcoEvAci CcCya ApyTefc	Provides refuge for the Priority taxon <i>Ipomoea racemigera</i> (P2), however this species is not considered locally or regionally significant as it is known from four locations locally, and is known from four IBRA regions.
Providing an important function required to maintain ecological integrity of a significant ecosystem	-	-
Other – vegetation at risk from mining activities	MA EvAci CcCyaSopl ApyTefc	MA EvAci CcCyaSopl ApyTefc is a PGDE as it contains the potential phreatophytic species <i>Eucalyptus victrix</i> . GDEs are susceptible to impacts associated with ground water draw down.
	MA EcoEvAci CcCya ApyTefc	MA EcoEvAci CcCya ApyTefc is a GDE as it contains the phreatophytic species <i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i> . GDEs are susceptible to impacts associated with ground water draw down.

^for the purpose of this assessment, there was a discussion for vegetation types with less than a 30 ha mapped extent within the Survey Area.

4.3.1. Post-Survey Review of Desktop Assessment Vegetation

The significant vegetation assigned 'Low' likelihood of occurrence during the desktop assessment, retained their 'Low' likelihood of occurrence post-survey, as the survey effort was sufficient and there were no significant limitations and constraints for the detailed assessment.

4.3.2. Local & Regional Context of Vegetation Types

The vegetation types have been further considered at a local and regional context in Table 4.4. Local significance was determined if the vegetation types were locally restricted (by using vegetation mapping and/or landforms in the local vicinity), and/or were associated with locally significant flora taxa. Regional significance was determined if the vegetation types were regionally restricted (by using BVAs and/or land system mapping to determine a potential regional extent), and/or were associated with regionally significant

flora taxa. Vegetation types were matched using the approximate spatial extent of the land systems and BVAs, and/or the species present. As the BVAs and land system mapping were undertaken at a broad scale, some vegetation types may not be matched, or some species may be outdated and/or generalised. All vegetation types appear to be locally and regionally widespread.

Table 4.4: Local & Regional Context & Discussion of Vegetation Types

Vegetation Type	Associated BVA	Associated Land System	Local Context & Discussion	Regional Context & Discussion
FS TvTpPamu EgHc AbAancAi: <i>Eucalyptus gamophylla</i> mid open mallee woodland with <i>Hakea chordophylla</i> low open woodland, over <i>Acacia bivenosa</i> , <i>Acacia ancistrocarpa</i> , and <i>Acacia inaequilatera</i> mid sparse shrubland, over <i>Triodia vanleeuwenii</i> and <i>Triodia pungens</i> low open hummock grassland, with <i>Paraneurachne muelleri</i> low sparse tussock grassland.	82.3: <i>Eucalyptus leucophloia</i> and <i>Eucalyptus gamophylla</i> low open woodland, over <i>Senna artemisioides</i> subsp. x <i>sturtii</i> , <i>Dodonaea viscosa</i> and <i>Grevillea wickhamii</i> tall sparse shrubland, over <i>Triodia wiseana</i> mid open hummock grassland, with <i>Ptilotus rotundifolius</i> and <i>Acacia lycopodiifolia</i> low open shrubland.	Widespread across multiple land systems in the Survey Area.	The associated BVA is widespread in the local area, and it is not associated with any particular land system. This vegetation type is therefore not considered locally significant.	The associated BVA and land systems are well represented across the Pilbara bioregion, therefore this vegetation type is not considered regionally significant.
HC TpTvAms EllHc SeggSegpAhi: <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> and <i>Hakea chordophylla</i> low open woodland, over <i>Senna glutinosa</i> subsp. <i>glutinosa</i> and <i>Senna glutinosa</i> subsp. <i>pruinosa</i> mid sparse shrubland, with <i>Acacia hilliana</i> low sparse shrubland, over <i>Triodia vanleeuwenii</i> and <i>Triodia pungens</i> low open hummock grassland, with <i>Amphipogon sericeus</i> low open tussock grassland.	82.3: <i>Eucalyptus leucophloia</i> and <i>Eucalyptus gamophylla</i> low open woodland, over <i>Senna artemisioides</i> subsp. x <i>sturtii</i> , <i>Dodonaea viscosa</i> and <i>Grevillea wickhamii</i> tall sparse shrubland, over <i>Triodia wiseana</i> mid open hummock grassland, with <i>Ptilotus rotundifolius</i> and <i>Acacia lycopodiifolia</i> low open shrubland.	Newman Land System: Rugged jaspilite plateau, ridges and mountains supporting hard spinifex grasslands.	The associated BVA and land system are widespread in the local area, this vegetation type is therefore not considered locally significant.	The associated BVA and land system are well represented in the Pilbara bioregion, this vegetation type is therefore not considered regionally significant.
HS TpTwTv Ell SeggSegpAb: <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> low open woodland, over <i>Senna glutinosa</i> subsp. <i>glutinosa</i> , <i>Senna glutinosa</i> subsp. <i>pruinosa</i> , and <i>Acacia bivenosa</i> mid sparse shrubland, over <i>Triodia pungens</i> (+/- <i>Triodia wiseana</i> and <i>Triodia vanleeuwenii</i>) low open hummock grassland.	82.3: <i>Eucalyptus leucophloia</i> and <i>Eucalyptus gamophylla</i> low open woodland, over <i>Senna artemisioides</i> subsp. x <i>sturtii</i> , <i>Dodonaea viscosa</i> and <i>Grevillea wickhamii</i> tall sparse shrubland, over <i>Triodia wiseana</i> mid open hummock grassland, with <i>Ptilotus rotundifolius</i> and <i>Acacia lycopodiifolia</i> low open shrubland.	Newman Land System: Rugged jaspilite plateau, ridges and mountains supporting hard spinifex grasslands. McKay Land System: Hills, ridges, plateaux remnants, and breakaways of meta sedimentary and sedimentary rocks supporting hard spinifex grasslands with <i>Acacia</i> and occasional <i>Eucalyptus</i> .	The associated BVA and land systems are widespread in the local area, this vegetation type is therefore not considered locally significant.	The associated BVA and land systems are well represented across the Pilbara bioregion, this vegetation type is therefore not considered regionally significant.
FS TbrTp AbSeaoSegl Ell: <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> low open woodland, over <i>Acacia bivenosa</i> , <i>Senna artemisioides</i> subsp. <i>oligophylla</i> , and <i>Senna glutinosa</i> subsp. x <i>luerssenii</i> low sparse shrubland, over <i>Triodia brizoides</i> and <i>Triodia pungens</i> low sparse hummock grassland.	82.3: <i>Eucalyptus leucophloia</i> and <i>Eucalyptus gamophylla</i> low open woodland, over <i>Senna artemisioides</i> subsp. x <i>sturtii</i> , <i>Dodonaea viscosa</i> and <i>Grevillea wickhamii</i> tall sparse shrubland, over <i>Triodia wiseana</i> mid open hummock grassland, with	Newman Land System: Rugged jaspilite plateau, ridges and mountains supporting hard spinifex grasslands.	The associated BVA and land system are widespread in the local area, this vegetation type is therefore not considered locally significant.	The associated BVA and land system are well represented in the Pilbara bioregion, this vegetation type is therefore not considered regionally significant.

Vegetation Type	Associated BVA	Associated Land System	Local Context & Discussion	Regional Context & Discussion
	<i>Ptilotus rotundifolius</i> and <i>Acacia lycopodiifolia</i> low open shrubland.			
SS Tp AbPISal ExHc: <i>Eucalyptus xerothermica</i> and <i>Hakea chordophylla</i> low open woodland, over <i>Acacia bivenosa</i> , <i>Petalostylis labicheoides</i> , and <i>Santalum lanceolatum</i> mid sparse shrubland, over <i>Triodia pungens</i> low open tussock grassland.	Not mapped by Beard.	Boolgeeda Land System: Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or Mulga shrublands.	The associated land system is widespread in the local area, this vegetation type is therefore not considered locally significant.	The associated land system is well represented in the Pilbara bioregion, this vegetation type is therefore not considered regionally significant.
HS TbrTw Ai SeggSegg: <i>Acacia inaequilatera</i> tall sparse shrubland, over <i>Senna glutinosa</i> subsp. <i>glutinosa</i> and <i>Senna glutinosa</i> subsp. <i>pruinosa</i> low sparse shrubland, over <i>Triodia brizoides</i> and <i>Triodia wiseana</i> low open hummock grassland.	Not mapped by Beard.	Newman Land System: Rugged jaspilite plateau, ridges and mountains supporting hard spinifex grasslands Rocklea.	The associated land system is widespread in the local area, this vegetation type is therefore not considered locally significant.	The associated land system is well represented in the Pilbara bioregion, this vegetation type is therefore not considered regionally significant.
HC TvAms CddHc: <i>Corymbia deserticola</i> subsp. <i>deserticola</i> and <i>Hakea chordophylla</i> low open woodland, over <i>Triodia vanleeuwenii</i> low open hummock grassland, with <i>Amphipogon sericeus</i> low sparse tussock grassland.	Not mapped by Beard.	Platform Land System: Dissected slopes and raised plains supporting shrubby hard spinifex grasslands.	The associated land system is widespread in the local area, this vegetation type is therefore not considered locally significant.	The associated land system is well represented across the Pilbara bioregion, this vegetation type is therefore not considered regionally significant.
SA TpPamu EgEx AtenSeaoAb: <i>Eucalyptus gamophylla</i> and <i>Eucalyptus xerothermica</i> low open woodland, over <i>Acacia tenuissima</i> , <i>Senna artemisioides</i> subsp. <i>oligophylla</i> , and <i>Acacia bivenosa</i> mid sparse shrubland, over <i>Triodia pungens</i> mid open hummock grassland, with <i>Paraneurachne muelleri</i> sparse tussock grassland.	Not mapped by Beard.	Boolgeeda Land System: Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or Mulga shrublands.	The associated land system is widespread in the local area, this vegetation type is therefore not considered locally significant.	The associated land system is well represented across the Pilbara bioregion, this vegetation type is therefore not considered regionally significant.
SS TpDibEua AprAa ApaPl: <i>Acacia pruinocarpa</i> and <i>Acacia aptaneura</i> low open woodland, over <i>Acacia pachyacra</i> and <i>Petalostylis labicheoides</i> tall sparse shrubland, over <i>Triodia pungens</i> mid open hummock grassland, with <i>Digitaria brownii</i> and <i>Eulalia aurea</i> mid sparse tussock grassland.	18.11: <i>Acacia aneura</i> , <i>Eremophila fraseri</i> , and <i>Acacia pruinocarpa</i> tall open shrubland, over <i>Ptilotus drummondii</i> , <i>Eremophila lanceolata</i> , and <i>Brachyscome</i> sp. low open shrubland.	Elimunna Land System: Stony plains on basalt supporting sparse <i>Acacia</i> and <i>Senna</i> shrublands and patchy tussock grasslands.	The associated BVA and land system are widespread in the local area, this vegetation type is therefore not considered locally significant.	The associated BVA and land system are well represented in the Pilbara bioregion, this vegetation type is therefore not considered regionally significant.
ME TtCcTp EtEx AdIngSivg: <i>Eucalyptus trivalva</i> and <i>Eucalyptus xerothermica</i> low woodland, over <i>Sida</i> sp. L (A.M. Ashby 4202) low sparse shrubland, over <i>Themeda triandra</i> and <i>*Cenchrus ciliaris</i> mid open tussock grassland, with <i>Triodia pungens</i> mid sparse hummock grassland.	Not mapped by Beard.	Platform Land System: Dissected slopes and raised plains supporting shrubby hard spinifex grasslands.	The associated land system is widespread in the local area, this vegetation type is therefore not considered locally significant.	The associated land system is well represented across the Pilbara bioregion, this vegetation type is therefore not considered regionally significant.

Vegetation Type	Associated BVA	Associated Land System	Local Context & Discussion	Regional Context & Discussion
OT AspeArlaAsel Seh Asy: <i>Acacia synchronicia</i> mid sparse shrubland, over <i>Senna hamersleyensis</i> low sparse shrubland, over <i>Astrebla pectinata</i> , <i>Aristida latifolia</i> , and <i>Astrebla elymoides</i> mid tussock grassland.	Not mapped by Beard.	Elimunna Land System: Stony plains on basalt supporting sparse <i>Acacia</i> and <i>Senna</i> shrublands and patchy tussock grasslands.	The associated land system is widespread in the local area, this vegetation type is therefore not considered locally significant.	The associated land system is well represented in the Pilbara bioregion, this vegetation type is therefore not considered regionally significant.
HP TmTp AaAayApr PtoErff: <i>Acacia aptaneura</i> , <i>Acacia ayersiana</i> , and <i>Acacia pruinocarpa</i> low woodland, over <i>Ptilotus obovatus</i> and <i>Eremophila forrestii</i> subsp. <i>forrestii</i> mid sparse shrubland, over <i>Triodia melvillei</i> and <i>Triodia pungens</i> mid open hummock grassland.	Not mapped by Beard.	Not associated with a land system.	-	-
FP Cc AdApaPl CooHall: <i>Corymbia opaca</i> and <i>Hakea lorea</i> subsp. <i>lorea</i> low open woodland, over <i>Acacia dictyophleba</i> , <i>Petalostylis labicheoides</i> , and <i>Acacia pachyacra</i> tall open shrubland, over <i>*Cenchrus ciliaris</i> mid open tussock grassland.	Not mapped by Beard.	Boolgeeda Land System: Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or Mulga shrublands. Elimunna Land System: Stony plains on basalt supporting sparse <i>Acacia</i> and <i>Senna</i> shrublands and patchy tussock grasslands.	The associated land systems are widespread in the local area, this vegetation type is therefore not considered locally significant.	The associated land systems are well represented in the Pilbara bioregion, this vegetation type is therefore not considered regionally significant.
ME TtEaTp CoasEx AdIngSis: <i>Corymbia aspera</i> and <i>Eucalyptus xerothermica</i> low open woodland, over <i>Acacia dictyophleba</i> , <i>Indigofera georgei</i> , and <i>Sida</i> sp. L (A.M. Ashby 4202) mid sparse shrubland, over <i>Themeda triandra</i> and <i>Eulalia aurea</i> mid open tussock grassland, with <i>Triodia pungens</i> mid sparse hummock grassland.	Not mapped by Beard.	Boolgeeda Land System: Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or Mulga shrublands. Elimunna Land System: Stony plains on basalt supporting sparse <i>Acacia</i> and <i>Senna</i> shrublands and patchy tussock grasslands. Platform Land System: Dissected slopes and raised plains supporting shrubby hard spinifex grasslands.	The associated land systems are widespread in the local area, this vegetation type is therefore not considered locally significant.	The associated land systems are well represented in the Pilbara bioregion, this vegetation type is therefore not considered regionally significant.
MI AmAnlGoro TpTt Ch: <i>Corymbia hamersleyana</i> and +/- <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> low open woodland, over <i>Acacia monticola</i> , <i>Androcalva luteiflora</i> , and <i>Gossypium robinsonii</i> tall open shrubland, over <i>Triodia pungens</i> mid	Not mapped by Beard.	Newman Land System: Rugged jaspilite plateau, ridges and mountains supporting hard spinifex grasslands.	The associated land system is widespread in the local area, this vegetation type is therefore not considered locally significant.	The associated land system is well represented across the Pilbara bioregion, this vegetation type is therefore not considered regionally significant.

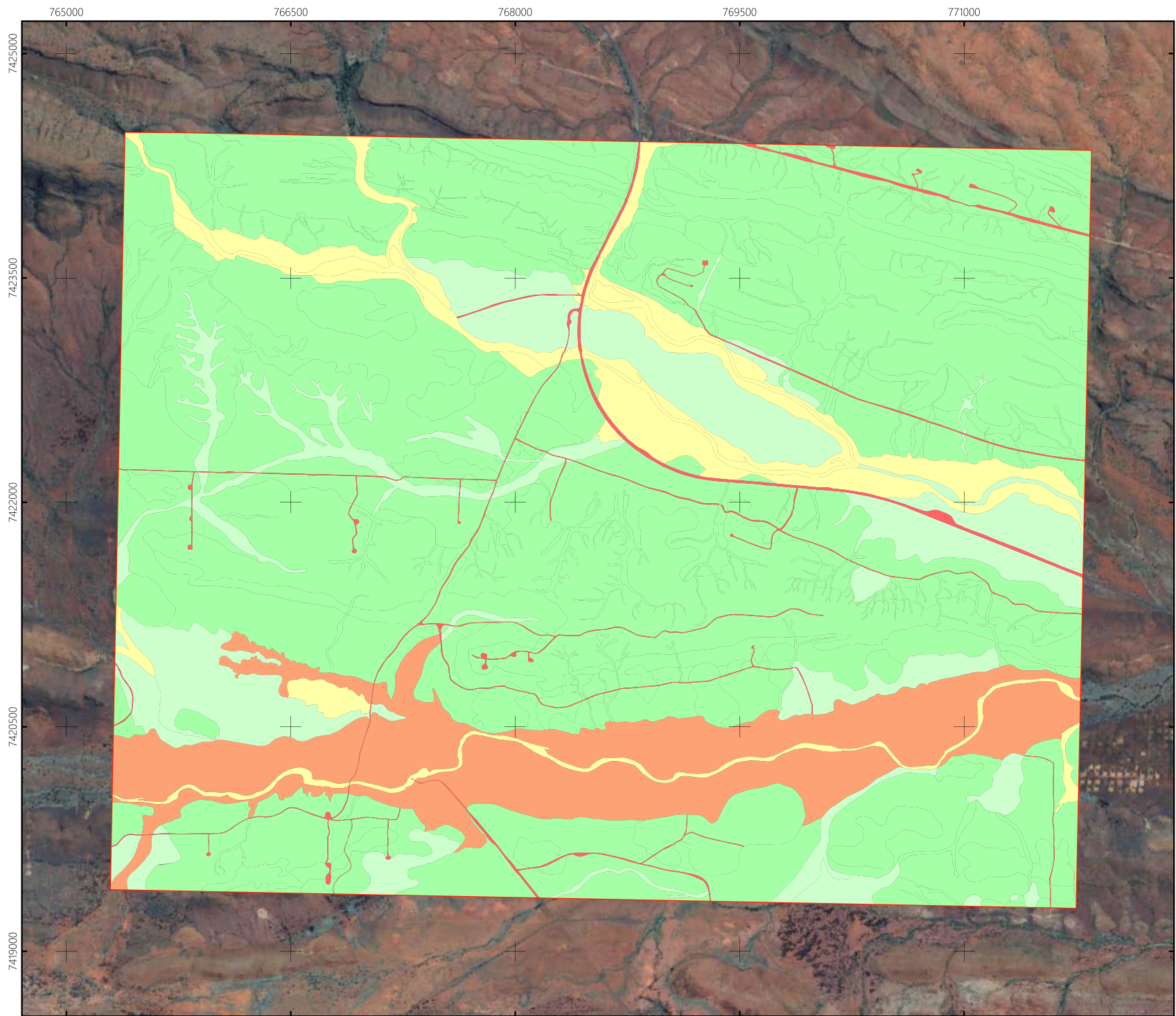
Vegetation Type	Associated BVA	Associated Land System	Local Context & Discussion	Regional Context & Discussion
open hummock grassland, with <i>Themeda triandra</i> mid sparse tussock grassland.				
MA EvAci CcCyaSopl ApyTefc: <i>Eucalyptus victrix</i> and <i>Acacia citrinoviridis</i> low woodland, over <i>Acacia pyrifolia</i> and <i>Tephrosia rosea</i> var. Fortescue creeks (M.I.H. Brooker 2186) mid to low sparse shrubland, over <i>*Cenchrus ciliaris</i> , <i>Cymbopogon ambiguus</i> , and <i>Sorghum plumosum</i> mid open tussock grassland.	Not mapped by Beard.	Boolgeeda Land System: Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or Mulga shrublands.	The associated land system is widespread in the local area, this vegetation type is therefore not considered locally significant.	The associated land system is widespread in the Pilbara bioregion, this vegetation type is therefore not considered regionally significant.
MA EcoEvAci CcCya ApyTefc: <i>Eucalyptus camaldulensis</i> subsp. <i>obtusata</i> and <i>Eucalyptus victrix</i> mid woodland, with <i>Acacia citrinoviridis</i> low woodland, over <i>Acacia pyrifolia</i> and <i>Tephrosia rosea</i> var. Fortescue creeks (M.I.H. Brooker 2186) low sparse shrubland, over <i>*Cenchrus ciliaris</i> and <i>Cymbopogon ambiguus</i> mid sparse tussock grassland.	82.3: <i>Eucalyptus camaldulensis</i> , <i>Eucalyptus microtheca</i> and <i>Eucalyptus dichromophloia</i> low woodland, over <i>Hibiscus goldsworthii</i> tall sparse shrubland with <i>Arivela viscosa</i> tall sparse forbland, over <i>Swainsona stenodonta</i> , <i>Jasminum lineare</i> and <i>Tephrosia bidwillii</i> low sparse shrubland.	Elimunna Land System: Stony plains on basalt supporting sparse <i>Acacia</i> and <i>Senna</i> shrublands and patchy tussock grasslands.	The associated BVA and land system are widespread in the local area, this vegetation type is therefore not considered locally significant.	The associated BVA and land system are well represented in the Pilbara bioregion, this vegetation type is therefore not considered regionally significant.

4.4. Vegetation Condition

The majority of the Survey Area was mapped as 'Excellent' (61.9%) showing no obvious signs of disturbance and included the hillslopes and crests across the middle and north of the Survey Area, most minor drainage in the hills, and the OT AspeArlaAsel Seh Asy grasslands in the south of the Survey Area. Areas mapped as 'Very Good' (19.2%) included the sandy clay plains, stony plains, low quartz rises, and some lower slopes, where weeds and tracks were present as well as low levels of grazing. Hills and slopes in the south of the Survey Area which contained old drill lines and tracks were also mapped as 'Very Good'. Areas mapped as 'Good' (6.7%) included the majority of the major drainage lines and northern floodplains, where there was a high level of weed cover. The southern floodplains (FP Cc AdApaPl CooHall) were mapped as 'Poor', due to the understorey being dominated by weeds. Small sections were mapped as 'Completely Degraded' (1.2%) which includes areas that have been cleared for tracks and drill lines. Vegetation condition of the Survey Area is presented in Table 4.5 and mapped in Map 4.2.

Table 4.5: Vegetation Condition

Condition	Area (ha)	%	Disturbance Detail in Survey Area
Excellent	2,021.8	61.9	No obvious disturbance.
Very Good	626.6	19.2	Scattered weeds, low levels of grazing within areas of undisturbed native vegetation. Old tracks and drill lines.
Good	219.0	6.7	Moderate weed cover within undisturbed native vegetation, some tracks, and mounds.
Poor	360.2	11.0	Vegetation along roadside or larger areas that may have been cleared, dominated by weeds, but maintains some natural vegetation structural components.
Degraded	-	-	-
Completely Degraded	38.6	1.2	Includes roads, drill lines, and roadsides with no vegetation present. Mapped as 'Cleared' in vegetation mapping and vegetation condition for this project.

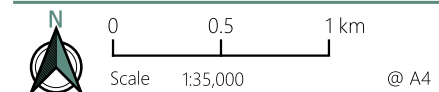


Legend

 Survey Area

Vegetation Condition

-  Excellent
-  Very Good
-  Good
-  Poor
-  Completely Degraded



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



Author: SB

Date: 23-08-2023

Vegetation Condition

Homestead Creek & Cathedral Gorge

MAP

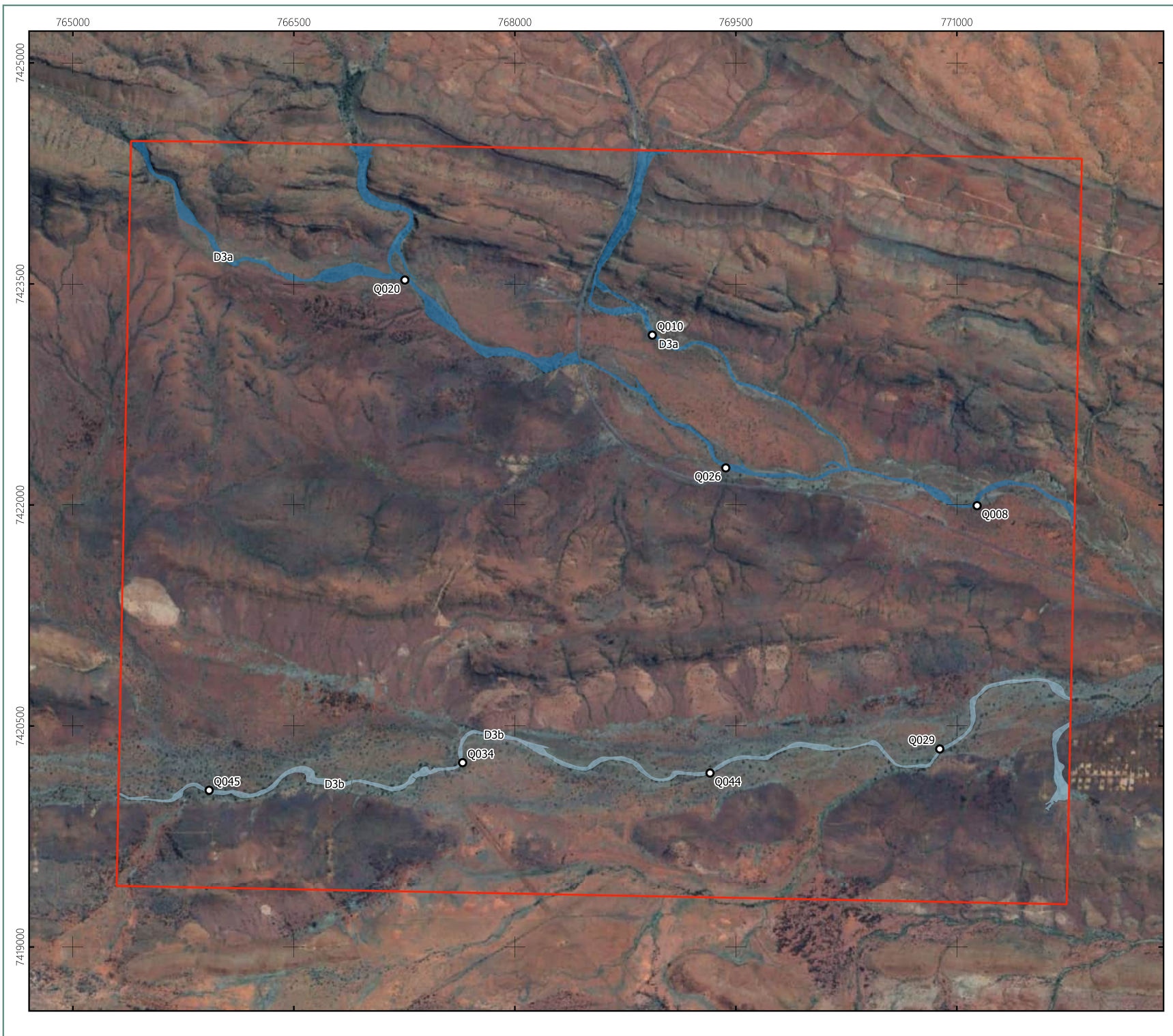
Prepared for
BHP WAIO

4.2

5. RESULTS & DISCUSSION - GROUNDWATER DEPENDENT ECOSYSTEMS

5.1. Distribution of GDEs in Survey Area

GDEs were recorded associated with the Homestead Creek in the south of the Survey Area, and PGDEs were recorded in the north of the Survey Area, associated with the Homestead tributary (Map 5.1). GDE sites contained the phreatophytic species *Eucalyptus camaldulensis* subsp. *obtus**a*, and the potential phreatophytic species *Eucalyptus victrix*. PGDE sites contained only the potential phreatophytic species *Eucalyptus victrix*.



