



Shearers West
Detailed Flora and Vegetation Survey

Prepared for BHP Western Australia Iron Ore
2 November 2018



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EXECUTIVE SUMMARY

Onshore Environmental Consultants Pty Ltd (Onshore Environmental) was commissioned by BHP Western Australia Iron Ore Pty Ltd (BHP WAIO) to undertake a single season detailed flora and vegetation survey of the Shearers West tenement, herein referred to as the study area. The study area is located immediately south of the Jimblebar (Wheellarra Hill) mine, approximately 42 km east of Newman and covers approximately 15 km².

The field survey was conducted between the 7th and 13th of May 2018 and recorded 264 plant taxa (including varieties and subspecies) from 38 families and 110 genera. Species representation was greatest among the Poaceae (58 taxa), Fabaceae (49 taxa), Malvaceae (31 taxa), Chenopodiaceae (23 taxa) and Amaranthaceae (11 taxa) families, with *Acacia* (26 taxa) the most speciose genus, followed by *Sida* (13 taxa), *Senna* (10 taxa), *Eremophila* and *Triodia* (8 taxa each).

There were no plant taxa gazetted as Threatened Flora pursuant to subsection (2) of section 23F of the *Wildlife Conservation Act 1950* (WC Act), or listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) recorded from the study area. Additionally, no Priority listed flora were recorded from the study area. Two of the taxa recorded were identified as range extensions; *Euphorbia multifaria* and *Ipomoea coptica*.

A total of 18 vegetation associations, classified into nine broad floristic formations, were described and mapped within the study area. None of the vegetation associations within the study area had any affiliation with Federal or State listed Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs).

Six introduced (weed) species were recorded from the study area, none of which are listed as a Declared Pest under the *Biosecurity and Agriculture Management Act 2007* (BAM Act). The condition of vegetation ranged from very good to completely degraded with hills generally in better condition than areas of lower relief. The major disturbances throughout the study area were related to grazing by domestic cattle and the introduction of weeds, particularly the establishment of **Cenchrus ciliaris* (Buffel Grass).

TABLE OF CONTENTS

EXECUTIVE SUMMARY	ii
1.0 INTRODUCTION	1
1.1 Preamble	1
1.2 Previous Biological Surveys	1
1.3 Climate	3
1.4 Biogeographic Regions	4
1.5 Existing Land Use	4
1.6 Soils	4
1.7 Geology	4
1.8 Regional Vegetation	7
1.9 Land Systems	9
2.0 METHODOLOGY	9
2.1 Legislation and Guidance Statements	9
2.2 Desktop Assessment	9
2.2.1 Literature Review.....	9
2.2.2 Database Searches	9
2.2.3 Assessment of Likelihood of Occurrence in the Study Area.....	9
2.3 Baseline Survey Methodology	10
2.3.1 Timing and Personnel.....	10
2.3.2 Sampling of Study Sites.....	10
2.3.3 Targeted Surveys for Conservation Significant Species.....	11
2.3.4 Weed Survey and Mapping	11
2.3.5 Vegetation Association Mapping	13
2.3.6 Vegetation Association Coding.....	13
2.3.7 Vouchering.....	13
2.3.8 Field Survey Constraints.....	13
2.3.9 Assessment of Conservation Significance.....	14
3.0 RESULTS	15
3.1 Desktop Assessment	15
3.1.1 Previous Flora and Vegetation Surveys	15
3.1.2 Threatened Flora listed under the EPBC Act.....	15
3.1.3 Threatened Flora listed under the IUCN Red List database.....	15
3.1.4 Threatened Flora listed under the WA Wildlife Conservation (Rare Flora) Notice	16
3.1.5 Priority Flora recognised by the DBCA	16
3.1.6 Threatened Ecological Communities (TECs).....	19
3.1.7 Priority Ecological Communities (PECs).....	19
3.2 Flora Species	19
3.3 Significant Flora	20
3.3.1 Threatened Flora listed under the WC Act and EPBC Act	20
3.3.2 Significant Flora	20
3.3.3 Range Extensions.....	20
3.4 Introduced Flora	22
3.5 Threatened Ecological Communities	27
3.6 Priority Ecological Communities	27
3.7 Vegetation	27
3.8 Vegetation Condition	50
4.0 SUMMARY	52
5.0 STUDY TEAM	53

6.0	REFERENCES.....	54
APPENDIX 1.....	Summary of background and results for previous flora and vegetation surveys.....	59
	Summary of background and results for previous flora and vegetation surveys.....	59
APPENDIX 2.....	Vegetation condition scale (as developed by Keighery 1994)	73
	Vegetation condition scale (as developed by Keighery 1994)	73
APPENDIX 3.....	Vegetation Classifications for the Pilbara based on Specht (1970), as modified by Aplin (1979) and Trudgen (2002).....	75
	Vegetation Classifications for the Pilbara based on Specht (1970), as modified by Aplin (1979) and Trudgen (2002).....	75
APPENDIX 4.....	Conservation categories for flora described under the EPBC Act	77
	Conservation categories for flora described under the EPBC Act	77
APPENDIX 5.....	Conservation Codes for Western Australian Flora	79
	Conservation Codes for Western Australian Flora	79
APPENDIX 6.....	Total flora list from the study area	81
	Total flora list from the study area	81
APPENDIX 7.....	Records for introduced species recorded from the study area	89
	Records for introduced species recorded from the study area	89
APPENDIX 8.....	Site sheets summarising raw data for quadrats within the study area and adjacent drainageline.....	91
	Site sheets summarising raw data for quadrats within the study area and adjacent drainageline.....	91

LIST OF TABLES

Table 1	Pre-European extent of vegetation associations occurring within the study area (Shepherd et al. 2002).	7
Table 2	Land systems occurring within the study area (descriptions from Van Vreeswyk et al. 2004).	7
Table 3	Ranking system used to assign the likelihood that a species would occur in the study area.	10
Table 4	Relevance of constraints, as identified by EPA (2016b), to the flora and vegetation survey.	13
Table 5	Significant flora taxa recorded in or around the survey area from the federal and state database searches, literature review and local knowledge. Refer Table 3 for ranking determination of likelihood of occurring within the study area.	17
Table 6	Statistics for total flora recorded from the study area.	19
Table 7	Introduced weed species recorded from the study area.....	24
Table 8	Vegetation descriptions for 18 vegetation associations mapped within the study area.	28

LIST OF FIGURES

Figure 1	Study area location.	2
Figure 2	Climatic data recorded from Newman Airport, with long term monthly rainfall compared against monthly rainfall for 2017 and January-April 2018 (BoM 2018).	3
Figure 3	Geology within the study area.	6
Figure 4	Beard (1975) vegetation complexes within the study area.	8
Figure 5	Land systems occurring within the study area (descriptions from Van Vreeswyk et al. 2004).	8
Figure 6	Vegetation sample locations within the study area.....	12
Figure 7	Range extension species within the study area.	21
Figure 8	Introduced flora species within the study area.	23
Figure 9	Vegetation types for the study area.	30
Figure 10	Vegetation condition within the study area	51

1.0 INTRODUCTION

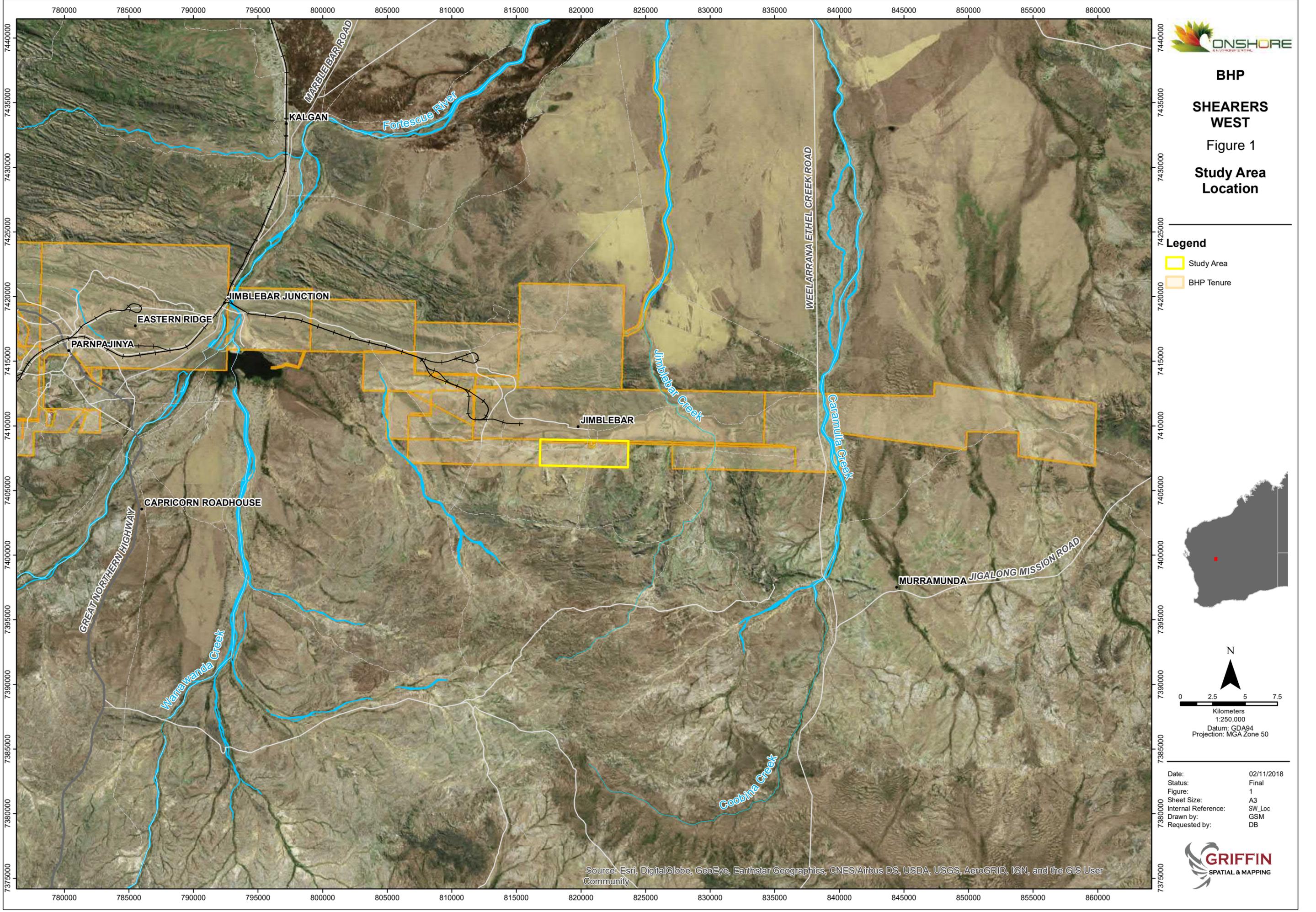
1.1 Preamble

Onshore Environmental was commissioned by BHP WAIO to undertake a single season detailed flora and vegetation survey within the Shearers West tenement, hereafter referred to as the study area. The study area is situated immediately south of BHP WAIO's Jimblebar (Wheellarra Hill) mine and approximately 42 km east of Newman in the Pilbara region of Western Australia (Figure 1). The tenement covers an area of approximately 15 km².

1.2 Previous Biological Surveys

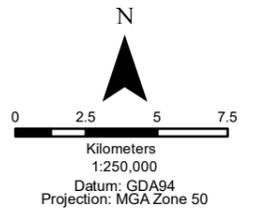
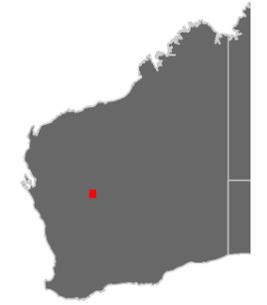
There are 56 flora and vegetation surveys that have previously been completed in close proximity (within a 25 km radius) to the study area. These surveys include three desktop assessments, 13 targeted surveys, four reconnaissance surveys (previously referred to as Level 1 surveys), and 36 detailed surveys (previously referred to as Level 2 surveys). These surveys are described in Appendix 1.

None of the previous surveys have been completed within the boundary of the study area, with the exception of a desktop assessment completed by Onshore Environmental in 2017 (Onshore Environmental 2017). There are two previous surveys that adjoin the boundary of the study area; one situated immediately west of the study area and covering BHP WAIO's South West Jimblebar study area (Syrinx Environmental 2012a), and a second situated immediately north of the study area and covering the Jimblebar (Wheellarra Hill) mine (Outback Ecology 2010). Vegetation mapping from the Outback Ecology (2010) survey extended across the northern sector of the study area; however, no formal study sites were assessed within the study area during the survey.



BHP
SHEARERS WEST
 Figure 1
Study Area Location

- Legend**
- Study Area
 - BHP Tenure



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 Status: Final
 Figure: 1
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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

1.3 Climate

The study area is located in the far south-eastern corner of the Pilbara region in Western Australia. The Pilbara region has an arid to tropical climate with two distinct seasons; a hot summer from October to April, and a mild winter from May to September. The majority of annual rainfall is received during the hot summer months, typically associated with cyclonic activity and thunderstorms, with falls being of higher intensity and shorter duration contributing to an erratic annual range (Sudmeyer 2016).

The nearest BoM weather station is Newman Aero, located approximately 30 km east of the study area. Annual rainfall for Newman ranges from 36 mm to over 619 mm, with a long-term average of 332 mm occurring over 30 rain days (Bureau of Meteorology [BOM] 2018). Most of the annual precipitation occurs during the four summer months from December to March. The average maximum summer temperature ranges between 38°C and 40°C, while winter maximum temperatures range from 28°C to 30.5°C (BOM 2018).

The field survey was undertaken in May 2018 and seasonal conditions were rated as *poor*. Rainfall for 2017 was well above average with an annual total of 519 mm. However, the majority of this rainfall fell early in the year with November and December both recording below average falls. Rainfall for January 2018 was slightly higher than average at 84.2 mm. However, rainfall for February to April was below average (Figure 2, BOM 2018).

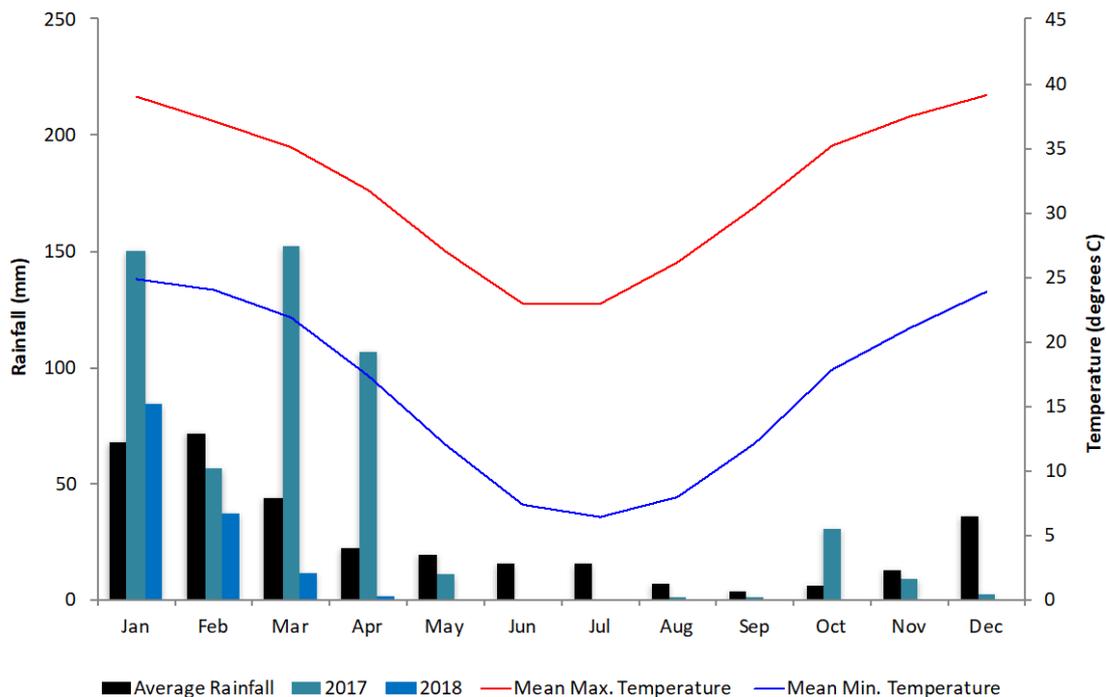


Figure 2 Climatic data recorded from Newman Airport, with long term monthly rainfall compared against monthly rainfall for 2017 and January-April 2018 (BoM 2018).

1.4 Biogeographic Regions

The Interim Biogeographic Regionalisation for Australia (IBRA7) divides Australia into 89 bioregions and 419 subregions based on climate, geology, landform, native vegetation and species information (Department of the Environment and Energy [DoEE] 2018a). The study area is located primarily within the Augustus (GAS3) subregion of the Gascoyne bioregion and partially within the Hamersley (PIL3) and Fortescue (PIL2) subregions of the Pilbara bioregion.

The Augustus subregion is described as rugged low Proterozoic sedimentary and granite ranges divided by broad flat valleys. The vegetation on rises consists of Mulga woodland and *Triodia* on shallow stony loams. The hardpan plains of the sub-region are dominated by Mulga parkland with shallow earthy loams (Desmond *et al.* 2001).

The Hamersley subregion is characterised by mountain ranges and plateaux of Proterozoic sedimentary rock, dissected by gorges. The vegetation is characterised by Mulga low woodland over bunch grasses on fine textured soils in valley floors, and Snappy Gum (*Eucalyptus leucophloia*) over *Triodia brizoides* on skeletal soils of the ranges (Kendrick 2001a).

The Fortescue subregion is dominated by alluvial plains and river frontage with extensive salt marsh, mulga-bunch grass, and short grass communities on alluvial plains in the east. Deeply incised gorge systems occur in the western (lower) part of the drainage. Drainage lines are fringed by river gum woodlands (Kendrick 2001b).