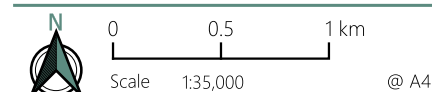
Legend

 Survey Area

Vegetation Types

 D3a - PGDE Monitoring Sites

 D3b - GDE Monitoring Sites



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



Author: SB

Date: 25-08-2023

GDE & PGDE Monitoring Sites

Homestead Creek & Cathedral Gorge

MAP

Prepared for
BHP WAIO

5.1

5.1.1. General Vegetation Condition of GDEs

All GDE and PGDE monitoring sites were in 'Good' condition, with high weed cover recorded across all eight sites (Table 5.2). The most common weed was **Cenchrus ciliaris*, which was recorded across all GDE and PGDE sites, followed by **Eragrostis tenella*, which was recorded at three sites in small cover (0.1%; Table 5.1).

GDE sites had more weed species recorded on average, however the total weed cover for both sites was similar at around 10.0%. Q010, a PGDE site, had the highest total weed cover (30.0%). Full site details including all recorded species are included in Appendix B.

Table 5.1: GDE & PGDE Weed Cover

GDE Site Name	GDE Site Type	Weed Species Present	Weed Cover (%)	Total Weed Cover (%)
Q008	PGDE	* <i>Bidens bipinnata</i>	0.1	10.2
		* <i>Cenchrus ciliaris</i>	10.0	
		* <i>Eragrostis tenella</i>	0.1	
Q010		* <i>Cenchrus ciliaris</i>	30.0	30.0
Q020		* <i>Cenchrus ciliaris</i>	5.0	10.0
		* <i>Cenchrus setiger</i>	5.0	
Q026		* <i>Cenchrus ciliaris</i>	8.0	9.0
		* <i>Cenchrus setiger</i>	1.0	
Average Weed Cover PGDE (%)				14.8
Q029	GDE	* <i>Cenchrus ciliaris</i>	10.0	10.4
		* <i>Echinochloa colona</i>	0.1	
		* <i>Eragrostis tenella</i>	0.1	
		* <i>Malvastrum americanum</i>	0.1	
		* <i>Vachellia farnesiana</i>	0.1	
Q034		* <i>Cenchrus ciliaris</i>	12.0	12.0
Q044		* <i>Cenchrus ciliaris</i>	10.0	10.3
		* <i>Eragrostis tenella</i>	0.1	
		* <i>Malvastrum americanum</i>	0.1	
		* <i>Sonchus oleraceus</i>	0.1	
Q045		* <i>Bidens bipinnata</i>	0.1	10.1
		* <i>Cenchrus ciliaris</i>	10.0	
Average Weed Cover GDE (%)				10.7
Average Weed Cover PGDE & GDE (%)				12.8

Table 5.2: Vegetation Condition & Disturbances at GDE & PGDE Sites

Site Name	Site Type	Vegetation Condition	Disturbances Recorded	Site Photo (NW)	Site Name	Site Type	Vegetation Condition	Disturbances Recorded	Site Photo (NW)
Q008	PGDE	Good	Weeds (High)		Q020	PGDE	Good	Weeds (High)	
Q010		Good	Weeds (High)		Q026		Good	Weeds (High)	

Site Name	Site Type	Vegetation Condition	Disturbances Recorded	Site Photo (NW)	Site Name	Site Type	Vegetation Condition	Disturbances Recorded	Site Photo (NW)
Q029	GDE	Good	Weeds (High)		Q044	GDE	Good	Weeds (High)	
Q034		Good	Weeds (High)		Q045		Good	Weeds (High)	

5.1.2. Visual Tree Health Assessment

A visual health assessment of 10 sample trees per GDE site was conducted (Map 2.1). The sample trees were identified as *Eucalyptus victrix* only at four of the eight sites and a mix of *Eucalyptus victrix* and *Eucalyptus camaldulensis* subsp. *obtusa* at the remaining four sites (Table 5.3). The sample trees were generally in a healthy condition, with tree canopy extent and density scores recorded as 'major' for all *Eucalyptus camaldulensis* subsp. *obtusa* sample trees, and scored as 'medium' to 'major' for all *Eucalyptus victrix* sample trees. Leaf die off was not recorded at any site, and reproduction (presence of flowers or nuts), was noted across all sites except the *Eucalyptus victrix* dominated sites Q020 and Q026. Sample tree summary data is shown in Appendix E.

Table 5.3: GDE Tree Health Visual Assessment - Average Health Ranking Scores as per Table 2.8

Site	Species	Number Individuals	Average Height (m)	Crown Extent	Crown Density	Epicormic Growth	New Tip Growth	Reproduction Growth	Leaf Die Off	Presence of Mistletoe	Bark Condition
Q008	<i>Eucalyptus victrix</i>	10	8.5	3.7	3.8	1.1	3.0	2.7	1.0	1.0	0.0
Q010	<i>Eucalyptus victrix</i>	10	7.0	3.9	4.0	1.0	3.0	1.2	1.0	1.0	0.5
Q020	<i>Eucalyptus victrix</i>	10	6.7	3.9	3.9	1.0	2.8	1.0	1.0	1.0	0.3
Q026	<i>Eucalyptus victrix</i>	10	6.3	4.0	3.9	1.1	2.8	1.0	1.0	1.0	0.0
Q029	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>	3	15.0	4.0	4.0	2.0	3.0	3.0	1.0	1.0	0.3
	<i>Eucalyptus victrix</i>	7	12.6	3.4	3.9	1.4	2.9	2.6	1.0	1.0	0.6
Q034	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>	5	7.4	4.0	4.0	1.6	3.0	2.0	1.0	1.0	0.4
	<i>Eucalyptus victrix</i>	5	9.7	3.8	4.0	1.6	2.0	1.6	1.0	1.0	0.6
Q044	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>	4	8.8	4.0	4.0	1.0	3.0	3.0	1.0	1.0	0.3
	<i>Eucalyptus victrix</i>	6	10.3	3.7	4.0	1.0	2.2	1.2	1.0	1.0	0.8
Q045	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>	5	11.0	4.0	4.0	1.2	3.0	3.0	1.0	1.0	0.0
	<i>Eucalyptus victrix</i>	5	9.4	3.6	4.0	1.0	2.6	1.8	1.0	1.0	1.2
Total	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>	17	10.1	4.0	4.0	1.4	3.0	2.7	1.0	1.0	0.2
	<i>Eucalyptus victrix</i>	63	8.4	3.8	3.9	1.1	2.7	1.6	1.0	1.0	0.4

6. CONCLUSION

6.1. Flora

No Threatened flora were recorded or considered likely to occur within the Survey Area. Six Priority flora taxa, one novel species and one range extension were recorded:

- Priority 2: *Eragrostis* sp. Mt Robinson (S. van Leeuwen 4109) - four individuals recorded at one location in Mulga woodland;
- Priority 2: *Ipomoea racemigera* - three individuals recorded at one location on the bank of the Homestead Creek;
- Priority 3: *Dolichocarpa* sp. Hamersley Station (A.A. Mitchell PRP 1479) – two individuals recorded at one location on cracking clays;
- Priority 3: *Indigofera gilesii* - seven individuals recorded at one location in a rocky ironstone gorge;
- Priority 3: *Themeda* sp. Hamersley Station (M.E. Trudgen 11431) - 150 individuals recorded at one location in a drainage line;
- Priority 4: *Lepidium catapycnon* - 12 individuals recorded at two locations on rocky slopes and hill drainage;
- Novel species: *Hibiscus* aff. *campanulatus* - 336 individuals recorded over five locations including south facing steep slopes, gorges and gullies and drainage lines; and
- Range extension: *Goodenia heterochila* - closest record 151 km north-west.

Of these taxa, *Eragrostis* sp. Mt Robinson (S. van Leeuwen 4109; P2) was assigned a high local significance as the only known local record is 30 km north-west of the Survey Area, and *Hibiscus* aff. *campanulatus* a high local and regional significance, as the only known records are 5 to 25 km east of the Survey Area. The remaining taxa were assigned a low local and regional significance. *Triodia* sp. Mt Ella (M.E. Trudgen 12739; P3), was previously recorded in the Survey Area, but was unable to be confirmed in this assessment due to poor access.

6.2. Vegetation

No TECs or confirmed PECs were recorded or considered likely to occur in the Survey Area. No vegetation type was considered a Conservation Significant Community based on the definition listed in Section 2.4.4.1 (BHP WAO, 2016). Based on the definitions of significant vegetation listed in section 2.4.4 (Environmental Protection Authority, 2016a) three vegetation types may be considered significant:

- MI AmAnlGoro TpTt Ch provides refuge for the locally and regionally restricted novel taxon *Hibiscus* aff. *campanulatus*;
- MA EvAci CcCyaSopl ApyTefc is a Potential Groundwater Dependent Ecosystem (PGDE) as it supports the potential phreatophytic species *Eucalyptus victrix*. GDEs are susceptible to impacts associated with water draw down; and
- MA EcoEvAci CcCya ApyTefc is a GDE as it supports the phreatophytic species *Eucalyptus camaldulensis* subsp. *obtusata*. GDEs are susceptible to impacts associated with water draw down.

All vegetation types were likely to be locally and regionally widespread.

6.3. Groundwater Dependent Ecosystems

The vegetation health of GDE and PGDE sites was scored as in 'Good' condition due to high weed levels, with **Cenchrus ciliaris* recorded across all sites. However, the sample trees of *Eucalyptus victrix* and

Eucalyptus camaldulensis subsp. *obtusa* were generally in a healthy condition, with tree canopy extent and density scores recorded as 'major' for all *Eucalyptus camaldulensis* subsp. *obtusa* sample trees, and 'medium' to 'major' for all *Eucalyptus victrix* sample trees.

7. REFERENCES

- AECOM (2020) *Rhodes Ridge Targeted Flora Survey Dec 2020*. Unpublished report for Rio Tinto Iron Ore.
- AECOM (2021) *Rhodes Ridge - Giles Point and Bakers Road Upgrades Targeted Flora Survey*. Unpublished report for Rio Tinto Iron Ore.
- Astron (2019a) *Rhodes Ridge - Targeted Flora Survey, July/August 2019*. unpublished report for Hamersley Resources Limited.
- Astron (2019b) *Rhodes Ridge Detailed Flora and Vegetation Survey - Field Visit 1*. Rio Tinto Iron Ore.
- Astron (2021) *Rhodes Ridge - Priority Flora Searches, June 2021*. Unpublished report for Hamersley Resources Limited.
- Astron (2022) *Rhodes Ridge Detailed Flora and Vegetation Survey - Field Visit 2*. Unpublished report for Rio Tinto Iron Ore.
- Australian Government (1999) *Environment Protection and Biodiversity Conservation Act 1999*. Canberra: Office of Parliamentary Counsel.
- BHP WAIO (2016) *Procedure - Vegetation and Flora Survey Version 3.0 (0124627)*.
- BHP WAIO (2020) *Biodiversity Survey Spatial Data Requirements - SPR-IEN-EMS-015*.
- Biologic (2021) *Jimblebar Eremophila capricornica Targeted Flora Survey*. Unpublished report for BHP WAIO.
- Bureau of Meteorology (2022) 'Climate Data Online'.
- Chiu, C.-H. *et al.* (2014) 'An improved nonparametric lower bound of species richness via a modified good-turing frequency formula', *Biometrics*, 70(3), pp. 671–682. Available at: <https://doi.org/10.1111/biom.12200>.
- Council of Heads of Australasian Herbaria (2023) *The Australasian Virtual Herbarium*. Available at: <https://avh.chah.org.au/> (Accessed: 2 March 2023).
- Department of Agriculture and Food Western Australia (2016) *Rangeland land system mapping Western Australia*.
- Department of Biodiversity Conservation and Attractions (2016) *Biodiversity Conservation Act 2016*.
- Department of Biodiversity Conservation and Attractions (2017) 'Threatened and Priority Flora Report Form - Field Manual'. Department of Biodiversity, Conservation and Attractions.
- Department of Biodiversity Conservation and Attractions (2019a) *2018 Statewide Vegetation Statistics Incorporating the CAR Reserve Analysis (Full Report). Current as of December 2018*. Perth: WA Department of Biodiversity, Conservation and Attractions. Available at: <https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics>.
- Department of Biodiversity Conservation and Attractions (2019b) 'Conservation Codes for Western Australian Flora and Fauna'. Department of Parks and Wildlife.
- Department of Biodiversity Conservation and Attractions (2023) *Priority Ecological Communities for Western Australia Version 35*. Perth.
- Department of Mines Industry Regulation and Safety (2017) *1:500 000 State Regolith Geology of Western Australia*.

Department of Primary Industries and Regional Development (2019) 'Pre-European Vegetation - Western Australia (NVIS Compliant Version 20110715)'.

Department of the Environment and Energy (2016) 'Collaborative Australian Protected Areas Database - Terrestrial CAPAD2016'. Australian Government.

Department of the Environment and Energy (2019) 'Australian Wetlands Database'. Australian Government.

Department of Water and Environmental Regulation (2019) 'Clearing Regulations - Environmentally Sensitive Areas'. Government of Western Australia.

Ecologia (2008) *Newman Water Pipeline Enhancement Project: Vegetation and Flora Survey*. Unpublished Report for BHP WAIO.

ENV Australia (2011) *Orebody 42/43 Flora, Vegetation and Fauna Assessment*.

ENV Australia (2012) *Eastern Ridge (OB23/24/25) Flora and Vegetation Assessment*.

Environmental Protection Authority (2016a) 'EPA Environmental Factor Guideline: Flora and Vegetation'. Western Australia: EPA.

Environmental Protection Authority (2016b) 'EPA Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment'. Western Australia: EPA.

ESCAVI (2003) 'Australian Vegetation Attribute Manual: National Vegetation Information System, Version 6.0'. Canberra: Executive Steering Committee for Australian Vegetation information. Department of Environment and Heritage.

Galili, T. (2015) 'Dendextend: an R package for visualizing, adjusting, and comparing trees of hierarchical clustering. Bioinformatics.' Available at: <https://doi.org/10.1093/bioinformatics/btv428>.

Government of Western Australia (2007) 'Biosecurity and Agriculture Management Act (BAM Act) 2007'. Available at: https://www.legislation.wa.gov.au/legislation/statutes.nsf/main_mrtitle_2736_homepage.html.

Invasive Plants and Animals Committee (2017) *Australian Weeds Strategy 2017-2027*.

Kendrick, P. (2001) 'Pilbara 3 (PIL3 – Hamersley Subregion)', in *A Biodiversity Audit of Western Australia's 53 Biogeographic Subregions in 2002*. Department of Conservation and Land Management, pp. 568–580.

Leighton, K.A. (2004) 'Climate', in *Technical Bulletin 92 - An inventory and condition survey of the Pilbara region, Western Australia*, Perth, WA: Western Australian Department of Agriculture, pp. 19–38.

McKenzie, N.L., Van Leeuwen, S. and Pinder, A.M. (2009) 'Introduction to the Pilbara Biodiversity Survey, 2002-2007', *Records of the Western Australian Museum, Supplement*, 78, pp. 3–89. Available at: [https://doi.org/10.18195/issn.0313-122x.78\(1\).2009.003-089](https://doi.org/10.18195/issn.0313-122x.78(1).2009.003-089).

McKenzie, N.L., May, J.E. and McKenna, S. (2003) 'Bioregional Summary of the 2002 Biodiversity Audit for Western Australia'.

McLean, E.H. (2014) *Patterns of water use by the riparian tree Melaleuca argentea in semiarid northwestern Australia*. PhD Thesis. The University of Western Australia.

Oksanen, J. et al. (2019) 'vegan: Community Ecology Package. R package version 2.5-6'.

Onshore Environmental Consultants (2009a) *Myopic Exploration Lease Biological Survey*. Available at: <https://library.dbca.wa.gov.au/static/StaffOnly/071298.pdf> (Accessed: 18 January 2023).

- Onshore Environmental Consultants (2009b) *Myopic Exploration Lease Biological Survey*. Unpublished Report for BHP Billiton Iron Ore. Available at: <https://library.dbca.wa.gov.au/static/StaffOnly/071298.pdf> (Accessed: 18 December 2023).
- Onshore Environmental Consultants (2015a) *Fortescue River Riparian Flora and Vegetation Survey*.
- Onshore Environmental Consultants (2015b) *Targeted Survey for Acacia sp. East Fortescue (surrounding OB31)*.
- Onshore Environmental Consultants (2016) *Cathedral Gorge Level 2 Flora and Vegetation Survey*. Unpublished Report for BHP Billiton Iron Ore.
- Onshore Environmental Consultants (2017) *Reconnaissance Flora and Vegetation Survey and Fauna Assessment Newman to Mining Area C Powerline Corridor Prepared for BHP Billiton Iron Ore Pty Ltd*.
- Peel, M.C., Finlayson, B.L. and McMahon, T.A. (2007) 'Updated world map of the Köppen-Geiger climate classification', *Hydrology and Earth System Sciences Discussions*, 4(2), pp. 439–473.
- R Core Team (2021) 'R: A language and environment for statistical computing.' Vienna. Available at: <https://www.r-project.org/>.
- Rio Tinto (2020) *Rhodes Ridge Targeted Flora Survey – October 2019 and February 2020*. Unpublished report for Hamersley Resources Limited.
- Sommer, B. and Froend, R. (2011) 'Resilience of Phreatophytic Vegetation to Groundwater Drawdown: Is Recovery Possible Under a Drying Climate? Drawdown: Is Recovery Possible Under a Drying Climate? ', *Ecohydrology*, 4(1), pp. 67–82. Available at: <https://doi.org/10.1002/eco.124>.
- Souter, N.J. *et al.* (2009) 'Method manual for the visual assessment of Lower River Murray floodplain trees: River Red Gum (*Eucalyptus camaldulensis*). Technical note 2009/25 of the Department of Water, Land and Biodiversity Conservation'. Government of South Australia.
- Spectrum Ecology & Spatial (2021) *OB32 Surplus Water & Homestead Creek Wetting Front Detailed Flora & Vegetation Assessment*. Unpublished report for BHP WAIO.
- Spectrum Ecology & Spatial (2023) *East Ophthalmia & Ninga Detailed Flora & Vegetation Survey*. Unpublished Report for BHP WAIO.
- Spectrum Spatial & Ecology (2022) *Hibiscus aff. campanulatus Targeted Survey – Cathedral Gorge*. Unpublished Report for BHP WAIO.
- Stratagen JBS&G (2020) *Roy Hill Consolidated Vegetation Report*. Unpublished report for Roy Hill.
- Thackway, R. and Cresswell, I.D. (1995) 'An Interim Biogeographic Regionalisation for Australia (IBRA)'.
- Western Australian Government (1986) *Environmental Protection Act 1986*.
- Western Australian Herbarium (2023) *FloraBase - The Western Australian Flora*. Department of Biodiversity, Conservation and Attractions. Available at: <https://florabase.dbca.wa.gov.au/>.

Appendix A: Conservation Codes



Appendix A1: Definitions of Conservation Categories under the EPBC Act

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

Appendix A2: Definitions of Conservation Categories Under the BC Act

Code	Definition (BC Act)
Threatened Species (T)	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.
Critically Endangered (CR)	Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under 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.
Endangered (EN)	Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under 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.
Vulnerable (VU)	Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under 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.

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

Code	Definition (BC Act)
Priority 2: Poorly-known species (P2)	Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
Priority 3: Poorly-known species (P3)	Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
Priority 4: Rare, Near Threatened and other species in need of monitoring (P4)	(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently Threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of Threatened species during the past five years for reasons other than taxonomy.

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

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

Appendix B: Flora Site Data



FbothSite: Q001		Type: Quadrat	Size: 50x50m	Date: 09/05/2023	Botanist: Chris Shaw,Sarah Boys	
Landform:	Ridge					
Slope, aspect:	3° - Gentle N					
Soil:	Clay, Red-orange					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	60 - 200 mm - Cobbles					
Fire:	2 - 5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S2					
Location (NW):	50 769981 mE, 7424008 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia bivenosa</i>		1.2	1.5	<i>Indigofera monophylla</i>	0.3	0.1
<i>Acacia inaequilatera</i>		1.1	0.1	<i>Paraneurachne muelleri</i>	0.3	0.1
<i>Acacia monticola</i>		1.7	0.1	<i>Ptilotus astrolasius</i>	0.35	0.1
<i>Amphipogon sericeus</i>		0.2	0.1	<i>Ptilotus calostachyus</i>	0.8	0.2
<i>Dampiera candidans</i>		0.3	0.1	<i>Ptilotus exaltatus</i>	0.1	0.1
<i>Dodonaea coriacea</i>		0.6	0.1	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.6	0.1
<i>Eriachne mucronata</i>		0.2	0.1	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	0.6	0.5
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		4	3	<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.6	0.1
<i>Fimbristylis dichotoma</i>		0.1	0.1	<i>Solanum lasiophyllum</i>	0.5	0.1
<i>Goodenia cusackiana</i>		0.2	0.1	<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	0.3	0.1
<i>Goodenia triodiophila</i>		0.3	0.1	<i>Triodia pungens</i>	0.3	20
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>		1.1	0.1	<i>Triodia vanleeuwenii</i>	0.2	15

Site: Q002		Type: Quadrat		Size: 25 x 100 m	Date: 10/05/2023	Botanist: Chris Shaw	
Landform:	Creek/ river bank						
Slope, aspect:	<1° - Level -						
Soil:	Clay, sandy clay, Red-orange						
Rocks:	Creek stones Ironstone						
Abundance:	>90% - Continuous						
Size:	60 - 200 mm - Cobbles						
Fire:	2 - 5 yrs						
Condition:	Excellent						
Notes:	None						
Veg Unit:	D2						
Location (NW):	50 771210 mE, 7423530 mS						
Species		Height	Cover	Species		Height	Cover
Acacia adoxa var. adoxa		0.2	0.1	Hakea chordophylla		1.5	0.2
Acacia ancistrocarpa		1.4	2	Indigofera monophylla		0.6	0.1
Acacia bivenosa		1.2	0.5	Isotropis atropurpurea		0.5	0.1
Acacia inaequilatera		2	0.5	Jasminum didymum subsp. lineare		0.1	0.4
Acacia monticola		2	6	Paraneurachne muelleri		0.4	0.1
Acacia tumida		1.5	0.1	Petalostylis labicheoides		2	0.5
Afrohybanthus aurantiacus		0.4	0.1	Polymeria calycina		0.1	0.1
Amphipogon sericeus		0.2	0.1	Ptilotus astrolasius		0.3	1
Androcalva luteiflora		1.5	15	Ptilotus calostachyus		0.5	0.1
Aristida holathera var. holathera		0.5	0.1	Santalum lanceolatum		2.5	4
Corchorus lasiocarpus subsp. parvus		0.4	0.1	Senna artemisioides subsp. oligophylla		1	0.1
Corymbia hamersleyana		3	1	Senna glutinosa subsp. glutinosa		1.5	0.3
Dampiera candidans		0.2	0.1	Senna glutinosa subsp. pruinosa		1	0.1
Eriachne mucronata		0.4	1	Senna sericea		1	0.1
Eucalyptus leucophloia subsp. leucophloia		1	0.1	Themeda triandra		0.5	1
Gossypium robinsonii		2	3	Triodia pungens		0.5	35
Grevillea wickhamii subsp. hispidula		2	0.1	Triodia vanleeuwenii		0.2	0.2

Site: Q003		Type: Quadrat	Size: 50x50m	Date: 10/05/2023	Botanist: Chris Shaw,Sarah Boys	
Landform:	Ridge					
Slope, aspect:	3° - Gentle N					
Soil:	Clay, Red-orange					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	60 - 200 mm - Cobbles					
Fire:	2 - 5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S2					
Location (NW):	50 771164 mE, 7423426 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia adoxa</i> var. <i>adoxo</i>		0.2	0.5	<i>Paraneurachne muelleri</i>	0.2	0.1
<i>Acacia hilliana</i>		0.4	0.2	<i>Ptilotus calostachyus</i>	0.4	0.1
<i>Acacia tenuissima</i>		0.3	0.1	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.5	0.2
<i>Amphipogon sericeus</i>		0.2	0.2	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	0.5	0.2
<i>Dampiera candidans</i>		0.2	0.1	<i>Sida arenicola</i>	0.2	0.1
<i>Dodonaea coriacea</i>		0.1	0.1	<i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925)	0.2	0.1
<i>Eriachne mucronata</i>		0.2	0.1	<i>Sida</i> sp. <i>Pilbara</i> (A.A. Mitchell PRP 1543)	0.2	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		4	3	<i>Solanum lasiophyllum</i>	0.3	0.1
<i>Fimbristylis dichotoma</i>		0.1	0.1	<i>Triodia pungens</i>	0.3	0.5
<i>Goodenia triodiophila</i>		0.1	0.2	<i>Triodia vanleeuwenii</i>	0.2	20
<i>Hakea chordophylla</i>		2.1	0.5			

Site: Q004		Type: Quadrat	Size: 50x50m	Date: 10/05/2023	Botanist: Chris Shaw		
Landform:	Upper slope						
Slope, aspect:	37° - Very steep N						
Soil:	Clay, Red-orange, brown						
Rocks:	Ironstone						
Abundance:	>90% - Continuous						
Size:	60 - 200 mm - Cobbles						
Fire:	2 - 5 yrs						
Condition:	Excellent						
Notes:	None						
Veg Unit:	S4						
Location (NW):	50 771099 mE, 7423738 mS						
Species			Height	Cover	Species	Height	Cover
<i>Acacia inaequilatera</i>			3	5	<i>Paraneurachne muelleri</i>	0.2	0.1
<i>Acacia spondylophylla</i>			0.7	0.1	<i>Ptilotus astrolasius</i>	0.3	0.3
<i>Aristida contorta</i>			0.2	0.1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.75	0.1
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>			0.3	0.1	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.3	0.1
<i>Euphorbia careyi</i>			0.2	0.1	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	1	0.2
<i>Fimbristylis dichotoma</i>			0.1	0.1	<i>Triodia brizoides</i>	0.4	30
<i>Goodenia cusackiana</i>			0.2	0.1	<i>Triodia wiseana</i>	0.2	3
<i>Gossypium australe</i>			0.4	0.1			

Site: Q005		Type: Quadrat	Size: 50x50m	Date: 10/05/2023	Botanist: Sarah Boys	
Landform:	Mid slope					
Slope, aspect:	23° - Steep S					
Soil:	Clay, Red-orange					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	60 - 200 mm - Cobbles					
Fire:	>5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S4					
Location (NW):	50 770430 mE, 7423799 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia inaequilatera</i>		2.5	1.5	<i>Ptilotus rotundifolius</i>	0.5	0.1
<i>Cheilanthes lasiophylla</i>		0.1	0.1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.5	0.1
<i>Gossypium robinsonii</i>		1.8	0.1	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.1	0.1
<i>Hakea chordophylla</i>		2.5	0.1	<i>Themeda triandra</i>	0.3	0.5
<i>Indigofera rugosa</i>		0.6	0.25	<i>Triodia pungens</i>	0.5	0.1
<i>Indigofera rugosa</i>		0.5	0.1	<i>Triodia brizoides</i>	0.5	30
<i>Ptilotus obovatus</i>		0.5	0.1	<i>Triodia wiseana</i>	0.3	15