1.5 Existing Land Use

Land tenure throughout the Augustus, Hamersley and Fortescue subregions consists of aboriginal lands and leasehold reserves, national parks and reserves, and Crown land which falls under a range of pastoral and mining leases. The dominant land uses in the Pilbara and Gascoyne are pastoralism (cattle grazing), exploration and mining, conservation (and associated tourism), unallocated Crown land, Crown reserves and urban areas (Kendrick 2001a, Kendrick 2001b, Desmond *et al.* 2001).

1.6 Soils

Tille (2006) classified the most recent and detailed mapping of Western Australia's Rangelands and Arid Interior into a hierarchy of soil-landscape mapping units. The study area is located within the following soil unit:

- Hamersley Plateaux Zone: located in the Fortescue Province and described as having stony soils with red shallow loams and some red/brown non-cracking clays and red loamy earths.
- Bulloo Plains and Hills Zone: located in the Ashburton Province and described as having red shallow loams (often with hardpans), red loamy earths, stony soils and red deep sands with some red shallow sands.

1.7 Geology

The ancient continental Western Shield dominates the geology of Western Australia. The Pilbara region makes up a portion of the Western Shield and consists of pre-Cambrian, Proterozoic and Archaean rocks. Important mineral reserves, including iron ore, which is prevalent in the Pilbara, are associated with these rock formations.

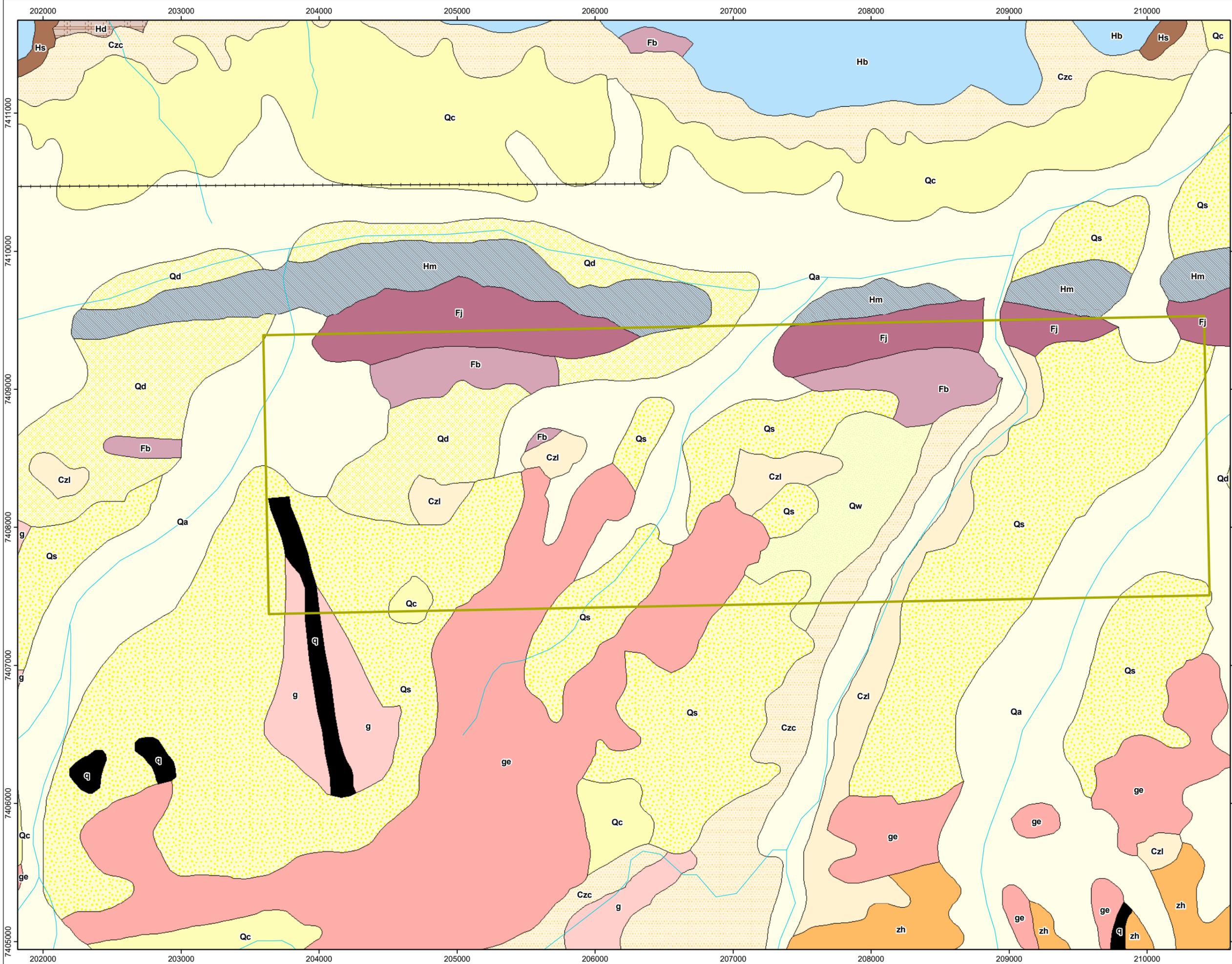
The Pilbara Craton lies beneath the Proterozoic rocks of the Hamersley and Bangemall Basins. The Hamersley Basin covers the majority of the southern part of the Pilbara Craton and is separated into three stratigraphic groups; the Fortescue, Hamersley and Turee Creek rock groups.

The Hamersley Group is the most relevant to the study area as it contains both the Brockman Iron Formation and the Marra Mamba Iron Formation, which together provide most of the major iron ore deposits in the Pilbara (O'Brien and Associates 1992). This group forms the Hamersley Range and Plateau and consists of jaspilite and dolomite. The jaspilite produces deposits of haematite and limonite, which are mined for iron ore.

The surface geology of the study area is dominated by the following geological formations (Williams and Tyler 1991) (Figure 3):

- Fj: Jeerinah Formation: interbedded shale, chert, sandstone, minor felsic tuff;
- Fb: Jeerinah Formation: mafic volcanic unit: metabasaltic to meta-andesitic lava interlayered with minor tuffaceous units;
- Cz1: Laterite: massive and pisolitic ferruginous duricrust, in places contains relict structures of parent rock;
- Czc: Colluvium: partly consolidated quartz and rock fragments in silt and sand matrix; old valley-fill deposits;
- Hm: Marra Mamba Iron Formation: chert, ferruginous chert, minor shale;
- ge: medium, even-grained metagranite to metagranodiorite;
- g: granitoid rocks, undifferentiated and deeply weathered;
- q: quartz;
- Qa: Alluvium: clay, silt, sand, gravel; in drainage channels and adjacent flood plains;
- Qc: Colluvium and Minor Alluvium: quartz, and rock fragments in loam, unconsolidated, grades in to Qz;
- Qd: Lacustrine: clay and silt, claypan deposits;
- Qs: Eolian sand: in sheets and longitudinal (seif), chain and net dunes; and
- Qw: Colluvium and alluvium: clay, silt, sand, gravel in broad sheet wash areas; distinctive vegetation striped photo- pattern.

**Shearers West
Figure 3
Geology**



Legend

Study Area
Surrounding Geology - 250k

- Qa
- Qd
- Qs
- Qw
- Qc
- Czc
- Czl
- q
- Hb
- Hs
- Hd
- Hm
- Fj
- Fb
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1.8 Regional Vegetation

The study area is located within the Fortescue and Kumarina Hills Botanical Districts, which are part of the Eremaean Province (Beard 1990). Vegetation within the study area (Figure 4) is classified as the following vegetation associations, as mapped by Beard (1975) and later refined by Shepherd *et al.* (2002):

- 82: Hummock grasslands, low tree steppe; Snappy gum over *Triodia wiseana*; and
- 216: Low woodland; mulga (with spinifex) on rises.

Vegetation types 82 and 216 have a large distribution, especially within the Pilbara bioregion (Table 1). Vegetation type 82 has nine percent of its area situated within conservation reserves and is determined to be of medium conservation priority. Vegetation type 216 has no area represented in conservation reserves and hence is determined to be of high conservation. Both vegetation types exist at close to 100 percent of their pre-European extent within the relevant subregions (Table 1).

Table 1 Pre-European extent of vegetation associations occurring within the study area (Shepherd et al. 2002).

Vegetation Association	Description	Pre-Euro. Extent Remaining (ha)	Remaining area (ha) in IUCN Class I-IV Reserves	% remaining Other Reserves	% remaining DBCA Managed PL
82	Hummock grasslands, low tree steppe; Snappy gum over <i>Triodia wiseana</i>	2,290,910 (100%)	8.9	0.2	1.0
216	Low woodland; mulga (with spinifex) on rises	298,549 (100%)	0.0	0.0	0.0



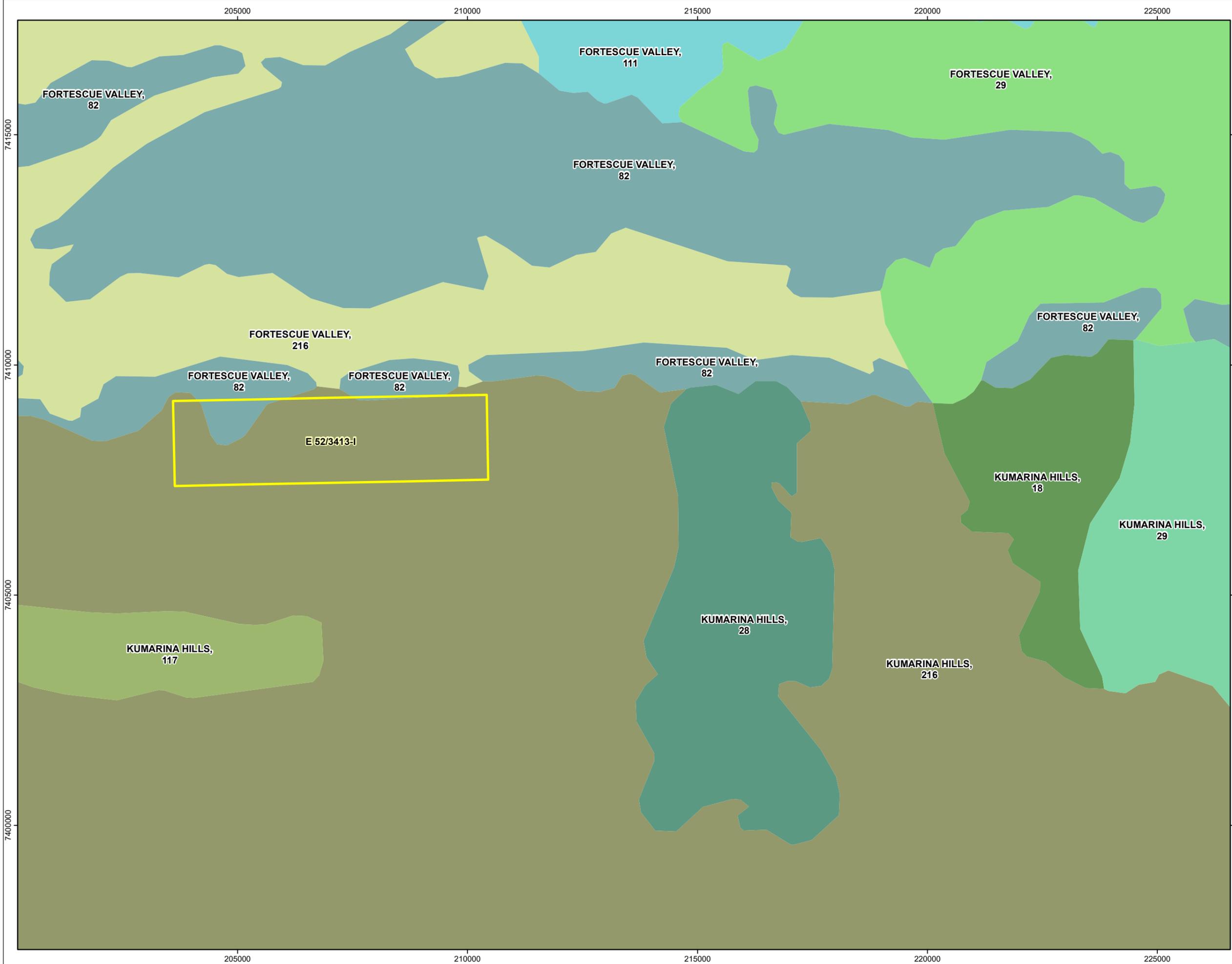
Shearers West

Figure 4

Beard (1975) vegetation complexes within the study area

Legend

- Study Area
- Pre-European Vegetation (Beard 1975)**
- FORTESCUE VALLEY, 111
- FORTESCUE VALLEY, 216
- FORTESCUE VALLEY, 29
- FORTESCUE VALLEY, 82
- KUMARINA HILLS, 117
- KUMARINA HILLS, 18
- KUMARINA HILLS, 216
- KUMARINA HILLS, 28
- KUMARINA HILLS, 29



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1.9 Land Systems

The Department of Agriculture (now the Department of Primary Industries and Regional Development) conducted inventory and condition surveys of the Pilbara (van Vreeswyk *et al.* 2004) using an integrated survey method involving the land system approach to rangeland description evaluation. The primary objective of the surveys was to provide comprehensive descriptions and mapping of the biophysical resources of the region, as well as an evaluation on the condition of soils and vegetation.

A total of 102 land systems were defined in the Pilbara at a scale of 1: 250,000 (van Vreeswyk *et al.* 2004), seven of which occur within the study area (Table 2, Figure 5).

The Jamindie land system is characterised by stony hardpan plains and rises. It is common in eastern parts of the bioregion covering 1.1 percent of the Pilbara. The dominant land unit of the Jamindie land system is hardpan plains.

The Laterite land system consists of laterite mesas surrounded by gravelly rises and plains. It is restricted to the south east of the Pilbara representing 0.2 percent of the bioregion. The most common land units are flat to gently inclined gravelly plains and mesas and low hills.

The McKay land system is characterised by hills, ridges, plateaux remnants and breakaways. It has a wide distribution but is very common in the south of the Pilbara bioregion. It represents 2.3 percent of the Pilbara bioregion. The major land unit consists of rounded hills and ridge crests, level to gently inclined plateau surfaces and moderately inclined to very steep upper slopes.

The Newman land system comprises rugged jaspilite plateaux, ridges and mountains of the Hamersley Range. This land system is very common in the southern half of the Pilbara representing eight percent of the bioregion. The dominant land unit comprises plateaux, ridges, mountains and hills with relief up to 400 m.

The Prairie land system is restricted to the south-eastern sector of the Pilbara and consists of gently undulating stony plains and granite hills. It represents 0.7 percent of the Pilbara bioregion. The dominant land units are hills and gritty surfaced plains and interfluves.

The Sylvania land system is characterised by gritty surfaced plains and low rises on granite. It is restricted to the south-eastern sector of the Pilbara and represents 0.6 percent of the bioregion.

A very small section of the Divide land system occurs in the northern sector of the study area. This land system consists of sandplains and occasional dunes supporting shrubby hard spinifex grasslands.

Table 1 Land systems occurring within the study area (descriptions from Van Vreeswyk *et al.* 2004).

Land System	Description	Distribution in the Pilbara	Area in Pilbara (km ²)	Portion of Pilbara (%)	Area in study area (km ²)	Portion of study area (%)	% study area in land system
Divide	Sandplains and occasional dunes supporting shrubby hard spinifex grasslands.	Mainly south-east, common	5,293	2.9	0.004	0.03	0.00
Jamindie	Stony hardpan plains and rises supporting groved mulga shrublands, occasionally with spinifex understory.	East, common	2,074	1.1	0.700	5.57	0.03
Laterite	Laterite mesas and gravelly rises and plains supporting mulga shrublands.	South-east, common	355	0.2	1.210	9.63	0.34
McKay	Hills, ridges, plateaux remnants and breakaways of meta sedimentary and sedimentary rocks supporting hard spinifex grasslands.	Wide, common Southern half, very common	4,202	2.3	1.770	14.07	0.04
Newman	Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands.	Southern half, very common	14,580	8.0	0.120	0.99	0.00
Prairie	Gently undulating stony plains and granite hills supporting acacia-eremophila-cassia shrublands and minor soft spinifex grasslands.	South-east, common	1,221	0.7	1.800	14.32	0.15
Sylvania	Gritty surfaced plains and low rises on granite supporting acacia-eremophila-cassia shrublands.	South-east, common	1,077	0.6	6.980	55.38	0.65

2.0 METHODOLOGY

2.1 Legislation and Guidance Statements

The flora and vegetation survey was carried out in a manner that was compliant with Environmental Protection Authority (EPA) requirements for the environmental surveying and reporting of flora and vegetation in Western Australia:

- Statement of Environmental Principles, Factors and Objectives (EPA 2016a);
- Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016b); and
- Environmental Factor Guideline Flora and Vegetation (EPA 2016c).

The survey was also conducted in accordance with BHP WAIO's Vegetation and Flora Survey Procedure (BHP WAIO 2018).

2.2 Desktop Assessment

2.2.1 Literature Review

A comprehensive literature review of surveys previously completed within or in close proximity to the study area was completed. At least 56 flora and vegetation have been completed at BHP WAIO tenements within a 25 km radius of the study area.

2.2.2 Database Searches

Database searches included databases relating to significant flora, TECs and PECs previously collected or described within, or in close proximity to, the study area. For this report the search was extended beyond the study area to place flora values into a local and regional context.

Three database searches were completed for information relating to significant flora previously collected or described within, or in close proximity to the study area (Department of Biodiversity, Conservation and Attractions [DBCA] 2018a):

- The DBCA Threatened Flora Database;
- The DBCA Threatened and Priority Flora List; and
- The Western Australian Herbarium Specimen Database for Priority flora species opportunistically collected in the search area.

A separate database search was completed with the Species and Community Branch of DBCA for significant vegetation communities including TECs, PECs and Environmentally Sensitive Areas (ESAs) (DBCA 2018b).