Site: Q006		Type: Quadrat	Size: 50x50m	Date: 10/05/2023	Botanist: Chris Shaw	
Landform:	Creek/ river bank					
Slope, aspect:	<1° - Level -					
Soil:	Clay, sandy clay, Red-orange, brown					
Rocks:	Ironstone Creek stones					
Abundance:	50 - 90% - Abundant					
Size:	60 - 200 mm - Cobbles					
Fire:	2 - 5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	D2					
Location (NW):	50 771479 mE, 7423771 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia bivenosa</i>		1	0.1	<i>Eucalyptus gamophylla</i>	0.4	1
<i>Acacia maitlandii</i>		2	0.5	<i>Euphorbia biconvexa</i>	2.5	0.3
<i>Acacia monticola</i>		3	0.2	<i>Gossypium australe</i>	0.1	0.1
<i>Acacia pyrifolia</i>		2	5	<i>Gossypium robinsonii</i>	0.5	0.1
<i>Acacia tumida</i>		2.5	10	<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	4
<i>Afrohybanthus aurantiacus</i>		0.5	0.2	<i>Indigofera monophylla</i>	2	1
<i>Androcalva luteiflora</i>		0.3	0.1	<i>Isotropis atropurpurea</i>	0.5	0.4
<i>Aristida contorta</i>		1.5	8	<i>Paraneurachne muelleri</i>	0.4	0.1
<i>Aristida holathera</i> var. <i>holathera</i>		0.2	0.1	<i>Petalostylis labicheoides</i>	0.3	0.1
<i>Bulbostylis barbata</i>		0.2	0.1	<i>Polymeria calycina</i>	2	0.4
<i>Cassytha filiformis</i>		0.1	0.1	<i>Ptilotus astrolasius</i>	0.1	0.1
<i>Cenchrus ciliaris</i>		0.1	0.1	<i>Ptilotus calostachyus</i>	0.4	0.2
<i>Cleome viscosa</i>		0.4	0.1	<i>Santalum lanceolatum</i>	0.5	0.2
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>		0.1	0.1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1.5	6
<i>Corymbia hamersleyana</i>		0.3	0.1	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	0.2
<i>Cymbopogon ambiguus</i>		5	3	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	2	0.2
<i>Dodonaea lanceolata</i> var. <i>lanceolata</i>		0.7	1	<i>Themeda triandra</i>	1	0.1
<i>Enneapogon lindleyanus</i>		2	4	<i>Triodia pungens</i>	1	6
<i>Eragrostis mucronata</i>		0.5	0.5	<i>Triodia vanleeuwenii</i>	0.5	20

Site: Q007		Type: Quadrat	Size: 50x50m	Date: 10/05/2023	Botanist: Sarah Boys	
Landform:	Mid slope					
Slope, aspect:	23° - Steep N					
Soil:	Clay, Red-orange					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	60 - 200 mm - Cobbles					
Fire:	2 - 5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S4					
Location (NW):	50 771663 mE, 7423686 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia inaequilatera</i>		2.2	2	<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Acacia spondylophylla</i>		0.7	0.1	<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Calytrix carinata</i>		0.6	0.1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.5	0.25
<i>Eriachne mucronata</i>		0.2	0.1	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.5	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>		0.9	0.1	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	0.5	0.1
<i>Hakea chordophylla</i>		1.5	0.1	<i>Triodia brizoides</i>	0.2	30
<i>Paraneurachne muelleri</i>		0.2	0.1	<i>Triodia pungens</i>	0.3	1
<i>Ptilotus astrolasius</i>		0.4	1	<i>Triodia wiseana</i>	0.3	1

Site: Q008		Type: Quadrat	Size: 50x50m	Date: 11/05/2023	Botanist: Chris Shaw	
Landform:	Creek/ river bank					
Slope, aspect:	<1° - Level -					
Soil:	Clay, sandy clay, Red-orange					
Rocks:	Creek stones Ironstone					
Abundance:	50 - 90% - Abundant					
Size:	60 - 200 mm - Cobbles					
Fire:	>5 yrs					
Condition:	Very Good					
Notes:	Weeds (High)					
Veg Unit:	D3b					
Location (NW):	50 771138 mE, 7421995 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia citrinoviridis</i>		3	2	<i>Gossypium robinsonii</i>	1.5	0.3
<i>Acacia dictyophleba</i>		1	0.2	<i>Indigofera linifolia</i>	0.2	0.1
<i>Acacia pyrifolia</i>		1	2	<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.1	0.1
<i>Bidens bipinnata</i>		0.1	0.1	<i>Nellica maderaspatensis</i>	0.3	0.1
<i>Boerhavia coccinea</i>		0.1	0.1	<i>Nellica maderaspatensis</i>	0.1	0.1
<i>Cenchrus ciliaris</i>		0.6	10	<i>Petalostylis labicheoides</i>	2	0.1
<i>Sorghum plumosum</i>		1	2	<i>Pluchea rubelliflora</i>	0.3	0.1
<i>Cleome viscosa</i>		0.1	0.1	<i>Polymeria calycina</i>	0.3	0.1
<i>Cucumis melo</i>		0.1	0.1	<i>Rhynchosia minima</i>	0.1	0.1
<i>Cymbopogon ambiguus</i>		0.6	2.5	<i>Santalum lanceolatum</i>	1	0.1
<i>Cyperus</i> sp. <i>indet</i>		0.4	0.2	<i>Setaria dielsii</i>	0.4	0.1
<i>Enneapogon lindleyanus</i>		0.2	0.1	<i>Stemodia viscosa</i>	0.1	0.1
<i>Eragrostis mucronata</i>		0.3	0.1	<i>Tephrosia rosea</i> var. <i>Fortescue creeks</i> (M.I.H. Brooker 2186)	0.6	1.5
<i>Eragrostis tenella</i>		0.2	0.1	<i>Themeda triandra</i>	0.4	0.3
<i>Eucalyptus victrix</i>		12	65	<i>Triodia pungens</i>	0.3	0.2
<i>Euphorbia biconvexa</i>		0.1	0.1	<i>Urochloa subquadripara</i>	0.1	0.1
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>		0.1	0.1	<i>Vigna</i> sp. <i>Hamersley clay</i> (A.A. Mitchell PRP 113)	0.1	0.1
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>		0.2	0.1			

Site: Q009		Type: Quadrat	Size: 50x50m	Date: 11/05/2023	Botanist: Sarah Boys	
Landform:	Crest					
Slope, aspect:	1° - Very Gentle N					
Soil:	Clay, Orange-brown					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	20 - 60 mm - Coarse gravel					
Fire:	2 - 5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S2					
Location (NW):	50 768438 mE, 7421509 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia hilliana</i>		0.3	4	<i>Paraneurachne muelleri</i>	0.2	0.1
<i>Acacia spondylophylla</i>		0.5	0.5	<i>Ptilotus astrolasius</i>	0.2	0.1
<i>Acacia tenuissima</i>		0.3	0.1	<i>Ptilotus calostachyus</i>	0.2	0.1
<i>Amphipogon sericeus</i>		0.2	3	<i>Ptilotus rotundifolius</i>	0.5	0.3
<i>Aristida holathera</i> var. <i>holathera</i>		0.1	0.1	<i>Santalum lanceolatum</i>	1.2	0.1
<i>Corymbia hamersleyana</i>		5	1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1.1	0.1
<i>Cymbopogon obtectus</i>		0.5	0.1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.3	0.1
<i>Enneapogon polyphyllus</i>		0.1	0.1	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	0.7	0.2
<i>Eriachne mucronata</i>		0.2	0.1	<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	0.6	0.2
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		1.2	0.1	<i>Solanum centrale</i>	0.2	0.1
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>		0.1	0.1	<i>Solanum lasiophyllum</i>	0.3	0.1
<i>Goodenia triodiophila</i>		0.2	0.1	<i>Triodia pungens</i>	0.2	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>		0.3	0.1	<i>Triodia vanleeuwenii</i>	0.2	15
<i>Hakea chordophylla</i>		3.5	2			

Site: Q010		Type: Quadrat	Size: 25 x 100 m	Date: 11/05/2023	Botanist: Chris Shaw	
Landform:	Creek/ river bank					
Slope, aspect:	<1° - Level -					
Soil:	Clay, sandy clay, Red-orange, brown					
Rocks:	Creek stones Ironstone					
Abundance:	50 - 90% - Abundant					
Size:	60 - 200 mm - Cobbles					
Fire:	2 - 5 yrs					
Condition:	Good					
Notes:	Weeds (High)					
Veg Unit:	D3b					
Location (NW):	50 768933 mE, 7423152 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia citrinoviridis</i>		1	0.2	<i>Eucalyptus victrix</i>	11	40
<i>Acacia dictyophleba</i>		2	0.1	<i>Eulalia aurea</i>	0.5	1
<i>Acacia maitlandii</i>		2	0.1	<i>Indigofera linifolia</i>	0.1	0.1
<i>Acacia pyrifolia</i>		1	3	<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.5	0.2
<i>Androcalva luteiflora</i>		1	0.2	<i>Petalostylis labicheoides</i>	2	1
<i>Cenchrus ciliaris</i>		0.75	30	<i>Santalum lanceolatum</i>	1	1
<i>Sorghum plumosum</i>		0.75	3	<i>Sida fibulifera</i>	0.2	0.1
<i>Cyperus</i> sp. <i>indet</i>		0.4	0.2	<i>Themeda triandra</i>	0.5	3
<i>Eragrostis eriopoda</i>		0.2	0.1	<i>Triodia pungens</i>	0.3	0.5
<i>Eragrostis mucronata</i>		0.3	0.2	<i>Vigna</i> sp. Hamersley clay (A.A. Mitchell PRP 113)	0.1	0.2

Site: Q011		Type: Quadrat	Size: 50x50m	Date: 12/05/2023	Botanist: Sarah Boys	
Landform:	Crest					
Slope, aspect:	1° - Very Gentle S					
Soil:	Clay, Red-brown					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	20 - 60 mm - Coarse gravel					
Fire:	2 - 5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S2					
Location (NW):	50 770782 mE, 7422983 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia adoxa</i> var. <i>adoxo</i>		0.3	1	<i>Petalostylis labicheoides</i>	1.5	0.3
<i>Acacia hilliana</i>		0.2	2	<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Amphipogon sericeus</i>		0.1	0.5	<i>Scaevola browniana</i> subsp. <i>browniana</i>	0.3	1
<i>Calytrix carinata</i>		0.5	0.2	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.6	0.1
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>		0.3	0.1	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.5	0.1
<i>Corymbia hamersleyana</i>		4	1	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	0.6	0.1
<i>Dampiera candicans</i>		0.2	0.1	<i>Seringia exastia</i>	0.5	1
<i>Eriachne lanata</i>		0.3	1	<i>Sida arenicola</i>	0.7	0.1
<i>Eriachne mucronata</i>		0.2	0.2	<i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925)	0.2	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		3	1	<i>Solanum lasiophyllum</i>	0.2	0.1
<i>Hakea chordophylla</i>		2.1	1.5	<i>Tribulus suberosus</i>	0.2	0.1
<i>Hibiscus sturtii</i>		0.1	0.1	<i>Triodia pungens</i>	0.3	1
<i>Mirbelia viminalis</i>		0.6	0.1	<i>Triodia vanleeuwenii</i>	0.2	25

Site: Q012		Type: Quadrat	Size: 50x50m	Date: 11/05/2023	Botanist: Chris Shaw	
Landform:	Flat plain					
Slope, aspect:	<1° - Level -					
Soil:	Sandy clay, Brown					
Rocks:						
Abundance:	No rocks					
Size:						
Fire:	>5 yrs					
Condition:	Very Good					
Notes:	Tracks, Weeds (Medium)					
Veg Unit:	P1a					
Location (NW):	50 770782mE, 7421791 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia adsurgens</i>		1	0.2	<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	0.1	0.1
<i>Acacia dictyophleba</i>		1.5	3	<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	0.2	0.2
<i>Acacia tenuissima</i>		1	1.5	<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.2	0.1
<i>Aristida contorta</i>		0.2	0.1	<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.5	0.1
<i>Aristida inaequiglumis</i>		0.4	0.4	<i>Maireana planifolia</i>	0.3	0.1
<i>Boerhavia coccinea</i>		0.2	0.1	<i>Maireana villosa</i>	0.4	0.1
<i>Bonamia erecta</i>		0.3	0.1	<i>Paraneurachne muelleri</i>	0.3	1
<i>Bulbostylis barbata</i>		0.1	0.1	<i>Paspalidium rarum</i>	0.1	0.1
<i>Cenchrus ciliaris</i>		0.6	10	<i>Perotis rara</i>	0.1	0.1
<i>Cleome viscosa</i>		0.1	0.1	<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Cymbopogon obtectus</i>		0.4	0.2	<i>Ptilotus astrolasius</i>	0.2	0.25
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>		0.15	0.1	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	0.3	0.2
<i>Digitaria ctenantha</i>		0.1	0.1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.1	0.1
<i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i>		0.3	0.1	<i>Sida cardiophylla</i>	1	0.5
<i>Enneapogon lindleyanus</i>		0.6	0.25	<i>Sida</i> sp. L (A.M. Ashby 4202)	0.2	1
<i>Enneapogon polyphyllus</i>		0.2	0.1	<i>Sorghum plumosum</i>	0.7	3
<i>Eragrostis eriopoda</i>		0.2	0.6	<i>Trianthema pilosum</i>	0.1	0.1
<i>Eucalyptus gamophylla</i>		3	6	<i>Triodia pungens</i>	0.6	25
<i>Eucalyptus xerothermica</i>		8	6.3	<i>Vigna</i> sp. Hamersley clay (A.A. Mitchell PRP 113)	0.1	0.1
<i>Euphorbia biconvexa</i>		0.1	0.1			

Site: Q013		Type: Quadrat	Size: 50x50m	Date: 12/05/2023	Botanist: Sarah Boys
Landform:	Crest				
Slope, aspect:	3° - Gentle S				
Soil:	Clay, Red-brown				
Rocks:	Ironstone				
Abundance:	>90% - Continuous				
Size:	60 - 200 mm - Cobbles				
Fire:	>5 yrs				
Condition:	Excellent				
Notes:	None				
Veg Unit:	S2				
Location (NW):	50 769521 mE, 7423358 mS				
Species	Height	Cover	Species	Height	Cover
<i>Acacia adoxa</i> var. <i>adoxo</i>	0.4	1	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	4	2.5
<i>Acacia hamersleyensis</i>	1.2	0.1	<i>Goodenia triodiophila</i>	0.2	0.1
<i>Acacia hilliana</i>	0.3	0.2	<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2.2	0.1
<i>Acacia pruinocarpa</i>	0.9	0.1	<i>Hakea chordophylla</i>	2.1	0.5
<i>Acacia spondylophylla</i>	0.9	0.1	<i>Psyrax latifolia</i>	0.6	0.1
<i>Acacia pachyacra</i>	1.8	0.1	<i>Scaevola browniana</i> subsp. <i>browniana</i>	0.6	2
<i>Afrohybanthus aurantiacus</i>	0.2	0.1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1.8	0.3
<i>Amphipogon sericeus</i>	0.2	0.1	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.1	0.1
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>	0.2	0.1	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	1.8	0.1
<i>Corymbia hamersleyana</i>	5	2	<i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925)	0.25	0.1
<i>Cymbopogon ambiguus</i>	0.3	0.1	<i>Solanum lasiophyllum</i>	0.3	0.1
<i>Dampiera candidans</i>	0.2	0.1	<i>Triodia pungens</i>	0.3	4
<i>Eremophila latrobei</i> subsp. <i>glabra</i>	0.9	0.2	<i>Triodia vanleeuwenii</i>	0.3	35
<i>Eriachne lanata</i>	0.2	0.2	<i>Triodia wiseana</i>	0.3	0.1
<i>Eriachne mucronata</i>	0.2	0.1			

Site: Q014		Type: Quadrat	Size: 50x50m	Date: 12/05/2023	Botanist: Chris Shaw	
Landform:	Flat plain					
Slope, aspect:	<1° - Level -					
Soil:	Sandy clay, Red-orange, brown					
Rocks:	Ironstone					
Abundance:	10 - 20% - Common					
Size:	20 - 60 mm - Coarse gravel					
Fire:	>5 yrs					
Condition:	Very Good					
Notes:	Tracks,Weeds (Low)					
Veg Unit:	P1a					
Location (NW):	50 769585 mE, 7422574 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia adsurgens</i>		1	0.1	<i>Eucalyptus xerothermica</i>	6	3
<i>Acacia ancistrocarpa</i>		2	0.25	<i>Hibiscus sturtii</i>	0.3	0.2
<i>Acacia bivenosa</i>		1.5	3	<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.5	0.1
<i>Acacia dictyophleba</i>		1.5	0.2	<i>Paraneurachne muelleri</i>	0.3	4
<i>Acacia pruinocarpa</i>		2	2	<i>Ptilotus astrolasius</i>	0.3	1
<i>Acacia tenuissima</i>		1	1	<i>Ptilotus exaltatus</i>	0.3	0.1
<i>Aristida contorta</i>		0.15	0.1	<i>Ptilotus obovatus</i>	1	0.5
<i>Cenchrus ciliaris</i>		0.2	0.25	<i>Rhagodia eremaea</i>	1	0.1
<i>Duperreya commixta</i>		0.1	0.1	<i>Rhynchosia minima</i>	0.1	0.1
<i>Enneapogon polyphyllus</i>		0.1	0.1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1	2
<i>Eragrostis eriopoda</i>		0.2	0.25	<i>Sida</i> sp. L (A.M. Ashby 4202)	0.2	2.1
<i>Eucalyptus gamophylla</i>		3	10	<i>Triodia pungens</i>	0.5	30

Site: Q015		Type: Quadrat	Size: 50x50m	Date: 12/05/2023	Botanist: Sarah Boys	
Landform:	Mid slope					
Slope, aspect:	23° - Steep S					
Soil:	Clay, Red-orange, brown					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	60 - 200 mm - Cobbles					
Fire:	>5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S3a					
Location (NW):	50 767859 mE, 7423685 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia adoxa</i> var. <i>adoxo</i>		0.2	0.1	<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Acacia bivenosa</i>		1.2	0.5	<i>Ptilotus exaltatus</i>	0.2	0.1
<i>Acacia tenuissima</i>		0.5	0.1	<i>Ptilotus obovatus</i>	0.3	0.1
<i>Eremophila latrobei</i> subsp. <i>glabra</i>		1.2	0.1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1.2	0.2
<i>Eriachne mucronata</i>		0.3	5	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.8	0.5
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		6	3	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	1.2	0.6
<i>Goodenia triodiophila</i>		0.2	0.1	<i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925)	0.15	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>		0.3	0.1	<i>Solanum lasiophyllum</i>	0.3	0.1
<i>Hibiscus</i> aff. <i>campanulatus</i> (P1)		0.5	0.1	<i>Themeda triandra</i>	0.3	1
<i>Hibiscus sturtii</i>		0.1	0.1	<i>Triodia brizoides</i>	0.2	5
<i>Lepidium catapycnon</i> (P4)		0.2	0.1	<i>Triodia pungens</i>	0.3	35
<i>Ptilotus astrolasius</i>		0.2	0.1	<i>Vincetoxicum lineare</i>	0.8	0.1

Site: Q016		Type: Quadrat	Size: 50x50m	Date: 12/05/2023	Botanist: Chris Shaw	
Landform:	Simple slope					
Slope, aspect:	10° - Moderate S					
Soil:	Clay, Brown					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	20 - 60 mm - Coarse gravel					
Fire:	>5 yrs					
Condition:	Excellent					
Notes:	None, Tracks					
Veg Unit:	S3a					
Location (NW):	50 769443 mE, 7423244 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia bivenosa</i>		1.5	1	<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Acacia pruinocarpa</i>		0.2	0.1	<i>Ptilotus exaltatus</i>	0.2	0.1
<i>Acacia synchronicia</i>		0.3	0.1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.2	0.1
<i>Eriachne mucronata</i>		0.2	1	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		5	10	<i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925)	0.2	0.1
<i>Hibiscus</i> aff. <i>campanulatus</i> (P1)		0.3	0.1	<i>Sida</i> sp. <i>Pilbara</i> (A.A. Mitchell PRP 1543)	0.2	0.1
<i>Paraneurachne muelleri</i>		0.3	1	<i>Solanum lasiophyllum</i>	0.3	0.1
<i>Ptilotus astrolasius</i>		0.2	0.1	<i>Triodia pungens</i>	0.3	35

Site: Q017		Type: Quadrat	Size: 50x50m	Date: 13/05/2023	Botanist: Sarah Boys		
Landform:	Crest						
Slope, aspect:	3° - Gentle S						
Soil:	Clay, Red-orange, brown						
Rocks:	Ironstone						
Abundance:	>90% - Continuous						
Size:	20 - 60 mm - Coarse gravel						
Fire:	2 - 5 yrs						
Condition:	Excellent						
Notes:	None						
Veg Unit:	S2						
Location (NW):	50 767488 mE, 7423917 mS						
Species			Height	Cover	Species	Height	Cover
<i>Acacia adoxa</i> var. <i>adoxo</i>			0.2	5	<i>Hakea chordophylla</i>	2.1	0.5
<i>Acacia bivenosa</i>			0.3	0.1	<i>Hibiscus sturtii</i>	0.1	0.1
<i>Acacia hilliana</i>			0.3	0.1	<i>Mirbelia viminalis</i>	0.5	0.1
<i>Acacia tenuissima</i>			1.8	0.5	<i>Ptilotus calostachyus</i>	0.4	0.1
<i>Amphipogon sericeus</i>			0.2	0.2	<i>Scaevola browniana</i> subsp. <i>browniana</i>	0.3	0.5
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>			0.3	0.1	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.2	0.5
<i>Corymbia hamersleyana</i>			2.5	0.5	<i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925)	0.3	0.1
<i>Dampiera candidans</i>			0.4	0.5	<i>Sida</i> sp. <i>Pilbara</i> (A.A. Mitchell PRP 1543)	0.15	0.1
<i>Dodonaea pachyneura</i>			1.5	0.1	<i>Tribulus suberosus</i>	0.3	0.1
<i>Eriachne lanata</i>			0.2	5	<i>Triodia vanleeuwenii</i>	0.2	30
<i>Eriachne mucronata</i>			0.2	0.5	<i>Triodia pungens</i>	0.2	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>			4	2	<i>Triumfetta maconochieana</i>	0.2	0.1
<i>Goodenia triodiophila</i>			0.2	0.1			

Site: Q018		Type: Quadrat	Size: 50x50m	Date: 12/05/2023	Botanist: Chris Shaw	
Landform:	Flat plain					
Slope, aspect:	<1° - Level -					
Soil:	Sandy clay, Orange-brown					
Rocks:	Ironstone					
Abundance:	2 - 10% - Few					
Size:	6 - 20 mm - Medium gravel					
Fire:	2 - 5 yrs					
Condition:	Very Good					
Notes:	Tracks,Weeds (Low)					
Veg Unit:	P1a					
Location (NW):	50 767983 mE, 7423207 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia adsurgens</i>		0.3	0.2	<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.4	0.2
<i>Acacia aptaneura</i>		1	0.15	<i>Paraneurachne muelleri</i>	0.3	1
<i>Acacia bivenosa</i>		0.5	0.75	<i>Ptilotus astrolasius</i>	0.3	0.3
<i>Acacia tenuissima</i>		1	0.5	<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Bonamia erecta</i>		0.2	0.4	<i>Ptilotus obovatus</i>	0.5	0.1
<i>Cenchrus ciliaris</i>		0.5	0.1	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	0.2	0.1
<i>Cymbopogon obtectus</i>		0.5	0.1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1	3
<i>Duperreya commixta</i>		0.1	0.2	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	0.25
<i>Eragrostis eriopoda</i>		0.3	0.2	<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1	0.1
<i>Eucalyptus gamophylla</i>		3	10	<i>Sida cardiophylla</i>	0.4	0.2
<i>Eucalyptus xerothermica</i>		6	1	<i>Solanum lasiophyllum</i>	0.4	0.2
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>		0.1	0.1	<i>Triodia pungens</i>	0.5	35
<i>Hibiscus sturtii</i>		0.3	0.1			

Site: Q019		Type: Quadrat	Size: 50x50m	Date: 13/05/2023	Botanist: Sarah Boys	
Landform:	Crest					
Slope, aspect:	<1° - Level -					
Soil:	Clay, Red-orange, brown					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	20 - 60 mm - Coarse gravel					
Fire:	2 - 5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S2					
Location (NW):	50 766653 mE, 7421805 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia hilliana</i>		0.4	5	<i>Hakea lorea</i> subsp. <i>lorea</i>	1.2	0.2
<i>Acacia pruinocarpa</i>		2.1	0.5	<i>Paraneurachne muelleri</i>	0.3	0.1
<i>Acacia spondylophylla</i>		0.5	6	<i>Ptilotus calostachyus</i>	0.7	0.1
<i>Amphipogon sericeus</i>		0.2	0.1	<i>Ptilotus rotundifolius</i>	0.5	0.1
<i>Aristida holathera</i> var. <i>holathera</i>		0.2	0.1	<i>Scaevola browniana</i> subsp. <i>browniana</i>	0.3	0.1
<i>Cymbopogon obtectus</i>		0.2	0.1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1.1	0.1
<i>Eremophila exilifolia</i>		0.7	0.1	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	2.1	0.7
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>		1.5	0.1	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	1.4	0.1
<i>Eriachne lanata</i>		0.2	0.2	<i>Senna sericea</i>	0.9	0.2
<i>Eriachne mucronata</i>		0.2	0.1	<i>Solanum centrale</i>	0.6	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		4	3	<i>Solanum lasiophyllum</i>	0.1	0.1
<i>Goodenia triodiophila</i>		0.2	0.1	<i>Triodia vanleeuwenii</i>	0.2	25
<i>Hakea chordophylla</i>		2.2	0.5	<i>Triodia pungens</i>	0.3	1

Site: Q020		Type: Quadrat	Size: 20 x 125 m	Date: 13/05/2023	Botanist: Chris Shaw	
Landform:	Creek/ river bank					
Slope, aspect:	<1° - Level -					
Soil:	Sandy clay, Orange-brown					
Rocks:	Creek stones Ironstone					
Abundance:	>90% - Continuous					
Size:	60 - 200 mm - Cobbles					
Fire:	>5 yrs					
Condition:	Good					
Notes:	Weeds (High)					
Veg Unit:	D3b					
Location (NW):	50 767253 mE, 7423526 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia citrinoviridis</i>		4	3	<i>Gossypium robinsonii</i>	3	0.2
<i>Acacia maitlandii</i>		1.5	0.2	<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1	0.1
<i>Acacia pyrifolia</i>		1	5	<i>Hibiscus coatesii</i>	0.2	0.1
<i>Afrohybanthus aurantiacus</i>		0.3	0.1	<i>Indigofera linifolia</i>	0.1	0.1
<i>Androcalva luteiflora</i>		1.2	0.4	<i>Isotropis atropurpurea</i>	0.2	0.1
<i>Aristida holathera</i> var. <i>holathera</i>		0.3	0.1	<i>Melaleuca glomerata</i>	3	0.25
<i>Cenchrus ciliaris</i>		0.5	5	<i>Petalostylis labicheoides</i>	1.5	2
<i>Cenchrus setiger</i>		0.5	5	<i>Polymeria calycina</i>	0.2	0.1
<i>Cleome viscosa</i>		0.1	0.1	<i>Ptilotus astrolasius</i>	0.3	0.2
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>		0.4	0.2	<i>Rhynchosia minima</i>	0.1	0.1
<i>Cymbopogon ambiguus</i>		0.6	6	<i>Santalum lanceolatum</i>	1	0.4
<i>Cyperus</i> sp. <i>indet</i>		0.3	0.25	<i>Scaevola amblyanthera</i> var. <i>amblyanthera</i>	0.2	0.1
<i>Duperreya commixta</i>		0.1	0.1	<i>Solanum lasiophyllum</i>	0.1	0.1
<i>Enneapogon lindleyanus</i>		0.4	0.1	<i>Sorghum plumosum</i>	0.7	0.25
<i>Eragrostis eriopoda</i>		0.2	0.1	<i>Tephrosia rosea</i> var. <i>Fortescue creeks</i> (M.I.H. Brooker 2186)	0.5	5
<i>Eragrostis mucronata</i>		0.4	2	<i>Themeda triandra</i>	0.4	2
<i>Eucalyptus victrix</i>		6	15	<i>Triodia pungens</i>	0.5	0.2
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>		0.2	0.1	<i>Triodia wiseana</i>	0.3	0.25

Site: Q021		Type: Quadrat	Size: 50x50m	Date: 13/05/2023	Botanist: Sarah Boys	
Landform:	Mid slope					
Slope, aspect:	23° - Steep S					
Soil:	Clay, Red-orange, brown					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	20 - 60 mm - Coarse gravel					
Fire:	2 - 5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S3a					
Location (NW):	50 767887 mE, 7421339 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia bivenosa</i>		2.2	0.3	<i>Ptilotus exaltatus</i>	0.1	0.1
<i>Acacia tenuissima</i>		0.5	0.2	<i>Ptilotus obovatus</i>	0.2	0.2
<i>Amphipogon sericeus</i>		0.2	0.2	<i>Ptilotus rotundifolius</i>	0.2	0.1
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>		0.2	0.25	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.4	0.2
<i>Duperreya commixta</i>		0.2	0.1	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.7	0.2
<i>Enneapogon lindleyanus</i>		0.1	0.1	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	0.7	0.2
<i>Eriachne mucronata</i>		0.3	0.4	<i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925)	0.3	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		3	5	<i>Sida</i> sp. <i>Pilbara</i> (A.A. Mitchell PRP 1543)	0.4	0.1
<i>Goodenia cusackiana</i>		0.1	0.1	<i>Solanum centrale</i>	0.2	0.1
<i>Gossypium robinsonii</i>		0.6	0.1	<i>Solanum lasiophyllum</i>	0.2	0.1
<i>Paraneurachne muelleri</i>		0.2	0.25	<i>Themeda triandra</i>	0.4	0.1
<i>Ptilotus astrolasius</i>		0.2	0.2	<i>Triodia wiseana</i>	0.2	20
<i>Ptilotus calostachyus</i>		0.2	0.1			

Site: Q022		Type: Quadrat	Size: 50x50m	Date: 13/05/2023	Botanist: Chris Shaw	
Landform:	Flat plain					
Slope, aspect:	<1° - Level -					
Soil:	Clay, sandy clay, Dark brown-black					
Rocks:	Ironstone					
Abundance:	50 - 90% - Abundant					
Size:	6 - 20 mm - Medium gravel					
Fire:	>5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	P3					
Location (NW):	50 767189 mE, 7423143 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia aptaneura</i>		4.5	5.5	<i>Paraneurachne muelleri</i>	0.3	0.2
<i>Acacia ayersiana</i>		5	15	<i>Petalostylis labicheoides</i>	3	0.3
<i>Acacia bivenosa</i>		3	0.2	<i>Psyrax latifolia</i>	1.5	0.1
<i>Acacia pruinocarpa</i>		5	12	<i>Ptilotus astrolasius</i>	0.7	0.2
<i>Acacia synchronicia</i>		1.5	0.2	<i>Ptilotus obovatus</i>	1	3
<i>Aristida contorta</i>		2	1	<i>Rhagodia eremaea</i>	1	0.2
<i>Aristida inaequiglumis</i>		0.6	0.25	<i>Senna artemisioides</i> subsp. <i>helmsii</i>	0.3	0.1
<i>Sorghum plumosum</i>		0.5	0.25	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1	0.2
<i>Duperreya commixta</i>		0.1	0.1	<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1.2	0.5
<i>Enneapogon polyphyllus</i>		0.2	0.1	<i>Sida</i> sp. L (A.M. Ashby 4202)	0.2	0.2
<i>Eragrostis</i> sp. Mt Robinson (S. van Leeuwen 4109) (P2)		0.4	0.1	<i>Sida</i> sp. Supplejack Station (T.S. Henshall 2345)	0.1	0.2
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>		1	3	<i>Solanum lasiophyllum</i>	3	0.1
<i>Eremophila longifolia</i>		2	0.1	<i>Triodia melvillei</i>	0.6	40
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		4	1	<i>Triodia pungens</i>	0.5	0.3
<i>Hakea chordophylla</i>		0.2	0.1	<i>Vincetoxicum lineare</i>	0.2	0.1
<i>Hibiscus burtonii</i>		0.4	0.1			

Site: Q023		Type: Quadrat	Size: 50x50m	Date: 14/05/2023	Botanist: Sarah Boys	
Landform:	Crest					
Slope, aspect:	1° - Very Gentle N					
Soil:	Clay, Red-orange, brown					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	20 - 60 mm - Coarse gravel					
Fire:	>5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S1					
Location (NW):	50 767985 mE, 7422684 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia ancistrocarpa</i>		2.1	10	<i>Hakea lorea</i> subsp. <i>lorea</i>	1.8	0.1
<i>Acacia bivenosa</i>		1.3	1	<i>Hibiscus sturtii</i>	0.2	0.1
<i>Acacia inaequilatera</i>		1.8	3	<i>Indigofera monophylla</i>	0.4	0.2
<i>Acacia sibirica</i>		1.7	0.1	<i>Paraneurachne muelleri</i>	0.3	0.1
<i>Acacia pachyacra</i>		2.2	0.1	<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Acacia tenuissima</i>		1.1	0.5	<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1.8	0.1
<i>Amphipogon sericeus</i>		0.2	0.1	<i>Solanum centrale</i>	0.3	0.1
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>		0.2	0.1	<i>Solanum lasiophyllum</i>	0.2	0.1
<i>Duperreya commixta</i>		1.8	0.5	<i>Triodia pungens</i>	0.3	5
<i>Eucalyptus gamophylla</i>		4	2	<i>Triodia vanleeuwenii</i>	0.2	30
<i>Hakea chordophylla</i>		4	2			

Site: Q024		Type: Quadrat	Size: 50x50m	Date: 13/05/2023	Botanist: Chris Shaw	
Landform:	Crest					
Slope, aspect:	1° - Very Gentle N					
Soil:	Clay, Brown					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	6 - 20 mm - Medium gravel					
Fire:	>5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S2					
Location (NW):	50 767250 mE, 7421491 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia adoxa</i> var. <i>adoxo</i>		0.2	0.2	<i>Hakea lorea</i> subsp. <i>lorea</i>	3	0.2
<i>Acacia hilliana</i>		0.4	3	<i>Paraneurachne muelleri</i>	0.2	0.2
<i>Acacia pruinocarpa</i>		1.5	0.5	<i>Ptilotus rotundifolius</i>	1	0.2
<i>Amphipogon sericeus</i>		0.1	0.2	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1.2	0.1
<i>Cymbopogon ambiguus</i>		0.3	0.1	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	0.75
<i>Eriachne lanata</i>		0.3	0.2	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	1	0.2
<i>Eriachne mucronata</i>		0.3	0.2	<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1	0.2
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		5	0.5	<i>Triodia pungens</i>	0.3	0.5
<i>Goodenia triodiophila</i>		0.2	0.1	<i>Triodia vanleeuwenii</i>	0.3	35
<i>Hakea chordophylla</i>		3	1.5			

Site: Q025		Type: Quadrat	Size: 50x50m	Date: 14/05/2023	Botanist: Sarah Boys		
Landform:	Upper slope						
Slope, aspect:	3° - Gentle S						
Soil:	Clay, Red-orange, brown						
Rocks:	Ironstone						
Abundance:	>90% - Continuous						
Size:	20 - 60 mm - Coarse gravel						
Fire:	2 - 5 yrs						
Condition:	Excellent						
Notes:	None						
Veg Unit:	S1						
Location (NW):	50 766158 mE, 7422335 mS						
Species		Height	Cover	Species		Height	Cover
<i>Acacia ancistrocarpa</i>		2.1	5	<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>		2.2	0.1
<i>Acacia bivenosa</i>		1.2	5	<i>Hakea chordophylla</i>		3	1
<i>Acacia inaequilatera</i>		2.2	1	<i>Hibiscus coatesii</i>		0.1	0.1
<i>Acacia rhodophloia</i>		2.2	6	<i>Paraneurachne muelleri</i>		0.3	0.1
<i>Acacia pachyacra</i>		1.9	0.2	<i>Ptilotus calostachyus</i>		0.3	0.1
<i>Acacia tenuissima</i>		0.5	0.2	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>		0.6	0.1
<i>Amphipogon sericeus</i>		0.2	0.1	<i>Senna glutinosa</i> subsp. <i>x luerksenii</i>		1.9	0.1
<i>Cassytha filiformis</i>		0.2	0.2	<i>Senna sericea</i>		1.4	0.1
<i>Cymbopogon obtectus</i>		0.3	0.1	<i>Sida arenicola</i>		0.2	0.1
<i>Duperreya commixta</i>		1.5	0.2	<i>Solanum centrale</i>		0.2	0.1
<i>Eucalyptus gamophylla</i>		3	8	<i>Triodia pungens</i>		0.3	5
<i>Goodenia triodiophila</i>		0.3	0.1	<i>Triodia vanleeuwenii</i>		0.2	31

Site: Q026		Type: Quadrat	Size: 30 x 83.3 m	Date: 14/05/2023	Botanist: Chris Shaw	
Landform:	Creek/ river bank					
Slope, aspect:	<1° - Level -					
Soil:	Sandy clay, Orange-brown					
Rocks:	Creek stones Ironstone					
Abundance:	>90% - Continuous					
Size:	60 - 200 mm - Cobbles					
Fire:	>5 yrs					
Condition:	Good					
Notes:	Weeds (High)					
Veg Unit:	D3b					
Location (NW):	50 769432 mE, 7422251 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia citrinoviridis</i>		3	1	<i>Eucalyptus victrix</i>	5	10
<i>Acacia dictyophleba</i>		1.5	0.3	<i>Euphorbia biconvexa</i>	0.1	0.1
<i>Acacia pyrifolia</i>		1.5	2	<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	0.1	0.1
<i>Androcalva luteiflora</i>		1	0.5	<i>Gomphrena cunninghamii</i>	0.1	0.1
<i>Cenchrus ciliaris</i>		0.6	8	<i>Gossypium robinsonii</i>	1	0.2
<i>Cenchrus setiger</i>		0.6	1	<i>Nellica maderaspatensis</i>	0.3	0.1
<i>Sorghum plumosum</i>		1	0.7	<i>Paraneurachne muelleri</i>	0.3	0.1
<i>Cleome viscosa</i>		0.1	0.1	<i>Petalostylis labicheoides</i>	1.5	0.5
<i>Cymbopogon ambiguus</i>		0.6	4	<i>Tephrosia rosea</i> var. <i>Fortescue creeks</i> (M.I.H. Brooker 2186)	1	3
<i>Enneapogon lindleyanus</i>		0.2	0.2	<i>Themeda triandra</i>	0.7	2
<i>Eriachne mucronata</i>		0.3	1	<i>Triodia pungens</i>	0.5	0.5

Site: Q027		Type: Quadrat	Size: 50x50m	Date: 14/05/2023	Botanist: Chris Shaw	
Landform:	Crest					
Slope, aspect:	1° - Very Gentle W					
Soil:	Clay, Light brown					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	6 - 20 mm - Medium gravel					
Fire:	>5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S5					
Location (NW):	50 765735 mE, 7422592 mS					
Species		Height	Cover	Species	Height	Cover
Acacia adsurgens		1.2	1	Fimbristylis simulans	0.1	0.1
Acacia inaequilatera		2	0.4	Goodenia stobbsiana	0.3	0.1
Amphipogon sericeus		0.3	2	Goodenia triodiophila	0.1	0.1
Aristida holathera var. holathera		0.3	0.1	Hakea chordophylla	2	0.5
Corymbia deserticola subsp. deserticola		6	1	Paraneurachne muelleri	0.2	0.1
Digitaria ammophila		0.3	0.1	Solanum lasiophyllum	0.4	0.1
Duperreya commixta		0.1	0.1	Triodia pungens	0.5	1.5
Eriachne lanata		0.4	0.1	Triodia vanleeuwenii	0.3	35

Site: Q028		Type: Quadrat	Size: 50x50m	Date: 14/05/2023	Botanist: Chris Shaw	
Landform:	Floodplain					
Slope, aspect:	<1° - Level -					
Soil:	Sandy clay, Orange-brown					
Rocks:	Ironstone					
Abundance:	<2% - Very few					
Size:	6 - 20 mm - Medium gravel					
Fire:	>5 yrs					
Condition:	Good					
Notes:	Weeds (High)					
Veg Unit:	D1a					
Location (NW):	50 771559 mE, 7422202 mS					
Species		Height	Cover	Species	Height	Cover
<i>Abutilon otocarpum</i>		0.2	0.1	<i>Eucalyptus xerothermica</i>	8	1.5
<i>Acacia dictyophleba</i>		2	10	<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.6	0.1
<i>Acacia pyrifolia</i>		1	1	<i>Petalostylis labicheoides</i>	2.5	20
<i>Acacia pachyacra</i>		2	5	<i>Polymeria calycina</i>	0.1	0.1
<i>Aristida holathera</i> var. <i>holathera</i>		3	0.1	<i>Rhynchosia minima</i>	0.1	0.1
<i>Bonamia erecta</i>		0.3	0.2	<i>Salsola australis</i>	0.3	0.2
<i>Cenchrus ciliaris</i>		0.6	20	<i>Sida</i> sp. L (A.M. Ashby 4202)	0.2	0.1
<i>Sorghum plumosum</i>		0.6	0.2	<i>Trianthema pilosum</i>	0.1	0.1
<i>Cleome viscosa</i>		0.1	0.1	<i>Triodia pungens</i>	0.6	2
<i>Corymbia opaca</i>		11	2			

Site: Q029		Type: Quadrat	Size: 20 x 125 m	Date: 15/05/2023	Botanist: Chris Shaw
Landform:	Creek/ river bank				
Slope, aspect:	<1° - Level -				
Soil:	Sandy clay, Orange-brown				
Rocks:	Ironstone Creek stones				
Abundance:	>90% - Continuous				
Size:	20 - 60 mm - Coarse gravel				
Fire:	>5 yrs				
Condition:	Good				
Notes:	Weeds (High)				
Veg Unit:	D3a				
Location (NW):	50 770884 mE, 7420343 mS				
Species	Height	Cover	Species	Height	Cover
<i>Acacia citrinoviridis</i>	4	1	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>	20	10
<i>Acacia pyrifolia</i>	1.5	3	<i>Eucalyptus victrix</i>	12	40
<i>Acacia</i> sp. <i>indet</i> 1	0.5	0.1	<i>Eulalia aurea</i>	0.5	0.25
<i>Amaranthus undulatus</i>	0.2	0.1	<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1
<i>Alternanthera nana</i>	0.1	0.1	<i>Euphorbia biconvexa</i>	0.2	0.1
<i>Ammannia</i> sp. <i>indet</i>	0.1	0.1	<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	0.1	0.1
<i>Androcalva luteiflora</i>	1	0.2	<i>Ipomoea racemigera</i> (P2)	0.1	0.1
<i>Boerhavia coccinea</i>	0.1	0.1	<i>Isotropis iophyta</i>	0.75	0.1
<i>Cenchrus ciliaris</i>	0.6	10	<i>Malvastrum americanum</i> *	0.5	0.1
<i>Centipeda minima</i> subsp. <i>macrocephala</i>	0.1	0.1	<i>Marsilea hirsuta</i>	0.1	0.1
<i>Convolvulus clementii</i>	0.1	0.1	<i>Nellica maderaspatensis</i>	0.1	0.1
<i>Cucumis melo</i>	0.1	0.1	<i>Nellica maderaspatensis</i>	0.1	0.1
<i>Cyperus iria</i>	0.2	0.1	<i>Portulaca oleracea</i>	0.1	0.1
<i>Duperreya commixta</i>	0.1	0.1	<i>Santalum lanceolatum</i>	1	0.1
<i>Dysphania melanocarpa</i>	0.1	0.1	<i>Tephrosia rosea</i> var. <i>Fortescue creeks</i> (M.I.H. Brooker 2186)	1	0.5
<i>Echinochloa colona</i>	0.1	0.1	<i>Tragus australianus</i>	0.1	0.1
<i>Eragrostis cumingii</i>	0.1	0.1	<i>Vachellia farnesiana</i>	0.7	0.1
<i>Eragrostis tenellula</i>	0.1	0.2	<i>Vigna</i> sp. <i>indet</i>	0.1	0.1

Site: Q030		Type: Quadrat	Size: 25 x 100 m	Date: 14/05/2023	Botanist: Chris Shaw	
Landform:	Drainage line on flat					
Slope, aspect:	<1° - Level -					
Soil:	Clay, Brown					
Rocks:						
Abundance:	No rocks					
Size:						
Fire:	>5 yrs					
Condition:	Very Good					
Notes:	Weeds (Medium)					
Veg Unit:	D1b					
Location (NW):	50 767691 mE, 7422069 mS					
Species		Height	Cover	Species	Height	Cover
<i>Abutilon otocarpum</i>		0.1	0.1	<i>Euphorbia biconvexa</i>	0.1	0.1
<i>Acacia adsurgens</i>		1	0.5	<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	0.2	0.1
<i>Acacia ancistrocarpa</i>		2	0.2	<i>Glycine canescens</i>	0.1	0.1
<i>Acacia bivenosa</i>		1	0.1	<i>Goodenia heterochila</i>	0.2	0.1
<i>Acacia dictyophleba</i>		2	8	<i>Goodenia stellata</i>	0.1	1.5
<i>Acacia inaequilatera</i>		1	0.2	<i>Hakea chordophylla</i>	1	0.2
<i>Acacia pyrifolia</i>		1	0.2	<i>Indigofera georgei</i>	1	6
<i>Acacia synchronicia</i>		1	0.1	<i>Indigofera monophylla</i>	0.4	0.2
<i>Acacia tenuissima</i>		1	0.5	<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.1	0.2
<i>Alternanthera nana</i>		0.2	0.1	<i>Paraneurachne muelleri</i>	0.3	3
<i>Androcalva loxophylla</i>		0.5	1	<i>Perotis rara</i>	0.1	0.1
<i>Aristida inaequiglumis</i>		0.4	1	<i>Petalostylis labicheoides</i>	2	1
<i>Boerhavia coccinea</i>		0.1	0.1	<i>Ptilotus obovatus</i>	1	0.1
<i>Bonamia erecta</i>		0.3	0.1	<i>Rhynchosia minima</i>	0.1	0.1
<i>Capparis lasiantha</i>		0.7	0.2	<i>Santalum lanceolatum</i>	0.2	0.1
<i>Cenchrus ciliaris</i>		0.6	4	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	0.3	0.75
<i>Cleome viscosa</i>		0.1	0.1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1	0.1
<i>Corymbia aspera</i>		8	6			
<i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i>		0.3	0.3	<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	1	0.2
<i>Duperreya commixta</i>		0.1	0.1	<i>Sida</i> sp. L (A.M. Ashby 4202)	0.2	1
<i>Dysphania melanocarpa</i>		0.1	0.1	<i>Sorghum plumosum</i>	0.6	4
<i>Enneapogon polyphyllus</i>		0.3	0.1	<i>Themeda triandra</i>	0.6	15
<i>Eucalyptus gamophylla</i>		3	0.75	<i>Triodia pungens</i>	0.6	6
<i>Eucalyptus xerothermica</i>		5.5	4	<i>Vigna</i> sp. Hamersley clay (A.A. Mitchell PRP 113)	0.1	0.25
<i>Eulalia aurea</i>		0.4	16			

Site: Q031		Type: Quadrat	Size: 50x50m	Date: 15/05/2023	Botanist: Sarah Boys	
Landform:	Crest					
Slope, aspect:	<1° - Level -					
Soil:	Clay, Red-orange, brown					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	20 - 60 mm - Coarse gravel					
Fire:	2 - 5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S3a					
Location (NW):	50 771217 mE, 7419598 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia bivenosa</i>		0.5	0.3	<i>Ptilotus astrolasius</i>	0.2	0.1
<i>Acacia pachyacra</i>		1.2	0.1	<i>Ptilotus obovatus</i>	0.5	0.1
<i>Capparis lasiantha</i>		0.5	0.1	<i>Ptilotus rotundifolius</i>	0.5	0.3
<i>Duperreya commixta</i>		0.2	0.1	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.4	1
<i>Erneapogon polyphyllus</i>		0.15	0.1	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	0.6	0.1
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>		0.4	0.2	<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	0.9	0.5
<i>Eremophila platycalyx</i>		1.2	0.5	<i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925)	0.1	0.1
<i>Eriachne mucronata</i>		0.2	0.5	<i>Tribulus suberosus</i>	0.4	0.1
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		4	8	<i>Triodia brizoides</i>	0.2	1
<i>Indigofera monophylla</i>		0.3	0.1	<i>Triodia pungens</i>	0.3	20
<i>Paraneurachne muelleri</i>		0.3	0.1	<i>Triodia wiseana</i>	0.2	15

Site: Q032		Type: Quadrat	Size: 50x50m	Date: 15/05/2023	Botanist: Chris Shaw	
Landform:	Floodplain					
Slope, aspect:	1° - Very Gentle S,W					
Soil:	Clay, sandy clay, Brown					
Rocks:	Ironstone					
Abundance:	<2% - Very few					
Size:	6 - 20 mm - Medium gravel					
Fire:	>5 yrs					
Condition:	Poor					
Notes:	Grazing (Low),Weeds (High)					
Veg Unit:	D1a					
Location (NW):	50 770706.61193386 mE, 7420332.0065520704 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia dictyophleba</i>		1.5	10	<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.2	0.1
<i>Acacia pyrifolia</i>		0.5	0.2	<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	0.1	0.1
<i>Acacia pachyacra</i>		1.5	4	<i>Hakea lorea</i> subsp. <i>lorea</i>	5	2
<i>Boerhavia coccinea</i>		0.1	0.1	<i>Polymeria calycina</i>	0.1	0.1
<i>Bonamia erecta</i>		0.2	0.1	<i>Portulaca oleracea</i>	0.1	0.1
<i>Calotis hispidula</i>		0.1	0.1	<i>Sida</i> sp. L (A.M. Ashby 4202)	0.1	0.1
<i>Cenchrus ciliaris</i>		0.4	60	<i>Streptoglossa</i> sp.	0.1	0.1
<i>Sorghum plumosum</i>		0.4	0.5	<i>Swainsona kingii</i>	0.1	0.1
<i>Cleome viscosa</i>		0.1	0.1	<i>Themeda triandra</i>	1	2
<i>Convolvulus clementii</i>		0.1	0.1	<i>Tribulus terrestris</i>	0.1	0.1
<i>Corchorus tridens</i>		0.1	0.1	<i>Triodia pungens</i>	0.5	0.25
<i>Corymbia opaca</i>		8	3	<i>Vigna</i> sp. indet	0.1	0.1
<i>Eragrostis tenellula</i>		0.1	0.1			

Site: Q033		Type: Quadrat	Size: 50x50m	Date: 15/05/2023	Botanist: Sarah Boys	
Landform:	Crest					
Slope, aspect:	1° - Very Gentle S					
Soil:	Clay, Red-orange, brown					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	60 - 200 mm - Cobbles					
Fire:	>5 yrs					
Condition:	Excellent					
Notes:	Weeds (Low)					
Veg Unit:	S3a					
Location (NW):	50 767023 mE, 7419737 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia citrinoviridis</i>		2.2	0.1	<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	1.1	0.1
<i>Acacia pruinocarpa</i>		2.2	1	<i>Hakea chordophylla</i>	2.2	0.5
<i>Acacia spondylophylla</i>		0.9	0.5	<i>Hakea lorea</i> subsp. <i>lorea</i>	1.2	0.1
<i>Acacia pachyacra</i>		0.6	0.1	<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Acacia tetragonophylla</i>		0.9	0.1	<i>Ptilotus obovatus</i>	0.3	0.2
<i>Aristida contorta</i>		0.2	0.1	<i>Ptilotus rotundifolius</i>	0.7	0.1
<i>Aristida inaequiglumis</i>		0.2	0.1	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.2	0.5
<i>Codonocarpus cotinifolius</i>		0.3	0.1	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	1.2	0.1
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>		0.3	0.1	<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1.5	0.5
<i>Duperreya commixta</i>		0.3	0.1	<i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925)	0.3	0.1
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>		1.2	0.7	<i>Solanum centrale</i>	0.3	0.1
<i>Eriachne lanata</i>		0.2	0.1	<i>Triodia pungens</i>	0.3	20
<i>Eriachne mucronata</i>		0.3	0.1	<i>Triodia vanleeuwenii</i>	0.2	20
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		3	6	<i>Triodia wiseana</i>	0.4	5
<i>Eucalyptus</i> sp. <i>indet</i>		3.5	0.1			

Site: Q034		Type: Quadrat	Size: 20 x 125 m	Date: 16/05/2023	Botanist: Chris Shaw
Landform:	Creek/ river bank				
Slope, aspect:	<1° - Level -				
Soil:	Sandy clay, sand, Orange-brown				
Rocks:	Creek stones Ironstone				
Abundance:	50 - 90% - Abundant				
Size:	20 - 60 mm - Coarse gravel				
Fire:	>5 yrs				
Condition:	Good				
Notes:	Weeds (High)				
Veg Unit:	D3a				
Location (NW):	50 767645 mE, 7420250 mS				
Species	Height	Cover	Species	Height	Cover
<i>Abutilon amplum</i>	0.4	0.1	<i>Eucalyptus camaldulensis</i> subsp. <i>obtus</i>	12	10
<i>Acacia citrinoviridis</i>	3	4	<i>Eucalyptus victrix</i>	12	15
<i>Acacia pyrifolia</i>	1.5	2	<i>Euphorbia biconvexa</i>	0.1	0.1
<i>Afrohybanthus aurantiacus</i>	0.3	0.1	<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	0.1	0.1
<i>Alternanthera nana</i>	0.2	0.2	<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	0.1	0.1
<i>Alternanthera nodiflora</i>	0.4	0.1	<i>Gossypium robinsonii</i>	0.3	0.1
<i>Androcalva luteiflora</i>	1.5	1	<i>Indigofera georgei</i>	0.3	0.2
<i>Boerhavia coccinea</i>	0.1	0.1	<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.3	0.1
<i>Bothriochloa pertusa</i>	0.5	0.1	<i>Nellica maderaspatensis</i>	0.3	0.1
<i>Cenchrus ciliaris</i>	0.6	12	<i>Nellica maderaspatensis</i>	0.3	0.1
<i>Cleome viscosa</i>	0.1	0.1	<i>Santalum lanceolatum</i>	0.5	0.1
<i>Corchorus crozophorifolius</i>	1	0.4	<i>Tephrosia rosea</i> var. <i>Fortescue creeks</i> (M.I.H. Brooker 2186)	0.75	0.5
<i>Cymbopogon ambiguus</i>	0.6	4	<i>Themeda triandra</i>	0.4	3
<i>Eragrostis tenellula</i>	0.1	0.1	<i>Triodia pungens</i>	0.4	0.2
<i>Eriachne mucronata</i>	0.4	0.3	<i>Wahlenbergia tumidifructa</i>	0.1	0.1

Site: Q035		Type: Quadrat	Size: 50x50m	Date: 16/05/2023	Botanist: Sarah Boys	
Landform:	Lower slope					
Slope, aspect:	10° - Moderate S					
Soil:	Clay, Red-orange, brown					
Rocks:	Ironstone Quartz					
Abundance:	>90% - Continuous					
Size:	20 - 60 mm - Coarse gravel					
Fire:	2 - 5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S3b					
Location (NW):	50 768179 mE, 7420613 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia bivenosa</i>		0.6	3	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.5	0.2
<i>Acacia synchronicia</i>		0.3	0.2	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	0.9	0.2
<i>Acacia pachyacra</i>		0.5	0.1	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	0.7	0.3
<i>Acacia tenuissima</i>		0.3	0.1	<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1.1	0.4
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		4.5	3	<i>Senna symonii</i>	0.7	0.2
<i>Fimbristylis dichotoma</i>		0.1	0.1	<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.3	0.1
<i>Hibiscus sturtii</i>		0.2	0.1	<i>Solanum centrale</i>	0.2	0.1
<i>Maireana georgei</i>		0.15	0.1	<i>Solanum lasiophyllum</i>	0.3	0.1
<i>Ptilotus astrolasius</i>		0.5	0.5	<i>Triodia brizoides</i>	0.1	15
<i>Ptilotus obovatus</i>		0.2	0.1	<i>Triodia pungens</i>	0.3	2
<i>Ptilotus obovatus</i>		0.5	0.1			