The database searches extended beyond the immediate survey limits to place flora and vegetation values in a local and regional context. A search was conducted using a 50 km radius around the central point of the study area; 206976 E 7408048 N (Zone 51 GDA94).

A search of the EPBC Act Protected Matters database was undertaken (DoEE 2018b), as well as a search of the International Union for Conservation of Nature (IUCN) database (IUCN 2018) and NatureMap (DBCA 2018c).

2.2.3 Assessment of Likelihood of Occurrence in the Study Area

A list of conservation significant species occurring within a 50 km radius of the study area was compiled during the literature review and desktop searches. The likelihood of each

taxon occurring within the study area was assessed using a set of rankings and criteria (as described in Table 3). The criteria are based on presence of suitable landform (inferred from aerial imagery with contours overlaid, and knowledge of the adjacent areas) and distance to known records.

Table 3 Ranking system used to assign the likelihood that a species would occur in the study area.

Rank	Criteria
Recorded	The species has been recorded in the study area.
Likely to occur	The species has previously been recorded from a landform which is present within the study area, and there are previous records within a 20 km radius of the study area.
Possible to occur	The species has previously been recorded from a landform which is present within the study area, and there are previous records within a 50 km radius of the study area.
Unlikely to occur	The landform from which the species has previously been recorded is absent within the study area, and/or there are no previous records within a 50 km radius of the study area.

2.3 Baseline Survey Methodology

2.3.1 Timing and Personnel

The flora and vegetation survey was completed by Principal Botanist Dr Jerome Bull and Senior Botanist Ms Jessica Waters working over a seven-day period between the 7th and 13th of May 2018.

2.3.2 Sampling of Study Sites

The field survey involved systematic sampling using quadrats (referred to as study sites). Relevé vegetation descriptions were made to increase the accuracy of vegetation mapping and targeted searches were completed in habitats where it was anticipated that significant flora might occur.

A total of 49 study sites (50 m x 50 m quadrats) were assessed during the survey within the study area, and also included sampling of the adjacent drainage line (Figure 6).

The study sites were assessed to provide a list of the total flora occurring within the study area and a description of the vegetation structure. Data collected covered a range of environmental parameters including:

- Landform and habitat;
- Aspect;
- Soil colour and soil type;
- Rock type;
- Slope (angle);
- Vegetation condition;
- Disturbance (caused by fire, clearing, grazing etc.);
- Age since fire;
- Broad floristic formation;
- Vegetation association description; and
- Height, number of plants and percentage ground cover provided by conservation significant and introduced plant taxa.

Other parameters recorded for each study site were:

- Study site number and date of assessment;
- Names of the botanists undertaking the assessment;
- Location description a waypoint - GPS coordinate (GDA94) using a handheld GPS; and
- Photograph number.

Vegetation condition for each of the study sites was determined using a recognised rating scale (based on Keighery 1994, see Appendix 2).

2.3.3 Targeted Surveys for Conservation Significant Species

Targeted searches were conducted for flora of conservation significance across the study area. Ground truthing provided an opportunity to record opportunistic locations for Threatened and Priority listed flora and undertake closer examination of specific landforms where conservation significant flora may be expected to occur.

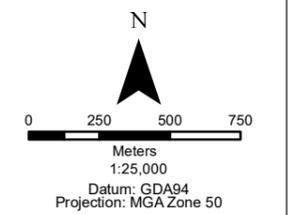
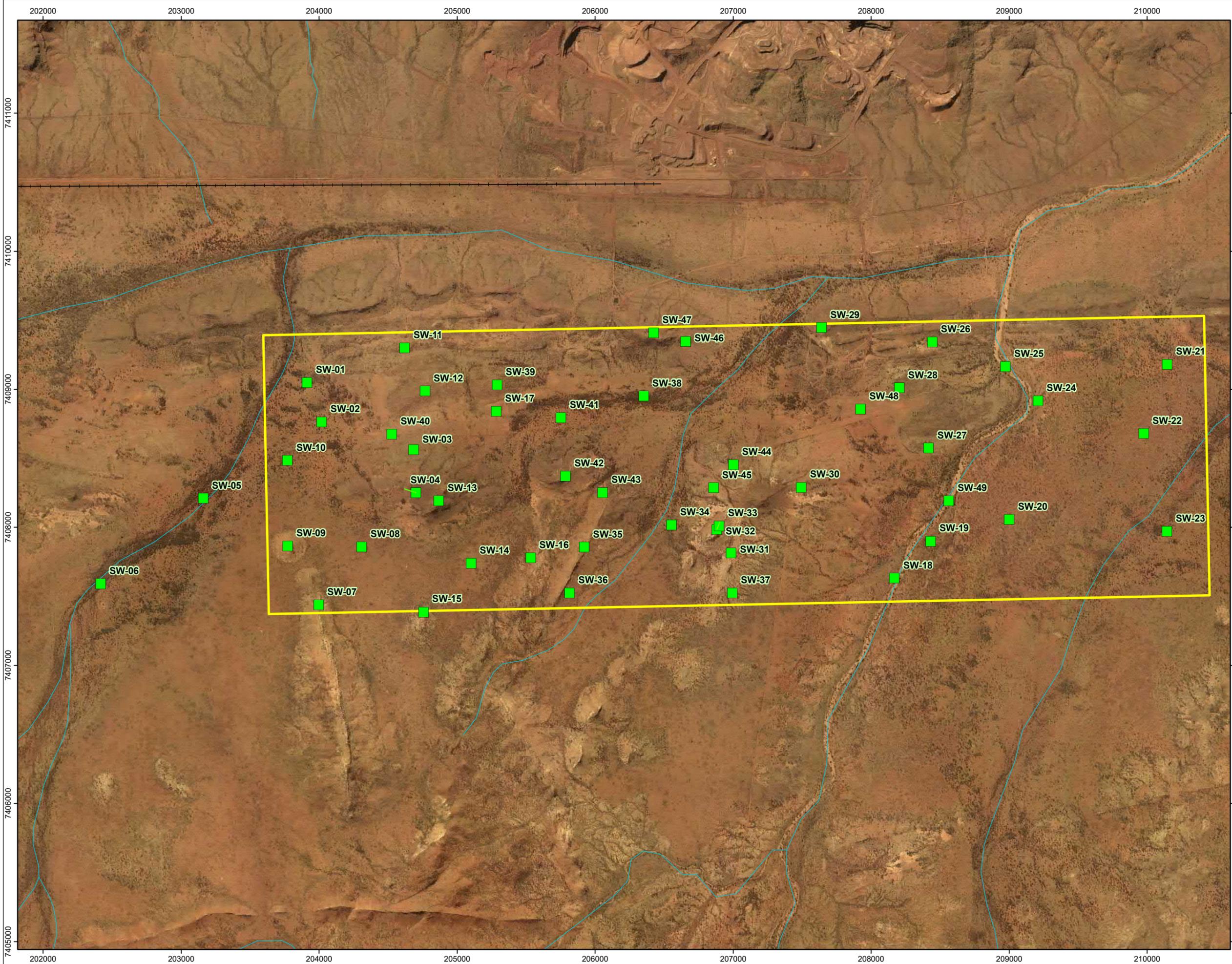
2.3.4 Weed Survey and Mapping

Introduced flora (weed) species were recorded from the 49 study sites assessed within the study area. Opportunistic collections were also made while moving around the study area, with targeted weed searches completed in high moisture habitats of the drainage channels.

Shearers West Figure 6 Vegetation Sample Locations

Legend

-  Study Area
-  Sample Locations



Date: 02/11/2018
Status: Final
Figure: 6
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2.3.5 Vegetation Association Mapping

The vegetation mapping utilised high-resolution aerial photography of the entire study area at a scale of 1:20,000, with definition of vegetation polygons based on contrasting shading patterns. Ground-truthing of the study area was completed during the survey with vegetation descriptions made within selected vegetation polygons to confirm dominant structural layers and associated plant taxa.

The location of the study sites and relevé plots were overlaid on the aerial photography, and associated flora and vegetation data was used to provide vegetation association descriptions for individual polygons defined. Description of vegetation structure follows the height, life form and density classes of Specht (1970) as modified by Aplin (1979) and Trudgen (2002) (see Appendix 3). This is largely a structural classification suitable for broader scale mapping, but taking all ecologically significant strata into account.

2.3.6 Vegetation Association Coding

A vegetation association code was applied to each vegetation association. This code is comprised of the dominate landform on which the vegetation association occurs and the dominant plant taxa in each vegetation stratum.

2.3.7 Vouchering

At least one voucher specimen was taken for each species collected to verify identification. Taxonomy was completed by Dr Jerome Bull, with selected voucher specimens provided to the specialist botanists within the Western Australian Herbarium (WAH) for further study were required. Use was made of the WAH for confirmation of species identification.

2.3.8 Field Survey Constraints

The EPA Technical Guidance (EPA 2016b) list seven potential limitations that field surveys may encounter. These limitations are addressed in Table 4. There were no survey-specific limitations for this survey.