Site: Q036		Type: Quadrat	Size: 50x50m	Date: 16/05/2023	Botanist: Chris Shaw
Landform:	Floodplain				
Slope, aspect:	1° - Very Gentle N				
Soil:	Clay, sandy clay, Brown				
Rocks:	Ironstone				
Abundance:	<2% - Very few				
Size:	6 - 20 mm - Medium gravel				
Fire:	>5 yrs				
Condition:	Poor				
Notes:	Weeds (High)				
Veg Unit:	D1a				
Location (NW):	50 767466 mE, 7420425 mS				
Species	Height	Cover	Species	Height	Cover
<i>Abutilon otocarpum</i>	0.3	0.1	<i>Indigofera georgei</i>	0.4	0.2
<i>Acacia bivenosa</i>	2	1	<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.3	0.1
<i>Acacia dictyophleba</i>	2	5	<i>Paraneurachne muelleri</i>	0.4	0.2
<i>Acacia pyrifolia</i>	1.5	1	<i>Paspalidium rarum</i>	0.2	0.1
<i>Acacia pachyacra</i>	1.5	6	<i>Perotis rara</i>	0.1	0.1
<i>Anthobolus leptomerioides</i>	0.5	0.2	<i>Petalostylis labicheoides</i>	1.5	1.5
<i>Aristida contorta</i>	0.3	0.1	<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Aristida holathera</i> var. <i>holathera</i>	0.3	0.1	<i>Polygala glaucifolia</i>	0.1	0.1
<i>Aristida inaequiglumis</i>	0.6	0.25	<i>Portulaca oleracea</i>	0.1	0.1
<i>Boerhavia coccinea</i>	0.2	0.1	<i>Ptilotus astrolasius</i>	0.4	0.4
<i>Bonamia erecta</i>	0.4	0.2	<i>Ptilotus exaltatus</i>	0.3	0.15
<i>Cenchrus ciliaris</i>	0.6	40	<i>Ptilotus helipteroides</i>	0.2	0.1
<i>Sorghum plumosum</i>	0.6	5	<i>Ptilotus obovatus</i>	1	1
<i>Cleome viscosa</i>	0.1	0.1	<i>Rhagodia eremaea</i>	1.2	0.5
<i>Corymbia opaca</i>	8	5	<i>Salsola australis</i>	0.4	0.2
<i>Cucumis melo</i>	0.1	0.1	<i>Santalum lanceolatum</i>	1	0.4
<i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i>	0.2	0.3	<i>Scaevola amblyanthera</i> var. <i>amblyanthera</i>	0.2	0.1
<i>Dysphania rhadinostachya</i>	0.1	0.1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1	0.2
<i>Enneapogon polyphyllus</i>	0.3	0.2	<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	0.4	0.1
<i>Eragrostis eriopoda</i>	0.3	0.5	<i>Senna pleurocarpa</i> var. <i>angustifolia</i>	0.4	0.2
<i>Eremophila longifolia</i>	1.5	2	<i>Senna</i> sp. indet	1	0.5
<i>Eucalyptus xerothermica</i>	2	0.2	<i>Sida fibulifera</i>	0.3	0.1
<i>Eulalia simonii</i>	0.3	1	<i>Sida</i> sp. L (A.M. Ashby 4202)	0.4	1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>	0.1	0.1	<i>Tephrosia</i> sp. Newman (A.A. Mitchell PRP 29)	0.3	0.15
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	0.1	0.1	<i>Themeda triandra</i>	1	0.45
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	0.2	0.1	<i>Triodia pungens</i>	0.5	0.2
<i>Hakea lorea</i> subsp. <i>lorea</i>	1.5	1	<i>Urochloa subquadrifera</i>	0.2	0.1
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.3	0.2			

Site: Q037		Type: Quadrat	Size: 50x50m	Date: 16/05/2023	Botanist: Sarah Boys	
Landform:	Lower slope					
Slope, aspect:	3° - Gentle S					
Soil:	Sandy clay, Red-orange, brown					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	60 - 200 mm - Cobbles					
Fire:	2 - 5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S1					
Location (NW):	50 768702 mE, 7420650 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia bivenosa</i>		0.6	5	<i>Ptilotus astrolasius</i>	0.2	0.2
<i>Acacia pachyacra</i>		0.7	5	<i>Ptilotus calostachyus</i>	0.3	0.1
<i>Amphipogon sericeus</i>		0.3	0.1	<i>Ptilotus exaltatus</i>	0.2	0.1
<i>Bonamia erecta</i>		0.2	0.3	<i>Salsola australis</i>	0.1	0.1
<i>Cenchrus ciliaris</i>		0.4	0.1	<i>Senna artemisioides</i> subsp. <i>helmsii</i>	0.3	0.2
<i>Eriachne mucronata</i>		0.15	0.1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.5	3
<i>Eucalyptus gamophylla</i>		2.1	5	<i>Senna glutinosa</i>	1.5	0.2
<i>Hakea chordophylla</i>		0.9	0.5	<i>Solanum centrale</i>	0.2	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>		1.1	0.1	<i>Triodia pungens</i>	0.3	3
<i>Hibiscus coatesii</i>		0.15	0.1	<i>Triodia vanleeuwenii</i>	0.2	5
<i>Indigofera monophylla</i>		0.3	0.2	<i>Vincetoxicum lineare</i>	0.3	0.1
<i>Paraneurachne muelleri</i>		0.3	0.5			

Site: Q038		Type: Quadrat	Size: 40 x 62.5 m		Date: 16/05/2023	Botanist: Chris Shaw
Landform:	Drainage line on flat					
Slope, aspect:	<1° - Level -					
Soil:	Clay, Dark brown					
Rocks:	Ironstone					
Abundance:	<2% - Very few					
Size:	20 - 60 mm - Coarse gravel					
Fire:	>5 yrs					
Condition:	Very Good					
Notes:	Weeds (Low)					
Veg Unit:	P1c					
Location (NW):	50 765890 mE, 7422286 mS					
Species		Height	Cover	Species	Height	Cover
<i>Abutilon otocarpum</i>		0.4	0.1	<i>Indigofera monophylla</i>	0.3	1
<i>Abutilon</i> sp. Pilbara (W.R. Barker 2025)		0.3	0.1	<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.3	0.1
<i>Acacia adsurgens</i>		0.5	0.1	<i>Paraneurachne muelleri</i>	0.4	0.1
<i>Acacia aptaneura</i>		1.5	0.5	<i>Perotis rara</i>	0.3	0.25
<i>Aristida inaequiglumis</i>		0.2	0.1	<i>Portulaca oleracea</i>	0.3	6
<i>Boerhavia coccinea</i>		0.6	0.5	<i>Ptilotus astrolasius</i>	0.1	0.1
<i>Bonamia erecta</i>		0.1	0.1	<i>Ptilotus exaltatus</i>	0.3	0.2
<i>Poaceae</i> sp.		0.3	0.2	<i>Ptilotus helipteroides</i>	0.3	0.1
<i>Bulbostylis barbata</i>		0.4	20	<i>Ptilotus obovatus</i>	0.1	0.1
<i>Cenchrus ciliaris</i>		0.1	0.1	<i>Rutidosis helichrysoides</i>	0.6	0.1
<i>Cleome viscosa</i>		0.6	2	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.4	0.2
<i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i>		0.1	0.1	<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	0.5	0.2
<i>Duperreya commixta</i>		0.1	0.1	<i>Senna</i> sp. Meekatharra (E. Bailey 1-26)	0.5	0.1
<i>Enneapogon polyphyllus</i>		0.1	0.1	<i>Sida arenicola</i>	0.6	0.2
<i>Eragrostis cumingii</i>		0.3	0.1	<i>Sida cardiophylla</i>	0.6	0.1
<i>Eragrostis tenellula</i>		0.1	0.1	<i>Sida</i> sp. L (A.M. Ashby 4202)	1	0.1
<i>Eucalyptus xerothermica</i>		0.1	0.1	<i>Solanum lasiophyllum</i>	0.2	5
<i>Eucalyptus trivalva</i>		4	2	<i>Sorghum plumosum</i>	0.4	0.1
<i>Euphorbia biconvexa</i>		4	35	<i>Streptoglossa</i> sp.	0.4	1.5
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>		0.1	0.1	<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431) (P3)	0.3	0.1
<i>Gomphrena canescens</i> subsp. <i>canescens</i>		0.2	0.1	<i>Themeda triandra</i>	1.2	2.5
<i>Goodenia nuda</i>		0.2	0.1	<i>Triodia pungens</i>	0.6	8
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>		0.6	1.1			

Site: Q039		Type: Quadrat	Size: 50x50m	Date: 16/05/2023	Botanist: Sarah Boys	
Landform:	Lower slope					
Slope, aspect:	1° - Very Gentle S					
Soil:	Sandy clay, Red-orange, brown					
Rocks:	Ironstone Quartz					
Abundance:	50 - 90% - Abundant					
Size:	6 - 20 mm - Medium gravel					
Fire:	2 - 5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S1					
Location (NW):	50 765959 mE, 7421266 mS					
Species		Height	Cover	Species	Height	Cover
<i>Abutilon fraseri</i>		0.2	0.1	<i>Hibiscus coatesii</i>	0.1	0.1
<i>Acacia ancistrocarpa</i>		1.2	0.1	<i>Indigofera monophylla</i>	0.3	0.2
<i>Acacia bivenosa</i>		1.2	0.5	<i>Ptilotus astrolasius</i>	0.3	1
<i>Acacia pachyacra</i>		0.9	0.2	<i>Ptilotus clementii</i>	0.3	0.1
<i>Aristida contorta</i>		0.15	0.2	<i>Ptilotus exaltatus</i>	0.3	0.1
<i>Cenchrus ciliaris</i>		0.3	0.1	<i>Ptilotus obovatus</i>	0.3	0.1
<i>Chrysopogon fallax</i>		0.5	0.1	<i>Senna artemisioides</i> subsp. <i>helmsii</i>	0.2	0.1
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>		0.3	0.1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.3	1
<i>Duperreya commixta</i>		0.2	0.1	<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	0.7	0.3
<i>Eriachne mucronata</i>		0.3	0.3	<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	0.4	0.1
<i>Eucalyptus gamophylla</i>		2.2	3	<i>Solanum lasiophyllum</i>	0.3	0.1
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>		0.2	0.1	<i>Triodia angusta</i>	0.2	1
<i>Goodenia muelleriana</i>		0.15	0.1	<i>Triodia pungens</i>	0.3	7
<i>Gossypium robinsonii</i>		0.9	0.2	<i>Vincetoxicum lineare</i>	0.2	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>		2.1	0.1			

Site: Q040		Type: Quadrat	Size: 50x50m	Date: 17/05/2023	Botanist: Chris Shaw	
Landform:	Upper slope					
Slope, aspect:	10° - Moderate S					
Soil:	Clay, Brown					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	20 - 60 mm - Coarse gravel					
Fire:	>5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S3a					
Location (NW):	50 770118 mE, 7420987 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia bivenosa</i>		2	0.2	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	0.25
<i>Acacia</i> sp. indet 2		1.5	1	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	1	0.1
<i>Acacia synchronica</i>		1	0.25	<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1	0.1
<i>Cassytha filiformis</i>		0.1	0.2	<i>Senna symonii</i>	2	0.4
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>		0.3	0.1	<i>Sida arenicola</i>	0.4	0.1
<i>Eremophila latrobei</i> subsp. <i>glabra</i>		2	0.2	<i>Themeda triandra</i>	0.2	0.1
<i>Eriachne mucronata</i>		0.4	3	<i>Triodia brizoides</i>	0.4	6
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		5	15	<i>Triodia pungens</i>	0.4	40
<i>Ptilotus obovatus</i>		0.5	0.1	<i>Triodia vanleeuwenii</i>	0.4	10
<i>Rhagodia eremaea</i>		0.3	0.1			

Site: Q041		Type: Quadrat	Size: 50x50m		Date: 17/05/2023	Botanist: Sarah Boys
Landform:	Lower slope					
Slope, aspect:	1° - Very Gentle S					
Soil:	Sandy clay, Red-orange, brown					
Rocks:	Ironstone Quartz					
Abundance:	>90% - Continuous					
Size:	20 - 60 mm - Coarse gravel					
Fire:	2 - 5 yrs					
Condition:	Very Good					
Notes:	Weeds (Low)					
Veg Unit:	S1					
Location (NW):	50 769963 mE, 7420736 mS					
Species		Height	Cover	Species	Height	Cover
<i>Abutilon fraseri</i>		0.7	0.1	<i>Hakea chordophylla</i>	0.5	0.1
<i>Acacia adsurgens</i>		0.7	0.3	<i>Indigofera monophylla</i>	0.2	1.5
<i>Acacia bivenosa</i>		1.1	2	<i>Paraneurachne muelleri</i>	0.3	1
<i>Acacia pruinocarpa</i>		1.5	0.2	<i>Petalostylis labicheoides</i>	1.9	1
<i>Acacia pachyacra</i>		1.9	1	<i>Ptilotus astrolasius</i>	0.3	2
<i>Aristida contorta</i>		0.2	0.1	<i>Ptilotus calostachyus</i>	0.4	0.1
<i>Aristida latifolia</i>		0.3	0.1	<i>Ptilotus exaltatus</i>	0.2	0.1
<i>Cenchrus ciliaris</i>		0.5	0.5	<i>Ptilotus obovatus</i>	0.4	0.2
<i>Sorghum plumosum</i>		0.3	0.1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.5	1.5
<i>Duperreya commixta</i>		0.3	0.1	<i>Sida cardiophylla</i>	0.2	0.1
<i>Erneapogon polyphyllus</i>		0.2	0.1	<i>Sida</i> sp. L (A.M. Ashby 4202)	0.2	0.1
<i>Eragrostis eriopoda</i>		0.3	0.1	<i>Solanum lasiophyllum</i>	0.3	0.1
<i>Eucalyptus gamophylla</i>		2.5	5	<i>Triodia pungens</i>	0.3	11
<i>Eulalia aurea</i>		0.6	0.1	<i>Triodia vanleeuwenii</i>	0.2	0.5
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>		0.3	0.1	<i>Vincetoxicum lineare</i>	1.1	0.1
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>		0.8	0.1			

Site: Q042		Type: Quadrat	Size: 50x50m	Date: 17/05/2023	Botanist: Chris Shaw	
Landform:	Crest					
Slope, aspect:	1° - Very Gentle N					
Soil:	Clay, Brown					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	20 - 60 mm - Coarse gravel					
Fire:	>5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S2					
Location (NW):	50 769495 mE, 7421359 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia hilliana</i>		0.6	3	<i>Goodenia stobbsiana</i>	0.3	0.1
<i>Acacia monticola</i>		0.3	0.1	<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	2	0.4
<i>Acacia pruinocarpa</i>		4	1	<i>Hakea lorea</i> subsp. <i>lorea</i>	3.5	2
<i>Acacia spondylophylla</i>		0.7	5	<i>Hibiscus sturtii</i>	0.3	0.1
<i>Amphipogon sericeus</i>		0.4	0.2	<i>Indigofera monophylla</i>	0.3	0.1
<i>Calytrix carinata</i>		1	0.3	<i>Scaevola browniana</i> subsp. <i>browniana</i>	0.3	0.1
<i>Cassutha filiformis</i>		0.1	0.1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.6	0.1
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>		0.5	0.1	<i>Senna glutinosa</i> subsp. <i>x luerksenii</i>	1.2	0.7
<i>Cymbopogon obtectus</i>		0.4	0.1	<i>Sida</i> sp. <i>Excedentifolia</i> (J.L. Egan 1925)	0.3	0.1
<i>Eriachne lanata</i>		0.3	1.5	<i>Triodia pungens</i>	0.6	1
<i>Eriachne mucronata</i>		0.3	0.2	<i>Triodia vanleeuwenii</i>	0.4	40
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		4	1			

Site: Q043		Type: Quadrat	Size: 50x50m	Date: 17/05/2023	Botanist: Sarah Boys	
Landform:	Lower slope					
Slope, aspect:	1° - Very Gentle N					
Soil:	Clay, Red-orange, brown					
Rocks:	Ironstone					
Abundance:	50 - 90% - Abundant					
Size:	20 - 60 mm - Coarse gravel					
Fire:	>5 yrs					
Condition:	Very Good					
Notes:	Mounds,Weeds (Low)					
Veg Unit:	S1					
Location (NW):	50 770294 mE, 7421549 mS					
Species		Height	Cover	Species	Height	Cover
<i>Abutilon fraseri</i>		0.5	0.1	<i>Indigofera monophylla</i>	0.5	1
<i>Acacia adsurgens</i>		0.5	0.5	<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.2	0.1
<i>Acacia ancistrocarpa</i>		1.5	2	<i>Maireana planifolia</i>	0.2	0.1
<i>Acacia bivenosa</i>		2.1	5	<i>Maireana villosa</i>	0.7	0.1
<i>Acacia inaequilatera</i>		2.2	2	<i>Paraneurachne muelleri</i>	0.4	1
<i>Acacia monticola</i>		1.1	0.1	<i>Petalostylis labicheoides</i>	1.8	0.2
<i>Acacia pachyacra</i>		2.1	0.1	<i>Ptilotus obovatus</i>	0.6	0.6
<i>Acacia pruinocarpa</i>		0.6	0.3	<i>Ptilotus astrolasius</i>	0.4	0.2
<i>Acacia rhodophloia</i>		1.5	2	<i>Ptilotus calostachyus</i>	0.7	0.1
<i>Acacia spondylophylla</i>		0.5	0.1	<i>Ptilotus exaltatus</i>	0.2	0.1
<i>Acacia synchronicia</i>		0.7	0.1	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	0.2	0.1
<i>Amphipogon sericeus</i>		0.3	0.1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.6	0.2
<i>Aristida latifolia</i>		0.6	0.1	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.1	0.1
<i>Bonamia erecta</i>		0.4	0.1	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	0.9	0.1
<i>Cenchrus ciliaris</i>		0.5	3	<i>Senna sericea</i>	1.2	0.1
<i>Duperreya commixta</i>		0.5	0.3	<i>Sida arenicola</i>	0.9	0.1
<i>Eucalyptus gamophylla</i>		3.5	8	<i>Solanum lasiophyllum</i>	0.4	0.1
<i>Gossypium robinsonii</i>		1.6	0.3	<i>Triodia pungens</i>	0.3	16
<i>Hibiscus burtonii</i>		0.2	0.1	<i>Triodia vanleeuwenii</i>	0.2	5
<i>Hibiscus sturtii</i>		0.2	0.1	<i>Vincetoxicum lineare</i>	0.3	0.1

Site: Q044		Type: Quadrat	Size: 15 x 170 m	Date: 17/05/2023	Botanist: Chris Shaw
Landform:	Creek/ river bank				
Slope, aspect:	<1° - Level -				
Soil:	Clay, sandy clay, Brown				
Rocks:	Ironstone Creek stones				
Abundance:	>90% - Continuous				
Size:	20 - 60 mm - Coarse gravel				
Fire:	>5 yrs				
Condition:	Good				
Notes:	Weeds (High)				
Veg Unit:	D3a				
Location (NW):	50 769325 mE, 7420180 mS				
Species	Height	Cover	Species	Height	Cover
<i>Acacia citrinoviridis</i>	5	4	<i>Eragrostis tenellula</i>	0.1	0.2
<i>Acacia pyrifolia</i>	1.5	3	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>	11	15
<i>Afrohybanthus aurantiacus</i>	0.3	0.1	<i>Eucalyptus victrix</i>	11	10
<i>Amaranthus undulatus</i>	0.3	0.1	<i>Euphorbia biconvexa</i>	0.1	0.1
<i>Alternanthera nana</i>	0.2	0.1	<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	0.2	0.1
<i>Alternanthera nodiflora</i>	0.3	0.1	<i>Isotropis iophyta</i>	0.2	0.1
<i>Androcalva luteiflora</i>	1	0.1	<i>Malvastrum americanum</i> *	0.1	0.1
<i>Boerhavia coccinea</i>	0.1	0.1	<i>Nellica maderaspatensis</i>	0.2	0.1
<i>Cenchrus ciliaris</i>	0.6	10	<i>Petalostylis labicheoides</i>	1.5	0.1
<i>Cleome viscosa</i>	0.1	0.1	<i>Sonchus oleraceus</i>	0.2	0.1
<i>Cucumis melo</i>	0.1	0.1	<i>Streptoglossa</i> sp.	0.1	0.1
<i>Cymbopogon ambiguus</i>	0.4	0.25	<i>Tephrosia rosea</i> var. <i>Fortescue</i> creeks (M.I.H. Brooker 2186)	0.5	0.5
<i>Cyperus vaginatus</i>	0.7	0.2	<i>Triodia pungens</i>	0.3	0.1
<i>Dichanthium sericeum</i> subsp. <i>sericeum</i>	0.6	0.75			

Site: Q045		Type: Quadrat	Size: 20 x 125 m	Date: 17/05/2023	Botanist: Chris Shaw	
Landform:	Creek/ river bank					
Slope, aspect:	<1° - Level -					
Soil:	Clay, sandy clay, Brown					
Rocks:	Ironstone Creek stones					
Abundance:	>90% - Continuous					
Size:	60 - 200 mm - Cobbles					
Fire:	>5 yrs					
Condition:	Good					
Notes:	Weeds (High)					
Veg Unit:	D3a					
Location (NW):	50 765925 mE, 7420062 mS					
Species		Height	Cover	Species	Height	Cover
<i>Abutilon amplum</i>		0.2	0.1	<i>Eriachne mucronata</i>	0.3	0.2
<i>Acacia citrinoviridis</i>		6	35	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>	11	15
<i>Acacia pyrifolia</i>		1	1	<i>Eucalyptus victrix</i>	11	18
<i>Acacia tetragonophylla</i>		1	0.1	<i>Euphorbia biconvexa</i>	0.1	0.1
<i>Amaranthus undulatus</i>		0.2	0.1	<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	0.3	0.1
<i>Androcalva luteiflora</i>		1	0.3	<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	0.1	0.1
<i>Bidens bipinnata</i>		0.1	0.1	<i>Nellica maderaspatensis</i>	0.3	0.1
<i>Boerhavia coccinea</i>		0.1	0.1	<i>Petalostylis labicheoides</i>	2	0.3
<i>Boerhavia repleta</i>		0.1	0.1	<i>Pterocaulon</i> sp. indet	0.3	0.1
<i>Cenchrus ciliaris</i>		0.6	10	<i>Ptilotus exaltatus</i>	0.1	0.1
<i>Cleome viscosa</i>		0.1	0.1	<i>Salsola australis</i>	0.2	0.1
<i>Corchorus crozophorifolius</i>		1	0.1	<i>Streptoglossa</i> sp.	0.1	0.1
<i>Cymbopogon ambiguus</i>		1.5	0.5	<i>Tephrosia rosea</i> var. Fortescue creeks (M.I.H. Brooker 2186)	0.6	4
<i>Dichanthium sericeum</i> subsp. <i>sericeum</i>		0.6	1	<i>Triodia pungens</i>	0.5	0.1
<i>Eragrostis tenellula</i>		0.1	0.1	<i>Waltheria indica</i>	0.3	0.1

Site: Q046		Type: Quadrat	Size: 50x50m	Date: 17/05/2023	Botanist: Chris Shaw	
Landform:	Flat plain					
Slope, aspect:	<1° - Level -					
Soil:	Cracking clay, Brown					
Rocks:	Ironstone					
Abundance:	2 - 10% - Few					
Size:	20 - 60 mm - Coarse gravel					
Fire:	2 - 5 yrs					
Condition:	Excellent					
Notes:	Tracks,Weeds (Low)					
Veg Unit:	P2					
Location (NW):	50 767808 mE, 7419630mS					
Species		Height	Cover	Species	Height	Cover
<i>Abutilon malvifolium</i>		0.1	0.1	<i>Goodenia muelleriana</i>	0.1	0.1
<i>Acacia synchronicia</i>		1.5	1	<i>Goodenia pascua</i>	0.1	0.1
<i>Aristida contorta</i>		0.3	0.2	<i>Haloragis odontocarpa</i>	0.1	0.1
<i>Aristida latifolia</i>		0.7	20.1	<i>Indigofera linifolia</i>	0.1	0.1
<i>Astrebula elymoides</i>		0.7	7	<i>Ipomoea lonchophylla</i>	0.1	0.2
<i>Astrebula pectinata</i>		0.7	20	<i>Iseilema vaginiflorum</i>	0.2	6
<i>Boerhavia paludosa</i>		0.1	0.2	<i>Neptunia xanthonema</i>	0.1	1
<i>Bulbostylis turbinata</i>		0.1	0.1	<i>Operculina aequisepala</i>	0.1	0.1
<i>Cenchrus ciliaris</i>		0.6	0.3	<i>Polycarpaea corymbosa</i>	0.1	0.1
<i>Chrysopogon fallax</i>		0.6	5	<i>Polygala glaucifolia</i>	0.1	0.1
<i>Cynodon convergens</i>		0.1	0.1	<i>Portulaca intraterranea</i>	0.1	0.1
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>		0.2	15	<i>Ptilotus gomphrenoides</i>	0.1	0.2
<i>Dolichocarpa</i> sp. Hamersley Station (A.A. Mitchell 1479)		0.1	0.2	<i>Rhynchosia minima</i>	0.1	2
<i>Dysphania rhadinostachya</i>		0.2	0.1	<i>Salsola australis</i>	0.5	0.2
<i>Eragrostis setifolia</i>		0.3	3	<i>Senna hamersleyensis</i>	0.8	1
<i>Eragrostis xerophila</i>		0.3	5	<i>Sida fibulifera</i>	0.3	0.5
<i>Euphorbia coghlani</i>		0.1	0.2	<i>Swainsona leeana</i>	0.1	0.1
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>		0.1	0.1	<i>Themeda triandra</i>	1	1
<i>Fimbristylis dichotoma</i>		0.3	0.2	<i>Vigna</i> sp. Hamersley clay (A.A. Mitchell PRP 113)	0.3	2

Site: Q047		Type: Quadrat	Size: 50x50m	Date: 18/05/2023	Botanist: Chris Shaw	
Landform:	Flat plain					
Slope, aspect:	1° - Very Gentle S					
Soil:	Clay, Brown					
Rocks:	Ironstone					
Abundance:	50 - 90% - Abundant					
Size:	20 - 60 mm - Coarse gravel					
Fire:	>5 yrs					
Condition:	Very Good					
Notes:	Tracks,Weeds (Low)					
Veg Unit:	P1b					
Location (NW):	50 765887 mE, 7420904 mS					
Species		Height	Cover	Species	Height	Cover
<i>Abutilon otocarpum</i>		0.1	0.1	<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	0.2	0.1
<i>Acacia aptaneura</i>		4	1.5	<i>Hibiscus burtonii</i>	1	0.1
<i>Acacia dictyophleba</i>		1.5	0.3	<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	0.4	0.2
<i>Acacia pachyacra</i>		2	3	<i>Isotropis iophyta</i>	0.5	0.1
<i>Acacia pruinocarpa</i>		4	5	<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.1	0.1
<i>Anthobolus leptomerioides</i>		1	0.1	<i>Maireana villosa</i>	0.4	0.2
<i>Aristida contorta</i>		0.2	0.1	<i>Paraneurachne muelleri</i>	0.4	0.2
<i>Aristida inaequiglumis</i>		0.5	0.2	<i>Petalostylis labicheoides</i>	2	4
<i>Boerhavia coccinea</i>		0.1	0.1	<i>Portulaca oleracea</i>	0.1	0.1
<i>Cenchrus ciliaris</i>		0.5	1	<i>Pterocaulon</i> sp. indet	0.4	0.1
<i>Cleome viscosa</i>		0.1	0.1	<i>Ptilotus astrolasius</i>	0.3	0.3
<i>Cymbopogon obtectus</i>		0.8	0.2	<i>Ptilotus exaltatus</i>	0.1	0.1
<i>Digitaria brownii</i>		0.6	4	<i>Ptilotus helipteroides</i>	0.2	0.1
<i>Duperreya commixta</i>		0.1	0.1	<i>Ptilotus obovatus</i>	0.4	0.2
<i>Dysphania kalpari</i>		0.1	0.1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1	0.3
<i>Enneapogon lindleyanus</i>		0.4	0.1	<i>Seringia nephrosperma</i>	0.7	0.1
<i>Enneapogon polyphyllus</i>		0.1	0.1	<i>Sida</i> sp. L (A.M. Ashby 4202)	0.3	0.1
<i>Eragrostis tenella</i>		0.1	0.1	<i>Solanum lasiophyllum</i>	0.3	0.1
<i>Eriachne pulchella</i> subsp. <i>pulchella</i>		0.1	0.1	<i>Solanum lasiophyllum</i>	0.2	0.1
<i>Eulalia aurea</i>		1	3	<i>Sorghum plumosum</i>	0.6	1
<i>Euphorbia australis</i> var. <i>subtomentosa</i>		0.1	0.1	<i>Triodia pungens</i>	0.6	40
<i>Euphorbia biconvexa</i>		0.1	0.1			

Site: R001		Type: Quadrat	Size: 15 x 170 m	Date: 15/05/2023	Botanist: Chris Shaw	
Landform:	Gorge					
Slope, aspect:	3° - Gentle S					
Soil:	Clay, Red-orange, brown					
Rocks:	Ironstone Creek stones					
Abundance:	>90% - Continuous					
Size:	200 - 600 mm - Stones					
Fire:	>5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	D2					
Location (NW):	50 770079 mE, 7423291 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia adoxa</i> var. <i>adoxo</i>		0.2	0.1	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	3	0.5
<i>Acacia ancistrocarpa</i>		2	0.2	<i>Euphorbia biconvexa</i>	0.2	0.1
<i>Acacia ayersiana</i>		6	0.2	<i>Euploca pachyphylla</i>	0.2	0.1
<i>Acacia citrinoviridis</i>		4	0.2	<i>Gompholobium oreophilum</i>	0.3	0.1
<i>Acacia hilliana</i>		0.5	0.1	<i>Gomphrena cunninghamii</i>	0.2	0.1
<i>Acacia maitlandii</i>		3	0.1	<i>Gossypium robinsonii</i>	2	4
<i>Acacia monticola</i>		3	35	<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	3	15
<i>Acacia tumida</i>		1	0.2	<i>Hibiscus</i> aff. <i>campanulatus</i> (P1)	1.5	1
<i>Androcalva luteiflora</i>		2.5	15	<i>Indigofera gilesii</i> (P3)	1	0.2
<i>Bidens bipinnata</i>		0.1	0.1	<i>Indigofera monophylla</i>	0.2	0.1
<i>Cenchrus ciliaris</i>		0.25	0.1	<i>Jasminum didymum</i> subsp. <i>lineare</i>	0.2	0.1
<i>Clerodendrum floribundum</i>		1.3	0.1	<i>Paraneurachne muelleri</i>	0.3	0.1
<i>Corymbia candida</i>		4	0.15	<i>Paspalidium clementii</i>	0.2	0.1
<i>Corymbia ferritcola</i>		4	0.2	<i>Petalostylis labicheoides</i>	3	10
<i>Corymbia ferritcola</i>		3	0.2	<i>Ptilotus obovatus</i>	0.5	0.1
<i>Corymbia hamersleyana</i>		4	3	<i>Santalum lanceolatum</i>	2	0.1
<i>Cucumis melo</i>		0.1	0.1	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1	0.2
<i>Cymbopogon ambiguus</i>		0.6	3	<i>Sida</i> sp. Articulation below (A.A. Mitchell PRP 1605)	0.6	0.2
<i>Dodonaea pachyneura</i>		0.5	0.1	<i>Sida</i> sp. Excedentifolia (J.L. Egan 1925)	0.4	0.2
<i>Duperreya commixta</i>		0.1	0.1	<i>Tephrosia rosea</i> var. <i>Fortescue creeks</i> (M.I.H. Brooker 2186)	0.4	0.2
<i>Enneapogon polyphyllus</i>		0.4	0.2	<i>Themeda triandra</i>	0.4	0.25
<i>Eremophila latrobei</i> subsp. <i>glabra</i>		1.2	0.1	<i>Trachymene oleracea</i>	0.1	0.1
<i>Eriachne mucronata</i>		0.2	3	<i>Triodia pungens</i>	0.6	5

Site: R002		Type: Releve	Size: -	Date: 15/05/2023	Botanist: Chris Shaw	
Landform:	Flat plain					
Slope, aspect:	1° - Very Gentle N					
Soil:	Clay, Dark brown					
Rocks:	Ironstone					
Abundance:	20 - 50% - Many					
Size:	<6 mm - Fine gravel					
Fire:	>5 yrs					
Condition:	Very Good					
Notes:	Weeds (Low)					
Veg Unit:	P3					
Location (NW):	50 771238 mE, 7420134 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia aptaneura</i>		4	50	<i>Maireana villosa</i>	0.5	1
<i>Acacia pruinocarpa</i>		4	5	<i>Rhagodia eremaea</i>	1.2	5
<i>Cenchrus ciliaris</i>		0.5	5	<i>Senna artemisioides</i> subsp. <i>helmsii</i>	1	2
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>		1.5	1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1.5	3
<i>Hakea lorea</i> subsp. <i>lorea</i>		5	2	<i>Sorghum plumosum</i>	0.5	1
<i>Hibiscus burtonii</i>		0.5	1	<i>Triodia pungens</i>	0.4	15

Site: R003		Type: Releve	Size: -	Date: 15/05/2023	Botanist: Chris Shaw	
Landform:	Flat plain					
Slope, aspect:	1° - Very Gentle W					
Soil:	Clay, Dark brown					
Rocks:	Ironstone					
Abundance:	50 - 90% - Abundant					
Size:	<6 mm - Fine gravel					
Fire:	>5 yrs					
Condition:	Very Good					
Notes:	Weeds (Medium)					
Veg Unit:	P3					
Location (NW):	50 770331 mE, 7419389 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia aptaneura</i>		6	30	<i>Hibiscus burtonii</i>	0.5	0.2
<i>Acacia ayersiana</i>		4	1	<i>Psyrax latifolia</i>	1.5	0.2
<i>Acacia pruinocarpa</i>		5	3	<i>Ptilotus obovatus</i>	0.3	0.2
<i>Acacia tetragonophylla</i>		2	1	<i>Rhagodia eremaea</i>	1.5	3
<i>Cenchrus ciliaris</i>		0.5	8	<i>Senna artemisioides</i> subsp. <i>helmsii</i>	1.2	1
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>		1.5	1.5	<i>Sorghum plumosum</i>	0.3	0.25
<i>Hakea lorea</i> subsp. <i>lorea</i>		3	1	<i>Triodia pungens</i>	0.6	1

Site: R004		Type: Releve	Size: -	Date: 15/05/2023	Botanist: Chris Shaw	
Landform:	Crest					
Slope, aspect:	<1° - Level -					
Soil:	Clay, Brown					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	20 - 60 mm - Coarse gravel					
Fire:	2 - 5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S2					
Location (NW):	50 766242 7 mE, 7419476 mS					
Species		Height	Cover	Species	Height	Cover
<i>Eriachne mucronata</i>		0.3	0.5	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	1.5	0.5
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		4	3	<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	1.5	2
<i>Hakea chordophylla</i>		3.5	4	<i>Triodia vanleeuwenii</i>	0.3	10
<i>Ptilotus obovatus</i>		0.75	1	<i>Triodia wiseana</i>	0.4	4

Site: R005		Type: Releve	Size: -	Date: 16/05/2023	Botanist: Chris Shaw	
Landform:	Lower slope					
Slope, aspect:	3° - Gentle S					
Soil:	Clay, Brown					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	20 - 60 mm - Coarse gravel					
Fire:	1 - 2 yrs					
Condition:	Excellent					
Notes:	None, Tracks					
Veg Unit:	S3a					
Location (NW):	50 765699 mE, 7421532 mS					
Species		Height	Cover	Species	Height	Cover
<i>Eriachne mucronata</i>		0.4	0.2	<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	1	3
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		4	3	<i>Triodia pungens</i>	0.4	5
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>		0.4	0.4	<i>Triodia vanleeuwenii</i>	0.2	1
<i>Senna alutinos</i> subsp. <i>alutinos</i>		1	0.5	<i>Triodia wiseana</i>	0.2	15

Site: R006		Type: Releve	Size: -	Date: 16/05/2023	Botanist: Chris Shaw	
Landform:	Crest					
Slope, aspect:	<1° - Level -					
Soil:	Clay, Brown					
Rocks:	Ironstone Quartz					
Abundance:	>90% - Continuous					
Size:	20 - 60 mm - Coarse gravel					
Fire:	2 - 5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S3b					
Location (NW):	50 765459 mE, 7421398 mS					
Species		Height	Cover	Species	Height	Cover
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		4	4	<i>Triodia angusta</i>	0.5	4

Site: R007		Type: Releve	Size: -	Date: 17/05/2023	Botanist: Chris Shaw	
Landform:	Drainage line on lower slope					
Slope, aspect:	1° - Very Gentle W					
Soil:	Sandy clay, Brown					
Rocks:	Ironstone					
Abundance:	20 - 50% - Many					
Size:	6 - 20 mm - Medium gravel					
Fire:	>5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	D2					
Location (NW):	50 769927 mE, 7421474 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia bivenosa</i>		1	0.5	<i>Indigofera monophylla</i>	1	5
<i>Acacia monticola</i>		2	60	<i>Petalostylis labicheoides</i>	3	5
<i>Androcalva luteiflora</i>		2	5	<i>Santalum lanceolatum</i>	4	0.5
<i>Corymbia hamersleyana</i>		5	1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	1	0.5
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		4	1	<i>Themeda triandra</i>	1	0.5
<i>Gossypium robinsonii</i>		2	15	<i>Triodia pungens</i>	0.6	5
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>		2	10			

Site: R008		Type: Releve	Size: -	Date: 18/05/2023	Botanist: Chris Shaw	
Landform:	Drainage line on lower slope					
Slope, aspect:	3° - Gentle S					
Soil:	Clay, Brown					
Rocks:	Ironstone					
Abundance:	20 - 50% - Many					
Size:	20 - 60 mm - Coarse gravel					
Fire:	>5 yrs					
Condition:	Very Good					
Notes:	Weeds (Low)					
Veg Unit:	D2					
Location (NW):	50 770996 mE, 7422476 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia bivenosa</i>		2	4	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	4	5
<i>Acacia monticola</i>		2.5	10	<i>Gossypium robinsonii</i>	2	1
<i>Androcalva luteiflora</i>		1.5	4	<i>Santalum lanceolatum</i>	2	2
<i>Cymbopogon ambiguus</i>		0.6	1	<i>Themeda triandra</i>	0.3	1
<i>Eucalyptus gamophylla</i>		3	1	<i>Triodia pungens</i>	0.4	20

Site: R009		Type: Releve	Size: -	Date: 18/05/2023	Botanist: Chris Shaw	
Landform:	Drainage line on flat					
Slope, aspect:	<1° - Level -					
Soil:	Clay, Brown					
Rocks:	Ironstone					
Abundance:	10 - 20% - Common					
Size:	6 - 20 mm - Medium gravel					
Fire:	>5 yrs					
Condition:	Good					
Notes:	Weeds (Low)					
Veg Unit:	D1b					
Location (NW):	50 765424 mE, 7420997 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia dictyophleba</i>		2	1	<i>Eulalia aurea</i>	0.6	5
<i>Acacia pyrifolia</i>		2	5	<i>Hibiscus sturtii</i>	0.6	0.5
<i>Androcalva luteiflora</i>		2	2	<i>Indigofera georgei</i>	0.7	3
<i>Corymbia aspera</i>		6	1	<i>Petalostylis labicheoides</i>	2	15
<i>Corymbia opaca</i>		4	4	<i>Sida</i> sp. L (A.M. Ashby 4202)	0.2	2
<i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i>		0.2	0.5	<i>Sorghum plumosum</i>	0.6	10
<i>Eriachne mucronata</i>		0.3	5	<i>Themeda triandra</i>	0.6	5
<i>Eucalyptus xerothermica</i>		4	8			

Site: R010		Type: Releve	Size: -	Date: 18/05/2023	Botanist: Chris Shaw	
Landform:	Flat plain					
Slope, aspect:	<1° - Level -					
Soil:	Clay, Brown					
Rocks:	Ironstone					
Abundance:	20 - 50% - Many					
Size:	20 - 60 mm - Coarse gravel					
Fire:	>5 yrs					
Condition:	Good					
Notes:	Weeds (Low)					
Veg Unit:	P3					
Location (NW):	50 767013 mE, 7420625 mS					
Species		Height	Cover	Species	Height	Cover
Acacia aptaneura		6	25	Ptilotus obovatus	1	2
Acacia pruinocarpa		5	15	Rhagodia eremaea	1.2	3
Cenchrus ciliaris		0.5	3	Senna artemisioides subsp. oligophylla	1	1
Hakea lorea subsp. lorea		1.5	0.5	Sorghum plumosum	0.6	0.5
Maireana villosa		0.6	0.5	Triodia pungens	0.4	8

Site: R011		Type: Releve	Size: -	Date: 18/05/2023	Botanist: Chris Shaw	
Landform:	Slope					
Slope, aspect:	10° - Moderate S					
Soil:	Clay, Brown					
Rocks:	Ironstone					
Abundance:	50 - 90% - Abundant					
Size:	>600 mm - Boulders					
Fire:	>5 yrs					
Condition:	Very Good					
Notes:	Weeds (Low)					
Veg Unit:	D2					
Location (NW):	50 769239 mE, 7423336 mS					
Species		Height	Cover	Species	Height	Cover
Acacia ayersiana		9	45	Eriachne mucronata	0.4	3
Bidens bipinnata		0.1	0.15	Eucalyptus leucophloia subsp. leucophloia	6	2
Corymbia ferriticola		4	0.5	Hibiscus aff. campanulatus (P1)	2	1
Eremophila latrobei subsp. glabra		2.5	0.5	Triodia pungens	0.4	3

Site: R012		Type: Releve	Size: -	Date: 10/05/2023	Botanist: Chris Shaw,Sarah Boys		
Landform:	Ridge						
Slope, aspect:	3° - Gentle None						
Soil:	Clay, Red-orange						
Rocks:	Ironstone						
Abundance:	>90% - Continuous						
Size:	60 - 200 mm - Cobbles						
Fire:	2 - 5 yrs						
Condition:	Excellent						
Notes:	None						
Veg Unit:	S2						
Location (NW):	50 771533 mE, 7423608 mS						
Species		Height	Cover	Species	Height	Cover	
<i>Acacia pruinocarpa</i>		1.3	0.2	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>		0.8	0.2
<i>Eriachne mucronata</i>		0.2	0.2	<i>Tribulus suberosus</i>		0.6	0.1
<i>Gossypium robinsonii</i>		1.7	1	<i>Triodia pungens</i>		0.3	30

Site: R013		Type: Releve	Size: -	Date: 14/05/2023	Botanist: Sarah Boys	
Landform:	Gorge					
Slope, aspect:	23° - Steep S					
Soil:	Clay, Red-orange, brown					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	>600 mm - Boulders					
Fire:	>5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	D2					
Location (NW):	50 771638 mE, 7422561 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia adsurgens</i>		2.5	1	<i>Eriachne mucronata</i>	0.2	8
<i>Acacia bivenosa</i>		2.1	1	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	5	7
<i>Acacia hamersleyensis</i>		2.1	3	<i>Mirbelia viminalis</i>	0.1	0.1
<i>Astrotricha hamptonii</i>		0.8	1	<i>Santalum lanceolatum</i>	1.8	0.1
<i>Cymbopogon obtectus</i>		0.6	2	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	1.6	0.5
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>		1.8	0.5	<i>Triodia pungens</i>	0.3	50

Site: R014		Type: Releve	Size: -	Date: 14/05/2023	Botanist: Sarah Boys	
Landform:	Drainage line on mid slope					
Slope, aspect:	37° - Very steep S					
Soil:	Clay, Red-orange, brown					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	>600 mm - Boulders					
Fire:	>5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	D2					
Location (NW):	50 771384 mE, 7422525 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia ayersiana</i>		3	2	<i>Dodonaea pachyneura</i>	1.7	5
<i>Acacia bivenosa</i>		2.5	1	<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	1.8	1
<i>Acacia hamersleyensis</i>		2.5	5	<i>Eriachne mucronata</i>	0.2	8
<i>Bidens bipinnata</i>		0.1	0.2	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	5	8
<i>Cenchrus ciliaris</i>		0.3	5	<i>Solanum cleistogamum</i>	0.3	0.2
<i>Cymbopogon obtectus</i>		0.4	5	<i>Triodia pungens</i>	0.3	8

Site: R015		Type: Releve	Size: -	Date: 14/05/2023	Botanist: Sarah Boys	
Landform:	Flat plain					
Slope, aspect:	3° - Gentle N					
Soil:	Sandy clay loam, Orange-brown					
Rocks:	Calcrete					
Abundance:	50 - 90% - Abundant					
Size:	20 - 60 mm - Coarse gravel					
Fire:	2 - 5 yrs					
Condition:	Excellent					
Notes:	Weeds (Low)					
Veg Unit:	S3c					
Location (NW):	50 768024 mE, 7422244 mS					
Species		Height	Cover	Species	Height	Cover
Acacia bivenosa		1.3	5	Ptilotus astrolasius	0.3	0.5
Cenchrus ciliaris		0.3	0.2	Ptilotus obovatus	0.5	0.5
Eremophila longifolia		1.2	1	Santalum lanceolatum	1.2	2
Eucalyptus xerothermica		6	1	Senna artemisioides subsp. oligophylla	0.5	0.5
Hakea chordophylla		4	0.5	Sida fibulifera	0.2	2
Petalostylis labicheoides		2.2	5	Triodia pungens	0.3	15

Site: R016		Type: Releve	Size: -	Date: 15/05/2023	Botanist: Sarah Boys		
Landform:	Crest						
Slope, aspect:	1° - Very Gentle W						
Soil:	Clay, Red-orange, brown						
Rocks:	Ironstone Quartz						
Abundance:	>90% - Continuous						
Size:	20 - 60 mm - Coarse gravel						
Fire:	2 - 5 yrs						
Condition:	Excellent						
Notes:	None						
Veg Unit:	S3b						
Location (NW):	50 770530 mE, 7419395 mS						
Species		Height	Cover	Species	Height	Cover	
<i>Acacia bivenosa</i>		1.5	5	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>		0.5	0.2
<i>Capparis lasiantha</i>		1.1	0.2	<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>		1.1	0.5
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>		4	3	<i>Triodia brizoides</i>		0.2	10
<i>Hakea chordophylla</i>		2	0.5	<i>Triodia pungens</i>		0.3	1
<i>Ptilotus astrolasius</i>		0.3	0.5	<i>Triodia wiseana</i>		0.2	15

Site: R017		Type: Relevé	Size: -	Date: 18/05/2023	Botanist: Sarah Boys	
Landform:	Lower slope					
Slope, aspect:	3° - Gentle S					
Soil:	Clay, Red-orange, brown					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	20 - 60 mm - Coarse gravel					
Fire:	2 - 5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S1					
Location (NW):	50 770896 mE, 7422426 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia adsurgens</i>		0.5	0.2	<i>Indigofera monophylla</i>	0.4	0.5
<i>Acacia bivenosa</i>		0.7	3	<i>Ptilotus astrolasius</i>	0.3	0.1
<i>Acacia inaequilatera</i>		1.2	0.1	<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	1.2	0.1
<i>Acacia pachyacra</i>		0.5	1	<i>Senna sericea</i>	0.3	0.1
<i>Acacia rhodophloia</i>		0.9	0.1	<i>Sida arenicola</i>	0.7	0.1
<i>Amphipogon sericeus</i>		0.3	0.5	<i>Solanum lasiophyllum</i>	0.3	0.1
<i>Eucalyptus gamophylla</i>		2.2	5	<i>Triodia pungens</i>	0.3	8
<i>Hakea chordophylla</i>		1.3	0.1	<i>Triodia vanleeuwenii</i>	0.2	8

Site: R018		Type: Releve	Size: -	Date: 18/05/2023	Botanist: Sarah Boys	
Landform:	Lower slope					
Slope, aspect:	3° - Gentle S					
Soil:	Clay, Red-orange, brown					
Rocks:	Ironstone					
Abundance:	>90% - Continuous					
Size:	20 - 60 mm - Coarse gravel					
Fire:	2 - 5 yrs					
Condition:	Excellent					
Notes:	None					
Veg Unit:	S1					
Location (NW):	50 767041 mE, 7421066 mS					
Species		Height	Cover	Species	Height	Cover
<i>Acacia bivenosa</i>		0.9	1	<i>Ptilotus astrolasius</i>	0.3	0.3
<i>Acacia inaequilatera</i>		1.9	5	<i>Ptilotus exaltatus</i>	0.2	0.1
<i>Acacia pachyacra</i>		0.9	1	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	0.5	0.2
<i>Eucalyptus gamophylla</i>		2.2	4	<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	1.2	0.2
<i>Hakea chordophylla</i>		2.5	0.2	<i>Sida arenicola</i>	0.8	0.1
<i>Indigofera monophylla</i>		0.3	0.5	<i>Triodia pungens</i>	0.3	5
<i>Paraneurachne muelleri</i>		0.3	0.2	<i>Triodia vanleeuwenii</i>	0.2	2

Appendix C: Likelihood of Occurrence Assessment – Flora



Likelihood-pre	Likelihood-post	Status	EPBC/BC Act	Family	Taxon	Description	Habitat	Closest Record to Project (km)
Recorded	Recorded	P3	-/-	Fabaceae	<i>Indigofera gilesii</i>	Shrub, to 1.5 m high. Fl. purple-pink, May or Aug.	Pebbly loam. Amongst boulders & outcrops, hills.	0.0
Recorded	High	P3	-/-	Poaceae	<i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739)	Perennial, grass-like or herb, 0.4 m high.	Gullies. Hill slopes. Drainage lines.	0.0
Recorded	Recorded	P4	-/-	Brassicaceae	<i>Lepidium catapycnon</i>	Open, woody perennial, herb or shrub, 0.2-0.3 m high, stems zigzag. Fl. white, Oct.	Skeletal soils. Hillsides.	0.0
High	Recorded	P2	-/-	Convolvulaceae	<i>Ipomoea racemigera</i>	Creeping annual, herb or climber. Fl. white.	Fringing vegetation of river.	7.3
High	High	P2	-/-	Euphorbiaceae	<i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i>	Herb to 2 cm.	Flat, red-brown loam. Cracking clay.	2.7
High	High	P2	-/-	Poaceae	<i>Aristida lazareidis</i>	Tufted perennial, grass-like or herb, 0.4-1.5 m high. Fl. green/purple, Apr.	Clay plains of an ephemeral lake. Floodplain/drainage zone. Sand or loam.	0.4
High	High	P3	-/-	Apocynaceae	<i>Gymnanthera cunninghamii</i>	Erect shrub, 1-2 m high. Fl. cream-yellow-green.	Sandy soils. Drainage lines.	7.7
High	High	P3	-/-	Asteraceae	<i>Streptoglossa</i> sp. Cracking clays (S. van Leeuwen et al. PBS 7353)	Erect annual herb. Light green stems and mid-green leaves with slightly greyish hairs.	Cracking clay.	0.2
High	High	P3	-/-	Asteraceae	<i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwen 4684)	Tall daisy to 1 m, open canopy, in late flower and dehiscent fruit, cream/white flowers.	Flat terrain, low in landscape. Red clay loam with some stone. Gilgai. Drainage lines.	8.0
High	High	P3	-/-	Fabaceae	<i>Isotropis parviflora</i>	Shrub, 0.1 m high. Fl. white/pink, Mar.	Low rocky hill. Red-brown loam soils and ironstone gravel.	7.9
High	High	P3	-/-	Goodeniaceae	<i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727)	Open, erect annual or biennial, herb, to 0.2 m high. Fl. yellow.	Red-brown clay soil. Calcrete pebbles. Low undulating plain, swampy plains.	0.2
High	High	P3	-/-	Poaceae	<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	Compactly tufted perennial, grass-like or herb, 0.3-0.8 m high, lemma groove muricate.	Flat terrain. Red clay loam, low in landscape. Hardpan plains.	6.9
High	High	P3	-/-	Scrophulariaceae	<i>Eremophila naaykensis</i>	Shrub to 2m tall. Rounded crowded canopy. Flowers white-cream-yellow-pink-purple.	Hill crest. Creek embankments. Gullies.	6.7
High	High	P4	-/-	Scrophulariaceae	<i>Eremophila magnifica</i> subsp. <i>magnifica</i>	Shrub, 0.5-1.5 m high. Fl. blue, Aug to Nov.	Skeletal soils over ironstone. Rocky screes.	5.1
High	Recorded	-	-/-	Malvaceae	<i>Hibiscus</i> aff. <i>campanulatus</i>	Shrub to 2m tall.	Gullies. Hill slopes. Drainage lines.	5.0
Medium	Medium	P1	-/-	Rubiaceae	<i>Paranotis</i> sp. Pilbara (H. Ajduk HAOP04a)	Erect ephemeral herb to 0.25 m tall with white flowers and mature fruit.	Drainage lines.	16.4

Likelihood-pre	Likelihood-post	Status	EPBC/BC Act	Family	Taxon	Description	Habitat	Closest Record to Project (km)
Medium	Medium	P3	-/-	Chenopodiaceae	<i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794)	Erect shrub to 1.5m.	Flat plain. Floodplain. Hillslope. Red sandy loam with surface cobbles.	11.7
Medium	Low	P3	-/-	Fabaceae	<i>Acacia subtiliformis</i>	Spindly, slender, erect shrub, to 3.5 m high, phyllodes green, new growth slightly viscid, resinous, aromatic; inflorescence in heads to 6 mm diameter; peduncles red. Fl. yellow, Jun.	Rocky calcrete plateau.	15.8
Medium	Medium	P3	-/-	Goodeniaceae	<i>Goodenia purpurascens</i>	Erect perennial or annual, herb, 0.1-0.3 m high. Fl. blue-purple/white/yellow.	Clay, mud. Swamps & seasonally wet depressions.	13.4
Medium	Medium	P3	-/-	Poaceae	<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)	Tussock grass.	Flat terrain, low in landscape. Red loamy soil with some alluvial sand material and stones.	9.7
Medium	Medium	P3	-/-	Proteaceae	<i>Grevillea saxicola</i>	Tall shrub to 2.5 m.	Breakaway. Scree slope.	24.7
Medium	Medium	P3	-/-	Scrophulariaceae	<i>Eremophila magnifica</i> subsp. <i>velutina</i>	Shrub, 0.5-1.5 m high. Fl. blue-purple, Aug to Sep.	Skeletal soils over ironstone. Summits.	11.6
Medium	Medium	P3	-/-	Scrophulariaceae	<i>Eremophila rigida</i>	Bushy shrub, 0.3-4 m high. Fl. cream, Sep.	Red sand alluvium. Hardpan plains, stony clay depressions.	29.2
Medium	Medium	P4	-/-	Fabaceae	<i>Acacia bromilowiana</i>	Tree or shrub, to 12 m high, bark dark grey, fibrous; phyllodes more or less glaucous & slightly pruinose; inflorescence in spikes. Fl. yellow/pink, Jul to Aug.	High in landscape. Edge of cliff. Rocky ironstone scree. Skeletal soil.	23.7
Medium	Medium	P4	-/-	Scrophulariaceae	<i>Eremophila youngii</i> subsp. <i>lepidota</i>	<i>Eremophila youngii</i> is an erect, highly-branched, shrub which grows to a height of between 1 and 4 m.	Stony red sandy loam. Flats plains. Floodplains, sometimes semi-saline. Clay flats.	11.9
Low	Low	P1	-/-	Fabaceae	<i>Acacia corusca</i>	Rounded to broadly rounded, robust, multi-stemmed shrub or small tree 1.5-4.0 (-5.0) m high, 1.5-5 (-6.0) m wide.	<i>Acacia corusca</i> grows in red-brown sandy loam soils on hill crests, ridges, slopes and minor drainage lines upon low, subdued and undulating stony hills.	43.6
Low	Low	P1	-/-	Scrophulariaceae	<i>Eremophila capricornica</i>	A small shrub 50-75 cm high, 50-75 cm wide. Branches terete, with woolly dendritic hairs; Leaves alternate.	Found from east of Newman across to Jigalong, growing in sandy clay loams in open Mulga shrubland with an understory of <i>Triodia</i> spp. and other grasses	45.2
Low	Low	P1	-/-	Scrophulariaceae	<i>Eremophila rhexos</i>	Erect shrub, ca 1 m high. Fl. blue-purple-white.	Skeletal stony loam over granite.	47.1
Low	Low	P2	-/-	Goodeniaceae	<i>Goodenia hartiana</i>	Erect to spreading, multi-stemmed perennial, herb or shrub (sub-shrub).	Sand. Sand dune swales, sandhills.	39.2