Table 4 **Relevance of constraints, as identified by EPA (2016b), to the flora and vegetation survey.**

Constraint	Relevance
Availability of contextual information at a regional and local scale	There has been no previous survey work completed within the study area. However, there has been high intensity sampling from numerous neighbouring tenements, with at least 56 previous flora and vegetation surveys having been undertaken within a 25 km radius of the study area, providing an extensive local database. This is confirmed by the intensity of records for the local area on FloraBase.
Proportion of flora recorded and/or collected, any identification issues	A large proportion of the perennial flora occurring within the study area would have been collected given the intensity of the survey effort by Onshore Environmental. Seasonal conditions at the time of the May 2018 field survey were <i>poor</i> , hence some of the ephemeral taxa and grasses may not have been recorded.
Survey timing, rainfall, season of survey	The survey was completed in May 2018 under <i>poor</i> seasonal conditions owing to low summer rainfall during months preceding field work.
Disturbance that may have affected the results of survey such as fire, flood or clearing	Disturbances within the study area included grazing of vegetation and damage to the creeklines by domestic stock (cattle), presence of introduced weed species, and fire (mosaic of burn ages recorded). None of the disturbances were a constraint to completing the survey.

Constraint	Relevance
Was the appropriate area fully surveyed (effort and extent)	Two botanists working over a seven-day period assessed a total of 49 study sites (quadrats) and numerous relevé plots during the May 2018 field survey, representing a high survey intensity. All allocated tasks detailed in the scope of works were achieved during the survey.
Access restrictions within the survey area	The study area was accessed by vehicle and on foot, noting that vegetation mapping was facilitated by high-resolution aerial photography.
Competency/experience of the team carrying out the survey, including experience in the bioregion surveyed	The Principal Botanist working on the survey has over 15 years Pilbara experience, and the accompanying Senior Botanist has in excess of seven years Pilbara experience. Together the survey team has completed numerous surveys in close proximity to the study area over recent years.

2.3.9 Assessment of Conservation Significance

The conservation significance of flora and ecological communities are classified at a Commonwealth, State and Local level on the basis of various Acts and Agreements, including:

Commonwealth Level:

- EPBC Act: The DoEE lists Threatened flora and ecological communities, which are determined by the Threatened Species Scientific Committee according to criteria set out in the Act. The Act lists flora that are considered to be of conservation significance under one of six categories (Appendix 4).

State Level:

- WC Act: At a State level, native flora species are protected under the *WC Act – Wildlife Conservation Notice*. A number of species are assigned an additional level of conservation significance based on a limited number of known populations and the perceived threats to these locations.
- DBCA Priority list: DBCA produces a list of Priority species and ecological communities that have not been assigned statutory protection under the WC Act. Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added under Priorities 1, 2 or 3. Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been removed from the threatened species list for other taxonomic reasons, are placed in Priority 4. These species require regular monitoring (see Appendix 5). The list of PECs identifies those that need further investigation before nomination for TEC status at a State level.

Local Level:

- Species may be considered of local conservation significance because of their patterns of distribution and abundance. Although not formally protected by legislation, such species are acknowledged to be in decline as a result of threatening processes, primarily habitat loss through land clearing.

3.0 RESULTS

3.1 Desktop Assessment

3.1.1 Previous Flora and Vegetation Surveys

The flora and vegetation of the Pilbara has been assessed at a broad scale by Burbidge (1959) and Beard (1975). More recently, the Department of Agriculture completed an inventory and condition survey of the Pilbara based on land system mapping (van Vreeswyk *et al.* 2004). More specific data has been collected as part of DBCA's Pilbara Region Biological Survey 2002-2013. This dataset has recently been published (DBCA 2013) and will provide added regional context that will benefit impact assessment for future development proposals within the Pilbara.

In addition to the larger broad scale surveys, an increasing number of smaller intensive flora and vegetation surveys have been completed in recent years associated with resource development projects. These surveys have resulted in the collection of a significant amount of site-specific biological survey data, most of which has been undertaken for formal environmental impact assessment.

A total of 56 flora and vegetation surveys have previously been undertaken within a 25 km radius of the study area. Each of these surveys were reviewed to identify the survey intensity, total flora statistics, and species and communities of conservation significance. These surveys are described in Appendix 1. A summary of the review findings is provided below:

- None of the surveys identified any Federal or State listed TECs, or State listed PECs;
- No Federal or State listed Threatened Flora were recorded from the surveys; and
- Sixteen current Priority flora taxa have been recorded from a 25 km radius of the study area.

3.1.2 Threatened Flora listed under the EPBC Act

A search of the EPBC Act Protected Matters Database (DoEE 2018b) identified one Threatened Flora or their habitat as occurring within a 40 km radius of the study area; *Pityrodia augustensis*, currently listed as Vulnerable under the EPBC Act (Appendix 4).

Pityrodia augustensis (Mt Augustus Foxglove) is restricted to the northern slopes of Mt Augustus approximately 350 km west south-west of the study area. It occurs as a bushy shrub up to 1 m in height and is found on rocky slopes or drainage lines. It is considered unlikely that *Pityrodia augustensis* occurs within the study area due to the distance from the nearest record.

3.1.3 Threatened Flora listed under the IUCN Red List database

A search of the International Union for Conservation of Nature (IUCN) database (IUCN 2018) determined that no Threatened Flora taxon was likely to occur within the study area.

3.1.4 Threatened Flora listed under the WA Wildlife Conservation (Rare Flora) Notice

The DBCA rare flora database search did not identify any plant taxon gazetted as Threatened Flora (T) pursuant to subsection (2) of section 23F of the WC Act from a 50 km radius around the study area.

3.1.5 Priority Flora recognised by the DBCA

NatureMap lists 471 plant taxa occurring within a 40 km radius of the study area, including 17 conservation significant flora. The DBCA rare flora database searches identified 24 Priority flora taxa as potentially occurring within a 50 km radius of the study area; these taxa are described in more detail in Table 5. A number of additional conservation significant flora recorded during previous surveys of the surrounding area are included in Table 5.

Table 5 Significant flora taxa recorded in or around the survey area from the federal and state database searches, literature review and local knowledge. Refer Table 3 for ranking determination of likelihood of occurring within the study area.

Taxon	Conservation Status	Life Form	Habitat Preference	Suitable Habitat Present	Closest Record to study area	Likelihood in the study area
<i>Acacia</i> sp. East Fortescue (J. Bull & D. Roberts ONS A 27.01)	P1	Perennial	Rocky low hills.	Yes	11 km (OB31)	Possible
<i>Amaranthus centralis</i>	P3	Annual	River banks. Sand plains. Mulga woodlands.	Yes	37 km	Possible
<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	P3	Perennial	Hardpan plains.	Yes	5 km (Wheelarra Hill North)	Likely
<i>Calotis latiuscula</i>	P3	Perennial	Sand, loam. Rocky hillsides, floodplains, rocky creeks or river beds.	Yes	40 km	Possible
<i>Crotalaria smithiana</i>	P3	Annual	Regeneration site on floodplain.	Yes	30 km	Possible
<i>Eremophila capricornica</i>	P1	Perennial	Sandy clay loams in open mulga shrubland with an understory of <i>Triodia</i> spp. and other grasses.	Yes	12 km	Possible
<i>Eremophila magnifica</i> subsp. <i>magnifica</i>	P4	Perennial	Skeletal soils over ironstone. Summits.	Yes	60 km	Unlikely
<i>Eremophila magnifica</i> subsp. <i>velutina</i>	P3	Perennial	Skeletal soils over ironstone. Summits.	Yes	43 km	Possible
<i>Eremophila pilosa</i>	P1	Perennial	Red brown clay loam, sandplains.	Yes	40 km	Possible
<i>Eremophila rigida</i>	P3	Perennial	Hardpan plains.	Yes	38 km	Possible
<i>Eremophila</i> sp. Hamersley Range (K. Walker KW 136)	P1	Perennial	NA	NA	58 km	Unlikely
<i>Eremophila</i> sp. Jigalong (B. Buirchell BB 204)	P1	Perennial	Plain with brown / red loam soil.	Yes	27 km	Possible
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	Perennial	Stony red sandy loam. Flats plains, floodplains, sometimes semi-saline, clay flats.	Yes	58 km	Unlikely
<i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i>	P2	Annual	Clayey silty soils.	Yes	5 km (SW Jimplebar)	Likely
<i>Goodenia berringbinensis</i>	P4	Annual	Red sandy loam. Along watercourses.	Yes	10 km (Dynasty)	Likely
<i>Goodenia hartiana</i>	P2	Perennial	Sand dune swales, sandhills.	No	1 km	Unlikely

Taxon	Conservation Status	Life Form	Habitat Preference	Suitable Habitat Present	Closest Record to study area	Likelihood in the study area
<i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727)	P3	Biennial	Low undulating calccrete plain.	Yes	68 km	Unlikely
<i>Goodenia nuda</i>	P4	Annual	Plains and floodplains.	Yes	<1 km (Wheellarra Hill North)	Likely
<i>Gymnanthera cunninghamii</i>	P3	Perennial	Sandy soils. Drainage lines.	Yes	28 km	Possible
<i>Hibiscus campanulatus</i>	P1	Perennial	Incised ironstone gullies, protected areas below cliffs, rocky creeklines and below breakaways.	Yes	Within 40 km ¹	Possible
<i>Ipomoea racemigera</i>	P2	Annual	Drainage lines, flood plains.	Yes	11 km (Dynasty)	Likely
<i>Isotropis parviflora</i>	P2	Annual	Disturbed stony hill crests and upper hill slopes.	Yes	15 km (OB19)	Likely
<i>Lepidium catapycnon</i>	P4, VU	Perennial	Skeletal soils. Hillsides.	Yes	50 km	Unlikely
<i>Pityrodia augustensis</i>	T, VU	Perennial	Amongst rocks on slopes or in drainage lines.	Yes	Species or species habitat occurs within 50 km ²	Unlikely
<i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794)	P3	Perennial	Clay plains. Mulga woodlands.	Yes	12 km (OB31)	Likely
<i>Rostellularia adscendens</i> var. <i>latifolia</i>	P3	Annual	Ironstone soils. Near creeks, rocky hills.	Yes	25 km (Repeater 9)	Possible
<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)	P3	Perennial	Clay pan, grass plain.	Yes	Within 40 km ³	Possible
<i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739)	P3	Perennial	Upper hill slopes, ironstone ranges.	Yes	4 km (OB31)	Likely
<i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwen 4684)	P1	Annual	Plains with red clay loams dominated by Mulga and <i>Aristida</i> spp.	Yes	2 km (SW Jimplebar)	Likely

¹ From Protected Matters database search, exact distance from the study area is not provided

² From Protected Matters database search, exact distance from the study area is not provided.

³ From Nature map database search, exact distance from the study area is not provided.

3.1.6 Threatened Ecological Communities (TECs)

A search of DBCAs communities database confirmed there was one TEC record within a 50 km radius of the study area; the Endangered '*Ethel Gorge aquifer stygobiont community*' located approximately 25 km north-east of the study area along the Fortescue River. It is a subterranean community that has no distinctive flora and vegetation features and is therefore not included as part of the scope of this work and will not be discussed further.

3.1.7 Priority Ecological Communities (PECs)

A search of the State database confirmed there were no PECs within a 50 km radius of the study area.

3.2 Flora Species

A total number of 262 plant taxa (including varieties and subspecies) from 39 families and 110 genera were recorded from the study area (Table 6, Appendix 6). Species representation was greatest among the Poaceae (63 taxa), Fabaceae (52 taxa), Malvaceae (31 taxa), Chenopodiaceae (21 taxa) and Amaranthaceae (13 taxa) families, with *Acacia* (26 taxa) the most speciose genus, followed by *Sida* (13 taxa), *Senna* (10 taxa), *Eremophila* and *Triodia* (8 taxa each).

Table 6 Statistics for total flora recorded from the study area.

Overview	No. Taxa
Families	38
Genera	110
Taxa (species, subspecies, varieties)	264
Native Taxa	258
Introduced Taxa	6
Threatened Flora	0
Priority Flora	0
Range Extension	2
Speciose Families	No. Taxa
Poaceae	58
Fabaceae	49
Malvaceae	31
Chenopodiaceae	23
Amaranthaceae	11
Myrtaceae	8
Scrophulariaceae	8
Euphorbiaceae	7
Speciose Genera	No. Taxa
<i>Acacia</i> (Fabaceae)	26
<i>Sida</i> (Malvaceae)	13
<i>Senna</i> (Fabaceae)	10
<i>Eremophila</i> (Scrophulariaceae)	8
<i>Triodia</i> (Poaceae)	8

3.3 Significant Flora

3.3.1 Threatened Flora listed under the WC Act and EPBC Act

No plant taxon gazetted as Threatened Flora (T) pursuant to subsection (2) of section 23F of the WC Act or listed under the EPBC Act was recorded from the study area.

3.3.2 Significant Flora

No Priority flora as defined by DBCA, were recorded from the study area.

3.3.3 Range Extensions

Two of the plant taxa recorded from the study area are considered to be range extensions; *Euphorbia multifaria* and *Ipomoea coptica* (Figure 7).

Euphorbia multifaria is a prostrate annual herb. This species is widespread across southern Australia but has only been collected from one other location within the Pilbara at Karijini National Park. It was recorded from two locations within the study area on stony plains with approximately 20 plants at each location. The locations within the study area represent a 150 km range extension to the south east.

Ipomoea coptica is a twining climber that produces white flowers between February and June. It occurs along watercourses and in damp depressions. This species occurs across northern Australia from the Kimberley to northern Queensland. A single plant of this species was recorded from one location in a major drainage line. This location represents a 100 km range extension to the south of the known distribution for this species.

Shearers West Figure 7 Range Extension

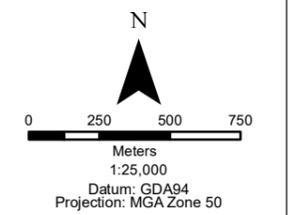
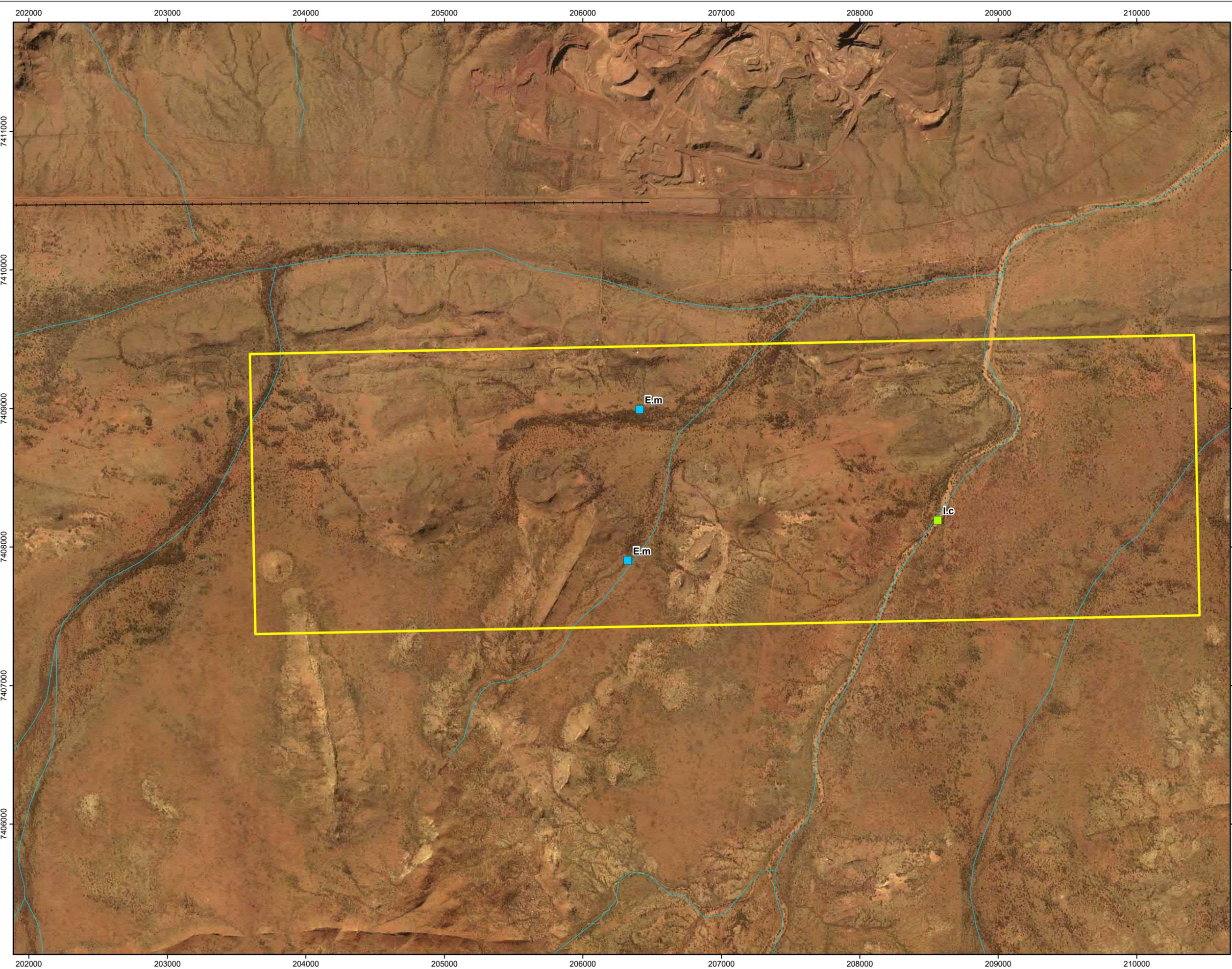
Legend

 Study Area

Range Extension

 Ipomoea coptica
(I.c)

 Euphorbia multifaria
(E.m)



Date:	02/11/2018
Status:	Final
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3.4 Introduced Flora

A total of six introduced flora (weed) species recorded during the survey; five of which were recorded from within the study area, and five from within the adjacent drainage line (Table 7, Figure 8, Appendix 7):

- **Bidens bipinnata* (Bipinnate Beggartick);
- **Cenchrus ciliaris* (Buffel Grass);
- **Cenchrus setiger* (Birdwood Grass);
- **Citrullus lanatus* (Melon);
- **Malvastrum americanum* (Spiked Malvastrum); and
- **Vachellia farnesiana* (Mimosa Bush).