Likelihood-pre	Likelihood-post	Status	EPBC/BC Act	Family	Taxon	Description	Habitat	Closest Record to Project (km)
Low	Low	P2	-/-	Malvaceae	<i>Hibiscus</i> sp. Gurinbiddy Range (M.E. Trudgen MET 15708)	Spindly upright shrub to 3 m tall, purple flower.	Rocky (boulder) slope below low cliffs. Gully. Gravelly, pebbly red-brown loam.	30.9
Low	Low	P2	-/-	Oxalidaceae	<i>Oxalis</i> sp. Pilbara (M.E. Trudgen 12725)	Small herb to 10 cm tall. Leaves green above, purple below; yellow flowers.	Gully. Brown-red loam.	29.0
Low	Low	P2	-/-	Poaceae	<i>Eragrostis</i> sp. Mt Robinson (S. van Leeuwen 4109)	Tussock-forming perennial, grass-like or herb, to 0.3 m high. Fl. Sep.	Red-brown skeletal soils. Ironstone. Steep slopes. Summits.	29.9
Low	Low	P2	-/-	Scrophulariaceae	<i>Eremophila</i> sp. West Angelas (S. van Leeuwen 4068)	Spindly shrub to 3 m high.	Summits of hills. Slopes.	23.7
Low	Low	P3	-/-	Acanthaceae	<i>Rostellularia adscendens</i> var. <i>latifolia</i>	Herb or shrub, 0.1-0.3 m high. Fl. blue-purple-violet.	Drainage area with red-brown loam soils. Ironstone soils. Creeks. Rocky hills.	49.4
Low	Low	P3	-/-	Amaranthaceae	<i>Amaranthus centralis</i>	Erect, to 60 cm high. Stems angular, sometimes reddish, sparsely hairy with glandular or multicellular hairs or becoming glabrous.	Red sand in ephemeral watercourses. Sandy to clayey loam. River banks. Edges of permanent pools in eucalypt lined channels.	49.7
Low	Low	P3	-/-	Chenopodiaceae	<i>Maireana prosthocochaeta</i>	Open, densely-leaved shrub, 0.3-0.6 m high.	Laterite. Hills, salty places.	42.9
Low	Low	P3	-/-	Fabaceae	<i>Crotalaria smithiana</i>	Annual, herb, to 0.4 m high. Fl. Yellow.	Regeneration site on floodplain.	31.4
Low	Low	P3	-/-	Fabaceae	<i>Swainsona thompsoniana</i>	Erect, herb. Stems terete, not spiny, glabrous.	Flat crabhole plain.	9.5
Low	Low	P3	-/-	Goodeniaceae	<i>Dampiera metallorum</i>	Rounded, multi-stemmed perennial, herb, to 0.5 m high. Fl. blue, Apr or Jun to Oct.	Skeletal red-brown gravelly soil over banded ironstone. Steep slopes. Summits of hills.	40.8
Low	Low	P3	-/-	Stylidiaceae	<i>Stylidium weeliwolli</i>	Annual, herb, 0.1-0.25 m high, throat appendages 4, rod-shaped. Fl. pink & red.	Gritty sand soil, sandy clay. Edge of watercourses.	42.4
Low	Low	P4	-/-	Goodeniaceae	<i>Goodenia berringbinensis</i>	Ascending annual, herb, 0.1-0.3 m high. Fl. Yellow.	Red sandy loam. Along watercourses.	35.9
Low	Low	P4	-/-	Malvaceae	<i>Sida</i> sp. Barlee Range (S. van Leeuwen 1642)	Spreading shrub, to 0.5 m high. Fl. Yellow.	Skeletal red soils pockets. Steep slope.	30.7
Not identified in desktop assessment	Recorded	P3	-/-	Rubiaceae	<i>Dolichocarpa</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	Spreading annual, herb, 0.05-0.1 m high. Fl. blue, Mar.	Cracking clay, basalt. Gently undulating plain with large surface rocks, flat crabholed plain.	92

Appendix D: Flora Species List & Site by Species Matrix



<i>Taxon</i>	Q001	Q002	Q003	Q004	Q005	Q006	Q007	Q008	Q009	Q010	Q011	Q012	Q013	Q014	Q015	Q016	Q017	Q018	Q019	Q020	Q021	Q022	Q023	Q024
<i>?Streptoglossa</i> sp. indet																								
<i>Abutilon amplum</i>																								
<i>Abutilon fraseri</i>																								
<i>Abutilon macrum</i>																								
<i>Abutilon malvifolium</i>																								
<i>Abutilon otocarpum</i>																								
<i>Abutilon</i> sp. Pilbara (W.R. Barker 2025)																								
<i>Acacia ?ayersiana</i>																						X		
<i>Acacia ?hamersleyensis</i>													X											
<i>Acacia ?sibirica</i>																							X	
<i>Acacia adoxa</i> var. <i>adoxo</i>		X	X								X		X		X		X							X
<i>Acacia adsurgens</i>												X		X				X						
<i>Acacia ancistrocarpa</i>		X				X								X									X	
<i>Acacia aptaneura</i>																		X				X		
<i>Acacia bivenosa</i>	X	X				X								X	X	X	X	X			X	X	X	
<i>Acacia citrinoviridis</i>								X		X										X				
<i>Acacia dictyophleba</i>								X		X		X		X										
<i>Acacia hilliana</i>			X						X		X		X				X		X					X
<i>Acacia inaequilatera</i>	X	X		X	X		X																X	
<i>Acacia maitlandii</i>						X				X											X			
<i>Acacia monticola</i>	X	X				X																		
<i>Acacia pachyacra</i>													X										X	
<i>Acacia pruinocarpa</i>													X	X		X			X			X		X
<i>Acacia pyrifolia</i>						X		X		X											X			
<i>Acacia rhodophloia</i>																								

<i>Taxon</i>	Q001	Q002	Q003	Q004	Q005	Q006	Q007	Q008	Q009	Q010	Q011	Q012	Q013	Q014	Q015	Q016	Q017	Q018	Q019	Q020	Q021	Q022	Q023	Q024
<i>Acacia</i> sp. indet 1																								
<i>Acacia</i> sp. indet 2																								
<i>Acacia spondylophylla</i>				X			X		X				X						X					
<i>Acacia synchronicia</i>																X						X		
<i>Acacia tenuissima</i>			X						X			X		X	X		X	X			X		X	
<i>Acacia tetragonophylla</i>																								
<i>Acacia tumida</i>		X				X																		
<i>Afrohybanthus aurantiacus</i>		X				X							X							X				
<i>Alternanthera nana</i>																								
<i>Alternanthera nodiflora</i>																								
<i>Amaranthus undulatus</i>																								
<i>Ammannia</i> sp. indet																								
<i>Amphipogon sericeus</i>	X	X	X						X		X		X				X		X		X		X	X
<i>Androcalva loxophylla</i>																								
<i>Androcalva luteiflora</i>		X				X				X										X				
<i>Anthobolus leptomerioides</i>																								
<i>Aristida contorta</i>				X		X						X		X								X		
<i>Aristida holathera</i> var. <i>holathera</i>		X				X			X										X	X				
<i>Aristida inaequiglumis</i>												X										X		
<i>Aristida latifolia</i>																								
<i>Astrebla elymoides</i>																								
<i>Astrebla pectinata</i>																								
<i>Bidens bipinnata</i>								X																
<i>Boerhavia coccinea</i>								X				X												
<i>Boerhavia paludosa</i>																								

<i>Taxon</i>	Q001	Q002	Q003	Q004	Q005	Q006	Q007	Q008	Q009	Q010	Q011	Q012	Q013	Q014	Q015	Q016	Q017	Q018	Q019	Q020	Q021	Q022	Q023	Q024
<i>Boerhavia repleta</i>																								
<i>Bonamia erecta</i>												X						X						
<i>Bothriochloa pertusa</i>																								
<i>Bulbostylis barbata</i>						X						X												
<i>Bulbostylis turbinata</i>																								
<i>Calotis hispidula</i>																								
<i>Calytrix carinata</i>							X				X													
<i>Capparis lasiantha</i>																								
<i>Cassytha filiformis</i>						X																		
* <i>Cenchrus ciliaris</i>						X		X		X		X		X				X		X				
* <i>Cenchrus setiger</i>																				X				
<i>Centipeda minima</i> subsp. <i>macrocephala</i>																								
<i>Cheilanthes lasiophylla</i>					X																			
<i>Chrysopogon fallax</i>																								
<i>Cleome viscosa</i>						X		X				X								X				
<i>Clerodendrum ?floribundum</i>																								
<i>Codonocarpus cotinifolius</i>																								
<i>Convolvulus clementii</i>																								
<i>Corchorus crozophorifolius</i>																								
<i>Corchorus tridens</i>																								
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>																				X				
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>		X		X		X					X		X				X				X		X	
<i>Corymbia ?hamersleyana</i>		X				X			X		X		X				X							
<i>Corymbia aspera</i>																								

<i>Taxon</i>	Q001	Q002	Q003	Q004	Q005	Q006	Q007	Q008	Q009	Q010	Q011	Q012	Q013	Q014	Q015	Q016	Q017	Q018	Q019	Q020	Q021	Q022	Q023	Q024
<i>Corymbia candida</i>																								
<i>Corymbia deserticola</i> subsp. <i>deserticola</i>																								
<i>Corymbia ferriticola</i>																								
<i>Corymbia hamersleyana</i>																								
<i>Corymbia opaca</i>																								
<i>Cucumis melo</i>								X																
<i>Cymbopogon ambiguus</i>						X		X					X							X				X
<i>Cymbopogon oblectus</i>									X			X						X	X					
<i>Cynodon convergens</i>																								
<i>Cyperus iria</i>																								
<i>Cyperus</i> sp. indet								X		X										X				
<i>Cyperus vaginatus</i>																								
<i>Dampiera candidans</i>	X	X	X								X		X				X							
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>												X												
<i>Dichanthium sericeum</i> subsp. <i>sericeum</i>																								
<i>Digitaria ammophila</i>																								
<i>Digitaria brownii</i>																								
<i>Digitaria ctenantha</i>												X												
<i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i>												X												
<i>Dodonaea coriacea</i>	X		X																					
<i>Dodonaea lanceolata</i> var. <i>lanceolata</i>						X																		
<i>Dodonaea pachyneura</i>																	X							

<i>Taxon</i>	Q001	Q002	Q003	Q004	Q005	Q006	Q007	Q008	Q009	Q010	Q011	Q012	Q013	Q014	Q015	Q016	Q017	Q018	Q019	Q020	Q021	Q022	Q023	Q024
<i>Dolichocarpa</i> sp. Hamersley Station (A.A. Mitchell 1479)																								
<i>Duperreya commixta</i>														X				X		X	X	X	X	
<i>Dysphania melanocarpa</i>																								
<i>Dysphania rhadinostachya</i>																								
<i>Dysphania kalpari</i>																								
* <i>Echinochloa colona</i>																								
<i>Enneapogon lindleyanus</i>						X		X				X								X	X			
<i>Enneapogon polyphyllus</i>									X			X		X								X		
<i>Eragrostis</i> sp. Mt Robinson (S. van Leeuwen 4109) (P2)																						X		
<i>Eragrostis cumingii</i>																								
<i>Eragrostis eriopoda</i>										X		X		X				X		X				
<i>Eragrostis mucronata</i>						X		X		X										X				
<i>Eragrostis setifolia</i>																								
* <i>Eragrostis tenella</i>								X																
<i>Eragrostis tenellula</i>																								
<i>Eragrostis xerophila</i>																								
<i>Eremophila exilifolia</i>																			X					
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>																						X		
<i>Eremophila latrobei</i>																								
<i>Eremophila latrobei</i> subsp. <i>glabra</i>													X		X									
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>																			X					
<i>Eremophila longifolia</i>																						X		
<i>Eremophila platycalyx</i>																								

<i>Taxon</i>	Q001	Q002	Q003	Q004	Q005	Q006	Q007	Q008	Q009	Q010	Q011	Q012	Q013	Q014	Q015	Q016	Q017	Q018	Q019	Q020	Q021	Q022	Q023	Q024
<i>Eriachne lanata</i>											X		X				X		X					X
<i>Eriachne mucronata</i>	X	X	X				X		X		X		X		X	X	X		X		X			X
<i>Eriachne pulchella</i> subsp. <i>pulchella</i>																								
<i>Eucalyptus ?xerothermica</i>																								
<i>Eucalyptus camaldulensis</i> subsp. <i>obtus</i>																								
<i>Eucalyptus gamophylla</i>						X						X		X				X					X	
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	X	X	X						X		X		X		X	X	X		X		X	X		X
<i>Eucalyptus</i> sp. <i>indet</i>																								
<i>Eucalyptus trivalva</i>																								
<i>Eucalyptus victrix</i>								X		X											X			
<i>Eucalyptus xerothermica</i>												X		X				X						
<i>Eulalia aurea</i>										X														
<i>Eulalia simonii</i>																								
<i>Euphorbia ?tannensis</i> subsp. <i>eremophila</i>																								
<i>Euphorbia australis</i> var. <i>subtomentosa</i>																								
<i>Euphorbia biconvexa</i>						X		X				X												
<i>Euphorbia careyi</i>				X																				
<i>Euphorbia coghlanii</i>																								
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>								X				X						X						
<i>Euploca pachyphylla</i>																								
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>								X				X								X				

<i>Taxon</i>	Q001	Q002	Q003	Q004	Q005	Q006	Q007	Q008	Q009	Q010	Q011	Q012	Q013	Q014	Q015	Q016	Q017	Q018	Q019	Q020	Q021	Q022	Q023	Q024
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>									X															
<i>Fimbristylis ?dichotoma</i>	X		X	X																				
<i>Fimbristylis dichotoma</i>																								
<i>Fimbristylis simulans</i>																								
<i>Glycine canescens</i>																								
<i>Gompholobium oreophilum</i>																								
<i>Gomphrena canescens</i> subsp. <i>canescens</i>																								
<i>Gomphrena cunninghamii</i>																								
<i>Goodenia cusackiana</i>	X			X																	X			
<i>Goodenia heterochila</i>																								
<i>Goodenia muelleriana</i>																								
<i>Goodenia nuda</i>																								
<i>Goodenia pascua</i>																								
<i>Goodenia stellata</i>																								
<i>Goodenia stobbsiana</i>																								
<i>Goodenia triodiophila</i>	X		X						X				X		X		X		X					X
<i>Gossypium australe</i>				X		X																		
<i>Gossypium robinsonii</i>		X			X	X		X												X	X			
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	X	X				X	X		X				X							X				
<i>Hakea chordophylla</i>		X	X		X		X		X		X		X				X		X			X	X	X
<i>Hakea lorea</i> subsp. <i>lorea</i>															X				X				X	X
<i>Haloragis odontocarpa</i>																								
<i>Hibiscus</i> aff. <i>campanulatus</i>															X	X								
<i>Hibiscus burtonii</i>																						X		

<i>Taxon</i>	Q001	Q002	Q003	Q004	Q005	Q006	Q007	Q008	Q009	Q010	Q011	Q012	Q013	Q014	Q015	Q016	Q017	Q018	Q019	Q020	Q021	Q022	Q023	Q024
<i>Hibiscus coatesii</i>																				X				
<i>Hibiscus sturtii</i>											X				X		X							
<i>Hibiscus sturtii</i> var. <i>campyloclamys</i>												X		X				X					X	
<i>Indigofera ?rugosa</i>					X																			
<i>Indigofera georgei</i>																								
<i>Indigofera gilesii</i> (P3)																								
<i>Indigofera linifolia</i>								X		X										X				
<i>Indigofera monophylla</i>	X	X				X																	X	
<i>Indigofera rugosa</i>					X																			
<i>Ipomoea lonchophylla</i>																								
<i>Ipomoea racemigera</i> (P2)																								
<i>Iseilema vaginiflorum</i>																								
<i>Isotropis atropurpurea</i>		X				X														X				
<i>Isotropis iophyta</i>																								
<i>Jasminum didymum</i> subsp. <i>lineare</i>		X						X		X		X		X				X						
<i>Lepidium catapycnon</i> (P4)															X									
<i>Maireana ?georgei</i>																								
<i>Maireana planifolia</i>												X												
<i>Maireana villosa</i>												X												
* <i>Malvastrum americanum</i>																								
<i>Marsilea hirsuta</i>																								
<i>Melaleuca glomerata</i>																				X				
<i>Mirbelia viminalis</i>											X						X							
<i>Nellica maderaspatensis</i>								X																

<i>Taxon</i>	Q001	Q002	Q003	Q004	Q005	Q006	Q007	Q008	Q009	Q010	Q011	Q012	Q013	Q014	Q015	Q016	Q017	Q018	Q019	Q020	Q021	Q022	Q023	Q024
<i>Neptunia xanthanema</i>																								
<i>Operculina aequisejala</i>																								
<i>Paraneurachne muelleri</i>	X	X	X	X		X	X		X			X		X		X		X	X		X	X	X	X
<i>Paspalidium clementii</i>																								
<i>Paspalidium rarum</i>												X												
<i>Perotis rara</i>												X												
<i>Petalostylis labicheoides</i>		X				X		X		X	X										X		X	
<i>Pluchea rubelliflora</i>								X																
<i>Polycarpha corymbosa</i>												X												
<i>Polygala glaucifolia</i>																								
<i>Polymeria calycina</i>		X				X		X													X			
<i>Portulaca intraterranea</i>																								
<i>Portulaca oleracea sens lat</i>																								
<i>Psydrax latifolia</i>													X									X		
<i>Pterocaulon sp. indet</i>																								
<i>Ptilotus ?obovatus</i>																								
<i>Ptilotus astrolasius</i>	X	X		X		X	X		X			X		X	X	X		X			X	X	X	
<i>Ptilotus calostachyus</i>	X	X	X			X	X		X		X				X	X	X	X	X		X		X	
<i>Ptilotus clementii</i>																								
<i>Ptilotus exaltatus</i>	X													X	X	X					X			
<i>Ptilotus gomphrenoides</i>																								
<i>Ptilotus helipteroides</i>																								
<i>Ptilotus obovatus</i>					X									X	X			X			X	X		
<i>Ptilotus rotundifolius</i>					X				X									X			X			X
<i>Rhagodia eremaea</i>														X								X		
<i>Rhynchosia minima</i>								X						X							X			

<i>Taxon</i>	Q001	Q002	Q003	Q004	Q005	Q006	Q007	Q008	Q009	Q010	Q011	Q012	Q013	Q014	Q015	Q016	Q017	Q018	Q019	Q020	Q021	Q022	Q023	Q024
<i>Rutidosia helichrysoides</i>																								
<i>Salsola australis</i>																								
<i>Santalum lanceolatum</i>		X				X		X	X	X										X				
<i>Scaevola amblyanthera</i> var. <i>amblyanthera</i>																				X				
<i>Scaevola browniana</i> subsp. <i>browniana</i>											X		X				X		X					
<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>												X						X						
<i>Senna ?artemisioides</i> subsp. <i>oligophylla</i>																			X					
<i>Senna ?sericea</i>		X																						
<i>Senna artemisioides</i> subsp. <i>helmsii</i>																						X		
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>		X		X	X	X	X		X		X	X	X	X	X	X		X			X	X		X
<i>Senna artemisioides</i> subsp. x <i>artemisioides</i>																								
<i>Senna glutinosa</i>																								
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	X	X	X	X	X	X	X				X		X		X	X	X	X	X		X			X
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	X	X	X	X		X	X		X		X		X		X				X		X			X
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>									X									X				X	X	X
<i>Senna hamersleyensis</i>																								
<i>Senna pleurocarpa</i> var. <i>angustifolia</i>																								
<i>Senna sericea</i>																			X					
<i>Senna</i> sp. Meekatharra (E. Bailey 1-26)																								

<i>Taxon</i>	Q001	Q002	Q003	Q004	Q005	Q006	Q007	Q008	Q009	Q010	Q011	Q012	Q013	Q014	Q015	Q016	Q017	Q018	Q019	Q020	Q021	Q022	Q023	Q024
<i>Senna</i> sp. indet																								
<i>Senna symonii</i>																								
<i>Seringia ?exastia</i>											X													
<i>Seringia nephrosperma</i>																								
<i>Setaria dielsii</i>								X																
<i>Sida ?arenicola</i>																								
<i>Sida ?fibulifera</i>																								
<i>Sida arenicola</i>			X								X													
<i>Sida cardiophylla</i>												X						X						
<i>Sida fibulifera</i>										X														
<i>Sida</i> sp. Excedentifolia (J.L. Egan 1925)			X								X		X		X	X	X				X			
<i>Sida</i> Articulation below (A.A. Mitchell PRP 1605)																								
<i>Sida</i> sp. L (A.M. Ashby 4202)												X		X								X		
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)	X		X													X	X				X			
<i>Sida</i> sp. Supplejack Station (T.S. Henshall 2345)																						X		
<i>Solanum centrale</i>									X										X		X		X	
<i>Solanum lasiophyllum</i>	X		X						X		X		X		X	X		X	X	X	X	X	X	
* <i>Sonchus oleraceus</i>																								
<i>Sorghum plumosum</i>								X		X		X								X		X		
<i>Stemodia viscosa</i>								X																
<i>Streptoglossa</i> sp.																								
<i>Swainsona kingii</i>																								
<i>Swainsona leeana</i>																								

<i>Taxon</i>	Q001	Q002	Q003	Q004	Q005	Q006	Q007	Q008	Q009	Q010	Q011	Q012	Q013	Q014	Q015	Q016	Q017	Q018	Q019	Q020	Q021	Q022	Q023	Q024
<i>Tephrosia rosea</i> var. Fortescue creeks (M.I.H. Brooker 2186)								X												X				
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)	X																							
<i>Tephrosia</i> sp. Newman (A.A. Mitchell PRP 29)																								
<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431) (P3)																								
<i>Themeda triandra</i>		X			X	X		X		X					X					X	X			
<i>Trachymene oleracea</i>																								
<i>Tragus australianus</i>																								
<i>Trianthema ?pilosum</i>												X												
<i>Tribulus suberosus</i>											X						X							
* <i>Tribulus terrestris</i>																								
<i>Triodia angusta</i>																								
<i>Triodia brizoides</i>				X	X		X								X									
<i>Triodia melvillei</i>																						X		
<i>Triodia pungens</i>	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
<i>Triodia vanleeuwenii</i>	X	X	X			X			X		X		X				X		X				X	X
<i>Triodia wiseana</i>				X	X		X						X							X	X			
<i>Triumfetta maconochieana</i>																	X							
<i>Urochloa subquadripara</i>								X																
* <i>Vachellia farnesiana</i>																								
<i>Vigna</i> sp. Hamersley clay (A.A. Mitchell PRP 113)								X		X		X												
<i>Vigna</i> sp. indet																								
<i>Vincetoxicum lineare</i>															X							X		

Taxon	Q001	Q002	Q003	Q004	Q005	Q006	Q007	Q008	Q009	Q010	Q011	Q012	Q013	Q014	Q015	Q016	Q017	Q018	Q019	Q020	Q021	Q022	Q023	Q024
<i>Wahlenbergia tumidifructa</i>																								
<i>Waltheria indica</i>																								
<i>Urochloa subquadriflora</i>								X																

Taxon	Q025	Q026	Q027	Q028	Q029	Q030	Q031	Q032	Q033	Q034	Q035	Q036	Q037	Q038	Q039	Q040	Q041	Q042	Q043	Q044	Q045	Q046	Q047	R001
<i>?Streptoglossa</i> sp. indet								X												X	X			
<i>Abutilon amplum</i>										X											X			
<i>Abutilon fraseri</i>															X		X		X					
<i>Abutilon macrum</i>														X										
<i>Abutilon malvifolium</i>																						X		
<i>Abutilon otocarpum</i>				X		X						X		X									X	
<i>Abutilon</i> sp. Pilbara (W.R. Barker 2025)														X										
<i>Acacia ?ayersiana</i>																								X
<i>Acacia ?hamersleyensis</i>																								
<i>Acacia ?sibirica</i>																								
<i>Acacia adoxa</i> var. <i>adoxo</i>																								X
<i>Acacia adsurgens</i>			X			X								X			X		X					
<i>Acacia ancistrocarpa</i>	X					X									X				X					X
<i>Acacia aptaneura</i>														X									X	
<i>Acacia bivenosa</i>	X					X	X				X	X	X		X	X	X		X					
<i>Acacia citrinoviridis</i>		X			X				X	X										X	X			X
<i>Acacia dictyophleba</i>		X		X		X		X				X											X	
<i>Acacia hilliana</i>																		X						X

Taxon	Q025	Q026	Q027	Q028	Q029	Q030	Q031	Q032	Q033	Q034	Q035	Q036	Q037	Q038	Q039	Q040	Q041	Q042	Q043	Q044	Q045	Q046	Q047	R001
<i>Acacia inaequilatera</i>	X		X			X													X					
<i>Acacia maitlandii</i>																								X
<i>Acacia monticola</i>																		X	X					X
<i>Acacia pachyacra</i>	X			X			X	X	X		X	X	X		X		X		X				X	
<i>Acacia pruinocarpa</i>									X								X	X	X				X	
<i>Acacia pyrifolia</i>		X		X	X	X		X		X		X								X	X			
<i>Acacia rhodophloia</i>	X																		X					
<i>Acacia</i> sp. indet 1					X																			
<i>Acacia</i> sp. indet 2																X								
<i>Acacia spondylophylla</i>									X									X	X					
<i>Acacia synchronicia</i>						X					X					X			X			X		
<i>Acacia tenuissima</i>	X					X					X													
<i>Acacia tetragonophylla</i>									X												X			
<i>Acacia tumida</i>																								X
<i>Afrohybanthus aurantiacus</i>										X										X				
<i>Alternanthera nana</i>					X	X				X										X				
<i>Alternanthera nodiflora</i>										X										X				
<i>Amaranthus undulatus</i>					X															X	X			
<i>Ammannia</i> sp. indet					X																			
<i>Amphipogon sericeus</i>	X		X										X					X	X					
<i>Androcalva loxophylla</i>						X																		
<i>Androcalva luteiflora</i>		X			X					X										X	X			X
<i>Anthobolus leptomerioides</i>												X											X	
<i>Aristida contorta</i>									X			X			X		X					X	X	
<i>Aristida holathera</i> var. <i>holathera</i>			X	X								X												

Taxon	Q025	Q026	Q027	Q028	Q029	Q030	Q031	Q032	Q033	Q034	Q035	Q036	Q037	Q038	Q039	Q040	Q041	Q042	Q043	Q044	Q045	Q046	Q047	R001
<i>Aristida inaequiglumis</i>						X			X			X		X									X	
<i>Aristida latifolia</i>																	X		X			3		
<i>Astrebla elymoides</i>																						X		
<i>Astrebla pectinata</i>																						X		
<i>Bidens bipinnata</i>																					X			X
<i>Boerhavia coccinea</i>					X	X		X		X		X		X						X	X		X	
<i>Boerhavia paludosa</i>																						X		
<i>Boerhavia repleta</i>																				X				
<i>Bonamia erecta</i>				X		X		X				X	X	X					X					
<i>Bothriochloa pertusa</i>										X														
<i>Bulbostylis barbata</i>														X										
<i>Bulbostylis turbinata</i>																						X		
<i>Calotis hispidula</i>								X																
<i>Calytrix carinata</i>																		X						
<i>Capparis lasiantha</i>						X	X																	
<i>Cassytha filiformis</i>	X															X		X						
* <i>Cenchrus ciliaris</i>		X		X	X	X		X		X		X	X	X	X		X		X	X	X	X	X	X
* <i>Cenchrus setiger</i>		X																						
<i>Centipeda minima subsp. macrocephala</i>					X																			
<i>Cheilanthes lasiophylla</i>																								
<i>Chrysopogon fallax</i>															X							X		
<i>Cleome viscosa</i>		X		X		X		X		X		X		X						X	X		X	
<i>Clerodendrum ?floribundum</i>																								X
<i>Codonocarpus cotinifolius</i>									X															
<i>Convolvulus clementii</i>					X			X																

Taxon	Q025	Q026	Q027	Q028	Q029	Q030	Q031	Q032	Q033	Q034	Q035	Q036	Q037	Q038	Q039	Q040	Q041	Q042	Q043	Q044	Q045	Q046	Q047	R001
<i>Corchorus crozophorifolius</i>										X											X			
<i>Corchorus tridens</i>								X																
<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>																		X						
<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>									X						X	X								
<i>Corymbia ?hamersleyana</i>																								
<i>Corymbia aspera</i>						X																		
<i>Corymbia candida</i>																								X
<i>Corymbia deserticola</i> subsp. <i>deserticola</i>			X																					
<i>Corymbia ferriticola</i>																								X
<i>Corymbia hamersleyana</i>																								X
<i>Corymbia opaca</i>				X				X				X												
<i>Cucumis melo</i>					X							X								X				X
<i>Cymbopogon ambiguus</i>		X								X										X	X			X
<i>Cymbopogon oblectus</i>	X																	X					X	
<i>Cynodon convergens</i>																						X		
<i>Cyperus iria</i>					X																			
<i>Cyperus</i> sp. indet																								
<i>Cyperus vaginatus</i>																				X				
<i>Dampiera candidans</i>																								
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>																						X		
<i>Dichanthium sericeum</i> subsp. <i>sericeum</i>																				X	X			
<i>Digitaria ammophila</i>			X																					
<i>Digitaria brownii</i>																							X	

Taxon	Q025	Q026	Q027	Q028	Q029	Q030	Q031	Q032	Q033	Q034	Q035	Q036	Q037	Q038	Q039	Q040	Q041	Q042	Q043	Q044	Q045	Q046	Q047	R001
<i>Digitaria ctenantha</i>																								
<i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i>						X						X		X										
<i>Dodonaea coriacea</i>																								
<i>Dodonaea lanceolata</i> var. <i>lanceolata</i>																								
<i>Dodonaea pachyneura</i>																								X
<i>Dolichocarpa</i> sp. Hamersley Station (A.A. Mitchell 1479)																						X		
<i>Duperreya commixta</i>	X		X		X	X	X		X					X	X		X		X				X	X
<i>Dysphania melanocarpa</i>					X	X																		
<i>Dysphania rhadinostachya</i>												X										X		
<i>Dysphania kalpari</i>																							X	
* <i>Echinochloa colona</i>					X																			
<i>Enneapogon lindleyanus</i>		X																					X	
<i>Enneapogon polyphyllus</i>						X	X					X		X			X						X	X
<i>Eragrostis</i> sp. Mt Robinson (S. van Leeuwen 4109) (P2)																								
<i>Eragrostis cumingii</i>					X									X										
<i>Eragrostis eriopoda</i>												X					X							
<i>Eragrostis mucronata</i>																								
<i>Eragrostis setifolia</i>																						X		
* <i>Eragrostis tenella</i>					X			X						X						X			X	
<i>Eragrostis tenellula</i>					X					X										X	X			
<i>Eragrostis xerophila</i>																						X		
<i>Eremophila exilifolia</i>																								
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>																								

Taxon	Q025	Q026	Q027	Q028	Q029	Q030	Q031	Q032	Q033	Q034	Q035	Q036	Q037	Q038	Q039	Q040	Q041	Q042	Q043	Q044	Q045	Q046	Q047	R001
<i>Eremophila latrobei</i>																X								X
<i>Eremophila latrobei</i> subsp. <i>glabra</i>																								
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>							X		X															
<i>Eremophila longifolia</i>												X												
<i>Eremophila platycalyx</i>							X																	
<i>Eriachne lanata</i>			X						X									X						
<i>Eriachne mucronata</i>		X					X		X	X			X		X	X		X			X			X
<i>Eriachne pulchella</i> subsp. <i>pulchella</i>																							X	
<i>Eucalyptus ?xerothermica</i>				X		X						X		X										
<i>Eucalyptus camaldulensis</i> subsp. <i>obtusata</i>					X					X										X	X			
<i>Eucalyptus gamophylla</i>	X					X							X		X		X		X					
<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>							X		X		X					X		X						X
<i>Eucalyptus</i> sp. <i>indet</i>									X															
<i>Eucalyptus trivalva</i>														X										
<i>Eucalyptus victrix</i>		X			X					X										X	X			
<i>Eucalyptus xerothermica</i>						X																		
<i>Eulalia aurea</i>					X	X											X						X	
<i>Eulalia simonii</i>												X												
<i>Euphorbia ?tannensis</i> subsp. <i>eremophila</i>								X		X		X								X				
<i>Euphorbia australis</i> var. <i>subtomentosa</i>					X			X				X											X	
<i>Euphorbia biconvexa</i>		X			X	X				X				X						X	X		X	X
<i>Euphorbia careyi</i>																								

Taxon	Q025	Q026	Q027	Q028	Q029	Q030	Q031	Q032	Q033	Q034	Q035	Q036	Q037	Q038	Q039	Q040	Q041	Q042	Q043	Q044	Q045	Q046	Q047	R001
<i>Euphorbia coghlanii</i>																						X		
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>															X		X				X			
<i>Euploca pachyphylla</i>																								X
<i>Evolvulus alsinoides</i> var. <i>decumbens</i>		X			X	X				X		X		X							X	X	X	
<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>																								
<i>Fimbristylis ?dichotoma</i>											X													
<i>Fimbristylis dichotoma</i>																						X		
<i>Fimbristylis simulans</i>			X																					
<i>Glycine canescens</i>						X																		
<i>Gompholobium oreophilum</i>																								X
<i>Gomphrena canescens</i> subsp. <i>canescens</i>														X										
<i>Gomphrena cunninghamii</i>		X																						X
<i>Goodenia cusackiana</i>																								
<i>Goodenia heterochila</i>						X																		
<i>Goodenia muelleriana</i>															X							X		
<i>Goodenia nuda</i>														X										
<i>Goodenia pascua</i>																						X		
<i>Goodenia stellata</i>						X																		
<i>Goodenia stobbsiana</i>			X															X						
<i>Goodenia triodiophila</i>	X		X															X						
<i>Gossypium australe</i>																								
<i>Gossypium robinsonii</i>		X								X					X				X					X
<i>Grevillea wickhamii</i> subsp. <i>hispidula</i>	X								X								X	X						X

Taxon	Q025	Q026	Q027	Q028	Q029	Q030	Q031	Q032	Q033	Q034	Q035	Q036	Q037	Q038	Q039	Q040	Q041	Q042	Q043	Q044	Q045	Q046	Q047	R001
<i>Hakea chordophylla</i>	X		X			X			X				X				X							
<i>Hakea lorea</i> subsp. <i>lorea</i>								X	X			X	X		X			X						
<i>Haloragis odontocarpa</i>																						X		
<i>Hibiscus</i> aff. <i>campanulatus</i>																								X
<i>Hibiscus burtonii</i>																			X				X	
<i>Hibiscus coatesii</i>	X												X		X									
<i>Hibiscus sturtii</i>																			X					
<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>											X	X		X				X					X	
<i>Indigofera ?rugosa</i>																								
<i>Indigofera georgei</i>						X				X		X												
<i>Indigofera gilesii</i> (P3)																								X
<i>Indigofera linifolia</i>																						X		
<i>Indigofera monophylla</i>						X	X						X	X	X		X	X	X					X
<i>Indigofera rugosa</i>																								
<i>Ipomoea lonchophylla</i>																						X		
<i>Ipomoea racemigera</i> (P2)					X																			
<i>Iseilema vaginiflorum</i>																						X		
<i>Isotropis atropurpurea</i>																								
<i>Isotropis iophyta</i>					X															X			X	
<i>Jasminum didymum</i> subsp. <i>lineare</i>				X		X				X		X		X					X				X	X
<i>Lepidium catapycnon</i> (P4)																								
<i>Maireana ?georgei</i>											X													
<i>Maireana planifolia</i>																			X					
<i>Maireana villosa</i>																			X				X	

Taxon	Q025	Q026	Q027	Q028	Q029	Q030	Q031	Q032	Q033	Q034	Q035	Q036	Q037	Q038	Q039	Q040	Q041	Q042	Q043	Q044	Q045	Q046	Q047	R001
<i>*Malvastrum americanum</i>					X															X				
<i>Marsilea hirsuta</i>					X																			
<i>Melaleuca glomerata</i>																								
<i>Mirbelia viminalis</i>																								
<i>Nelica maderaspatensis</i>		X			X					X										X	X			
<i>Neptunia xanthanema</i>																						X		
<i>Operculina aequisejala</i>																						X		
<i>Paraneurachne muelleri</i>	X	X	X			X	X					X	X	X			X		X				X	X
<i>Paspalidium clementii</i>																								X
<i>Paspalidium rarum</i>												X												
<i>Perotis rara</i>						X						X		X										
<i>Petalostylis labicheoides</i>		X		X		X						X					X		X	X	X		X	X
<i>Pluchea rubelliflora</i>																								
<i>Polycarpaea corymbosa</i>												X										X		
<i>Polygala glaucifolia</i>												X										X		
<i>Polymeria calycina</i>				X				X																
<i>Portulaca intraterranea</i>																						X		
<i>Portulaca oleracea sens lat</i>					X			X				X		X									X	
<i>Psyrax latifolia</i>																								
<i>Pterocaulon sp. indet</i>																					X		X	
<i>Ptilotus ?obovatus</i>							X		X		X					X			X					
<i>Ptilotus astrolasius</i>							X				X	X	X	X	X		X		X				X	
<i>Ptilotus calostachyus</i>	X								X				X				X		X					
<i>Ptilotus clementii</i>															X									
<i>Ptilotus exaltatus</i>												X	X	X	X		X		X		X		X	

Taxon	Q025	Q026	Q027	Q028	Q029	Q030	Q031	Q032	Q033	Q034	Q035	Q036	Q037	Q038	Q039	Q040	Q041	Q042	Q043	Q044	Q045	Q046	Q047	R001
<i>Ptilotus gomphrenoides</i>																						X		
<i>Ptilotus helipteroides</i>												X		X									X	
<i>Ptilotus obovatus</i>						X					X	X		X	X		X						X	X
<i>Ptilotus rotundifolius</i>							X		X															
<i>Rhagodia eremaea</i>												X				X								
<i>Rhynchosia minima</i>				X		X																X		
<i>Rutidosia helichrysoides</i>														X										
<i>Salsola australis</i>				X								X	X								X	X		
<i>Santalum lanceolatum</i>					X	X				X		X												X
<i>Scaevola amblyanthera</i> var. <i>amblyanthera</i>												X												
<i>Scaevola browniana</i> subsp. <i>browniana</i>																		X						
<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>						X													X					
<i>Senna ?artemisioides</i> subsp. <i>oligophylla</i>																								
<i>Senna ?sericea</i>																								
<i>Senna artemisioides</i> subsp. <i>helmsii</i>													X		X									
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	X					X					X	X	X	X	X		X	X	X				X	
<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>						X						X												
<i>Senna glutinosa</i>													X											
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>							X		X		X					X			X					X
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>							X		X		X					X			X					

Taxon	Q025	Q026	Q027	Q028	Q029	Q030	Q031	Q032	Q033	Q034	Q035	Q036	Q037	Q038	Q039	Q040	Q041	Q042	Q043	Q044	Q045	Q046	Q047	R001
<i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	X						X		X		X			X	X	X		X						
<i>Senna hamersleyensis</i>																						X		
<i>Senna pleurocarpa</i> var. <i>angustifolia</i>												X												
<i>Senna sericea</i>	X																		X					
<i>Senna</i> sp. Meekatharra (E. Bailey 1-26)														X										
<i>Senna</i> sp. indet												X												
<i>Senna symonii</i>											X					X								
<i>Seringia ?exastia</i>																								
<i>Seringia nephrosperma</i>																							X	
<i>Setaria dielsii</i>																								
<i>Sida ?arenicola</i>														X										
<i>Sida ?fibulifera</i>																						X		
<i>Sida arenicola</i>	X															X			X					
<i>Sida cardiophylla</i>														X			X							
<i>Sida fibulifera</i>												X												
<i>Sida</i> sp. Excedentifolia (J.L. Egan 1925)							X		X									X						X
<i>Sida</i> Articulation below (A.A. Mitchell PRP 1605)																								X
<i>Sida</i> sp. L (A.M. Ashby 4202)				X		X		X				X		X			X						X	
<i>Sida</i> sp. Pilbara (A.A. Mitchell PRP 1543)											X				X									
<i>Sida</i> sp. Supplejack Station (T.S. Henshall 2345)																								
<i>Solanum centrale</i>	X								X		X		X											
<i>Solanum lasiophyllum</i>			X								X			X	X		X		X				X	

Taxon	Q025	Q026	Q027	Q028	Q029	Q030	Q031	Q032	Q033	Q034	Q035	Q036	Q037	Q038	Q039	Q040	Q041	Q042	Q043	Q044	Q045	Q046	Q047	R001
<i>*Sonchus oleraceus</i>																				X				
<i>Sorghum plumosum</i>		X		X		X		X				X		X			X						X	
<i>Stemodia viscosa</i>																								
<i>Streptoglossa</i> sp.														X										
<i>Swainsona kingii</i>								X																
<i>Swainsona leeana</i>																						X		
<i>Tephrosia rosea</i> var. Fortescue creeks (M.I.H. Brooker 2186)		X			X					X										X	X			X
<i>Tephrosia</i> sp. Bungaroo Creek (M.E. Trudgen 11601)																								
<i>Tephrosia</i> sp. Newman (A.A. Mitchell PRP 29)												X												
<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431) (P3)														X										
<i>Themeda triandra</i>		X				X		X		X		X		X		X						X		X
<i>Trachymene oleracea</i>																								X
<i>Tragus australianus</i>					X																			
<i>Trianthema ?pilosum</i>				X																				
<i>Tribulus suberosus</i>							X																	
<i>*Tribulus terrestris</i>								X																
<i>Triodia angusta</i>															X									
<i>Triodia brizoides</i>							X				X					X								
<i>Triodia melvillei</i>																								
<i>Triodia pungens</i>	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X
<i>Triodia vanleeuwenii</i>	X		X						X				X			X	X	X	X					
<i>Triodia wiseana</i>							X		X															

Taxon	Q025	Q026	Q027	Q028	Q029	Q030	Q031	Q032	Q033	Q034	Q035	Q036	Q037	Q038	Q039	Q040	Q041	Q042	Q043	Q044	Q045	Q046	Q047	R001
<i>Triumfetta maconochieana</i>																								
<i>Urochloa subquadriflora</i>												X												
* <i>Vachellia farnesiana</i>					X																			
<i>Vigna</i> sp. Hamersley clay (A.A. Mitchell PRP 113)						X																X		
<i>Vigna</i> sp. indet					X			X																
<i>Vincetoxicum lineare</i>													X		X		X		X					
<i>Waltheria indica</i>										X														
<i>Urochloa subquadriflora</i>								X												X	X			

Appendix E: Summarised Data - Sample Plants



Site Name	Sample Plant	Species	Eastings	Northings	Height (m)	Crown Extent Score	Crown Density Score	Epicormic Growth Score	New Tip Growth Score	Reproduction Growth Score	Leaf Die Off Score	Presence of Mistletoe Score	Bark Condition Score	Comments
Q008	T01	<i>Eucalyptus victrix</i>	771128	7422019	7	4	4	2	3	2	1	1	0	Some insect grazing
Q008	T02	<i>Eucalyptus victrix</i>	771133	7422029	8	4	4	1	3	3	1	1	0	-
Q008	T03	<i>Eucalyptus victrix</i>	771143	7422029	7	4	4	1	3	2	1	1	0	-
Q008	T04	<i>Eucalyptus victrix</i>	771154	7422038	14	3	4	1	3	2	1	1	0	-
Q008	T05	<i>Eucalyptus victrix</i>	771141	7422044	10	3	3	1	3	3	1	1	0	On the cusp of medium and major crown density
Q008	T06	<i>Eucalyptus victrix</i>	771141	7422044	8	4	3	1	3	3	1	1	0	On the cusp of medium and major crown density
Q008	T07	<i>Eucalyptus victrix</i>	771150	7422068	11	4	4	1	3	3	1	1	0	-
Q008	T08	<i>Eucalyptus victrix</i>	771159	7422073	7	4	4	1	3	3	1	1	0	-
Q008	T09	<i>Eucalyptus victrix</i>	771162	7422049	7	3	4	1	3	3	1	1	0	-
Q008	T10	<i>Eucalyptus victrix</i>	771156	7422048	6	4	4	1	3	3	1	1	0	-
Q010	T01	<i>Eucalyptus victrix</i>	768949	7423163	9	4	4	1	3	1	1	1	1	-
Q010	T02	<i>Eucalyptus victrix</i>	768955	7423153	9	4	4	1	3	1	1	1	0	-
Q010	T03	<i>Eucalyptus victrix</i>	768967	7423138	8	4	4	1	3	1	1	1	1	-
Q010	T04	<i>Eucalyptus victrix</i>	768984	7423130	7	4	4	1	3	1	1	1	0	-
Q010	T05	<i>Eucalyptus victrix</i>	768985	7423117	6	4	4	1	3	1	1	1	0	-
Q010	T06	<i>Eucalyptus victrix</i>	769000	7423104	8	4	4	1	3	3	1	1	1	-
Q010	T07	<i>Eucalyptus victrix</i>	769010	7423108	5	4	4	1	3	1	1	1	0	-
Q010	T08	<i>Eucalyptus victrix</i>	769016	7423102	5	4	4	1	3	1	1	1	0	-
Q010	T09	<i>Eucalyptus victrix</i>	769009	7423096	8	4	4	1	3	1	1	1	2	Scar on tree
Q010	T10	<i>Eucalyptus victrix</i>	768984	7423130	5	3	4	1	3	1	1	1	0	-
Q020	T01	<i>Eucalyptus victrix</i>	767266	7423535	5	4	4	1	3	1	1	1	0	-
Q020	T02	<i>Eucalyptus victrix</i>	767271	7423520	6	4	4	1	3	1	1	1	0	Some insect predation on leaves

Site Name	Sample Plant	Species	Eastings	Northings	Height (m)	Crown Extent Score	Crown Density Score	Epicormic Growth Score	New Tip Growth Score	Reproduction Growth Score	Leaf Die Off Score	Presence of Mistletoe Score	Bark Condition Score	Comments
Q020	T03	<i>Eucalyptus victrix</i>	767279	7423516	6	4	4	1	3	1	1	1	0	Some insect predation on leaves
Q020	T04	<i>Eucalyptus victrix</i>	767286	7423522	6	4	4	1	3	1	1	1	0	-
Q020	T05	<i>Eucalyptus victrix</i>	767299	7423507	7	4	4	1	3	1	1	1	0	-
Q020	T06	<i>Eucalyptus victrix</i>	767306	7423496	7	4	4	1	3	1	1	1	0	-
Q020	T07	<i>Eucalyptus victrix</i>	767321	7423479	7	4	4	1	2	1	1	1	0	-
Q020	T08	<i>Eucalyptus victrix</i>	767305	7423485	8	4	3	1	3	1	1	1	0	Heavy insect predation
Q020	T09	<i>Eucalyptus victrix</i>	767325	7423467	6	4	4	1	3	1	1	1	0	Some insect holes on smaller trunk
Q020	T10	<i>Eucalyptus victrix</i>	767339	7423472	9	3	4	1	2	1	1	1	3	Scar on trunk
Q026	T01	<i>Eucalyptus victrix</i>	769443	7422262	7	4	4	1	3	1	1	1	0	-
Q026	T02	<i>Eucalyptus victrix</i>	769454	7422256	7	4	4	1	3	1	1	1	0	-
Q026	T03	<i>Eucalyptus victrix</i>	769467	7422250	7	4	4	1	2	1	1	1	0	-
Q026	T04	<i>Eucalyptus victrix</i>	769480	7422267	5	4	4	1	3	1	1	1	0	-
Q026	T05	<i>Eucalyptus victrix</i>	769485	7422263	6	4	4	2	3	1	1	1	0	On the lower end of major for crown cover
Q026	T06	<i>Eucalyptus victrix</i>	769492	7422245	6	4	3	1	3	1	1	1	0	-
Q026	T07	<i>Eucalyptus victrix</i>	769495	7422236	4	4	4	1	3	1	1	1	0	-
Q026	T08	<i>Eucalyptus victrix</i>	769505	7422259	5	4	4	1	3	1	1	1	0	-
Q026	T09	<i>Eucalyptus victrix</i>	769513	7422253	7	4	4	1	2	1	1	1	0	Crown extent 80%
Q026	T10	<i>Eucalyptus victrix</i>	769526	7422253	9	4	4	1	3	1	1	1	0	-
Q029	T01	<i>Eucalyptus victrix</i>	770904	7420351	14	3	4	1	3	3	1	1	0	-
Q029	T02	<i>Eucalyptus victrix</i>	770909	7420352	13	3	3	2	2	3	1	1	2	Tree is hollowed out at base
Q029	T03	<i>Eucalyptus victrix</i>	770914	7420357	15	4	4	2	3	3	1	1	1	-
Q029	T04	<i>Eucalyptus victrix</i>	770925	7420360	14	3	4	2	3	3	1	1	1	-

Site Name	Sample Plant	Species	Eastings	Northings	Height (m)	Crown Extent Score	Crown Density Score	Epicormic Growth Score	New Tip Growth Score	Reproduction Growth Score	Leaf Die Off Score	Presence of Mistletoe Score	Bark Condition Score	Comments
Q029	T05	<i>Eucalyptus victrix</i>	770933	7420366	11	3	4	1	3	2	1	1	0	Crown density on lower threshold of major
Q029	T06	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>	770951	7420377	15	4	4	2	3	3	1	1	0	-
Q029	T07	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>	770970	7420389	15	4	4	2	3	3	1	1	0	-
Q029	T08	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>	771005	7420413	15	4	4	2	3	3	1	1	1	-
Q029	T09	<i>Eucalyptus victrix</i>	771022	7420406	14	4	4	1	3	3	1	1	0	-
Q029	T10	<i>Eucalyptus victrix</i>	770920	7420359	7	4	4	1	3	1	1	1	0	-
Q034	T01	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>	767638	7420258	6	4	4	2	3	1	1	1	0	-
Q034	T02	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>	767642	7420263	8	4	4	1	3	3	1	1	0	-
Q034	T03	<i>Eucalyptus victrix</i>	767641	7420283	4.5	4	4	1	2	1	1	1	1	-
Q034	T04	<i>Eucalyptus victrix</i>	767625	7420282	14	4	4	2	2	2	1	1	0	-
Q034	T05	<i>Eucalyptus victrix</i>	767638	7420301	13	3	4	1	2	2	1	1	0	-
Q034	T06	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>	767620	7420300	8	4	4	2	3	1	1	1	0	-
Q034	T07	<i>Eucalyptus victrix</i>	767622	7420308	6	4	4	3	2	1	1	1	0	-
Q034	T08	<i>Eucalyptus victrix</i>	767638	7420343	11	4	4	1	2	2	1	1	2	Lower end of major canopy cover
Q034	T09	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>	767629	7420355	7	4	4	2	3	2	1	1	2	-
Q034	T10	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>	767641	7420372	8	4	4	1	3	3	1	1	0	-
Q044	T01	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>	769332	7420186	9	4	4	1	3	3	1	1	1	-
Q044	T02	<i>Eucalyptus victrix</i>	769339	7420188	6	4	4	1	3	1	1	1	0	-

Site Name	Sample Plant	Species	Eastings	Northings	Height (m)	Crown Extent Score	Crown Density Score	Epicormic Growth Score	New Tip Growth Score	Reproduction Growth Score	Leaf Die Off Score	Presence of Mistletoe Score	Bark Condition Score	Comments
Q044	T03	<i>Eucalyptus victrix</i>	769363	7420199	6	4	4	1	3	1	1	1	0	-
Q044	T04	<i>Eucalyptus victrix</i>	769371	7420209	14	4	4	1	3	2	1	1	1	-
Q044	T05	<i>Eucalyptus camaldulensis</i> subsp. <i>obtus</i>	769400	7420226	10	4	4	1	3	3	1	1	0	-
Q044	T06	<i>Eucalyptus victrix</i>	769396	7420238	12	3	4	1	2	1	1	1	0	-
Q044	T07	<i>Eucalyptus victrix</i>	769431	7420243	13	3	4	1	1	1	1	1	3	-
Q044	T08	<i>Eucalyptus camaldulensis</i> subsp. <i>obtus</i>	769465	7420264	7	4	4	1	3	3	1	1	0	-
Q044	T09	<i>Eucalyptus victrix</i>	769445	7420248	11	4	4	1	1	1	1	1	1	-
Q044	T10	<i>Eucalyptus camaldulensis</i> subsp. <i>obtus</i>	769412	7420231	9	4	4	1	3	3	1	1	0	-
Q045	T01	<i>Eucalyptus camaldulensis</i> subsp. <i>obtus</i>	765927	7420063	8	4	4	2	3	3	1	1	0	-
Q045	T02	<i>Eucalyptus victrix</i>	765938	7420039	8	4	4	1	3	1	1	1	0	-
Q045	T03	<i>Eucalyptus victrix</i>	765950	7420066	9	4	4	1	3	2	1	1	2	Canopy lower end of major
Q045	T04	<i>Eucalyptus victrix</i>	765977	7420063	11	3	4	1	2	2	1	1	2	-
Q045	T05	<i>Eucalyptus victrix</i>	765978	7420041	7	4	4	1	3	2	1	1	0	-
Q045	T06	<i>Eucalyptus camaldulensis</i> subsp. <i>obtus</i>	766000	7420036	10	4	4	1	3	3	1	1	0	-
Q045	T07	<i>Eucalyptus camaldulensis</i> subsp. <i>obtus</i>	765993	7420061	9	4	4	1	3	3	1	1	0	-
Q045	T08	<i>Eucalyptus camaldulensis</i> subsp. <i>obtus</i>	766030	7420037	14	4	4	1	3	3	1	1	0	Multiple stems
Q045	T09	<i>Eucalyptus camaldulensis</i> subsp. <i>obtus</i>	766031	7420038	14	4	4	1	3	3	1	1	0	Multiple stems
Q045	T10	<i>Eucalyptus victrix</i>	766046	7420049	12	3	4	1	2	2	1	1	2	Chunk of bark missing at base