None of these taxa are listed as a Declared Pest under the BAM Act.

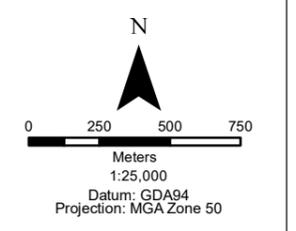
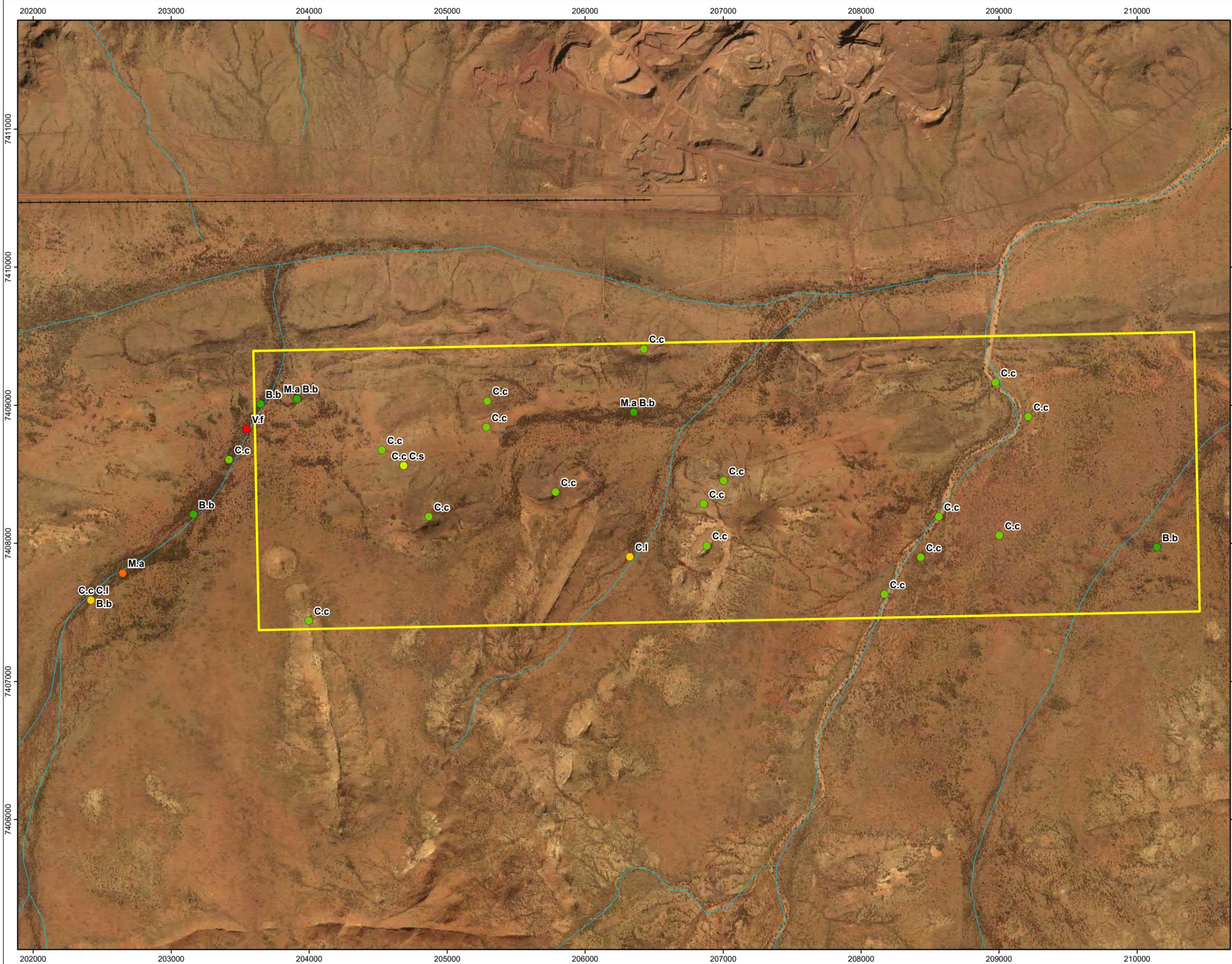
Shearers West Figure 8 Introduced Flora

Legend

Study Area

Range Extension

- Bidens bipinnata (B.b)
- Cenchrus ciliaris (C.c)
- Cenchrus setiger (C.s)
- Citrullus lanatus (C.l)
- Malvastrum americanum (M.a)
- Vachellia farnesiana (V.f)



Date: 02/11/2018
 Status: Final
 Figure: 8
 Sheet Size: A3
 Internal Reference: SW_Range_Ext
 Drawn by: GSM
 Requested by: DB

Table 7 Introduced weed species recorded from the study area.

Taxon (Common Name)	Photograph	Description	Occurrence in study area
<p>*<i>Bidens bipinnata</i> (Bipinnate Beggars Tick)</p>		<p>Erect annual herb that grows up to 1 m in height. This species is widespread in the northern parts of Western Australia from Shark Bay up to the Northern Territory border. It has three pronged barbs on its seed, so it is easily spread by livestock and other animals. In the Pilbara, it is common in moist habitats such as drainage lines, flood plains and gorges, and responds vigorously following rainfall.</p>	<p>Recorded from six locations (four within the study area and two within the adjacent drainage line) on drainage lines, floodplains and hardpan plains within the study area. Approximately 1,000 plants were recorded with coverage ranging up to 8%.</p>
<p>*<i>Citrullus lanatus</i> (Melon)</p>		<p>*<i>Citrullus lanatus</i> Is a trailing herb/climber that produces yellow flowers.</p>	<p>Recorded from two locations (one within the study area and one within the adjacent drainage line) along drainage lines. A total of five plants were recorded with coverage of <1% at both locations.</p>

Taxon (Common Name)	Photograph	Description	Occurrence in study area
<p>*<i>Cenchrus ciliaris</i> (Buffel Grass)</p>		<p>Tufted perennial grass originating from the Middle East as a fodder species by pastoralists. It grows in dense tussocks up to 1 m tall and typically occurs in monospecific stands on loamy plains and creekline levee banks. It is an aggressive colonizing species that has become well established throughout the Pilbara, Gascoyne and Murchison regions of Western Australia, and is continuing to spread in the south-west (Hussey <i>et al.</i> 1997).</p>	<p>Recorded from 19 point locations (17 within the study area and two within the adjacent drainage line). It was recorded from a variety of habitats but was a dominant component of two vegetation associations on floodplains and major drainage lines. Over 2,000 plants were recorded with ground coverage ranging from a few scattered plants to 20% coverage.</p>
<p>*<i>Cenchrus setiger</i> (Birdwood Grass)</p>		<p>An erect tussocky stoloniferous perennial grass up to 0.5 m in height. Flowers are cream or purple and flowering occurs between April and May. It occurs on brown sands, red loams and pindan soils on sand dunes, plains, rangelands, stony hillsides and floodplains. It has been recorded across the north of western Australia from Geraldton to the Northern Territory border.</p>	<p>Recorded from one location within the study area. A total of 50 plants were recorded from a footslope. Coverage was <1%.</p>

Taxon (Common Name)	Photograph	Description	Occurrence in study area
<p>*<i>Malvastrum americanum</i> (Spiked Malvastrum)</p>		<p>Erect perennial herb or shrub, ranging from 0.5 m to 1.3 m in height. It grows in a variety of soil types on stony ridges and hill sides, flood plains and along drainage lines.</p>	<p>Recorded from three locations (two within the study area and one within the adjacent drainage line) on stony plains, hardpan plains, gilgai plains and floodplains. A total of 210 plants were recorded with scattered plants at all locations.</p>
<p>*<i>Vachellia farnesiana</i> (Mimosa Bush)</p>		<p>An erect spreading thicket forming thorny tree or shrub. It grows up to 4 m in height and produces yellow flowers from June to August. Mimosa Bush grows on stony, sandy, clay or loam soils and is common in low lying areas such as creeks and river banks as well as in disturbed areas. It is widespread from the Kimberly to near Perth (Hussey <i>et al.</i> 1997).</p>	<p>A single plant was recorded at one location within the drainage adjacent to the study area.</p>

3.5 Threatened Ecological Communities

The field survey confirmed that no TECs occur within the study area.

3.6 Priority Ecological Communities

None of the vegetation associations described and mapped from the study area were aligned with any PECs documented from the Pilbara.

3.7 Vegetation

A total of 18 vegetation associations were described and mapped within the study area (Figure 9). The vegetation associations have been classified into nine broad floristic formations on the basis of the dominant vegetation stratum (Table 8; Appendix 8).

Table 8 Vegetation descriptions for 18 vegetation associations mapped within the study area.

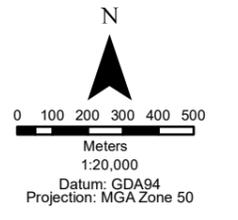
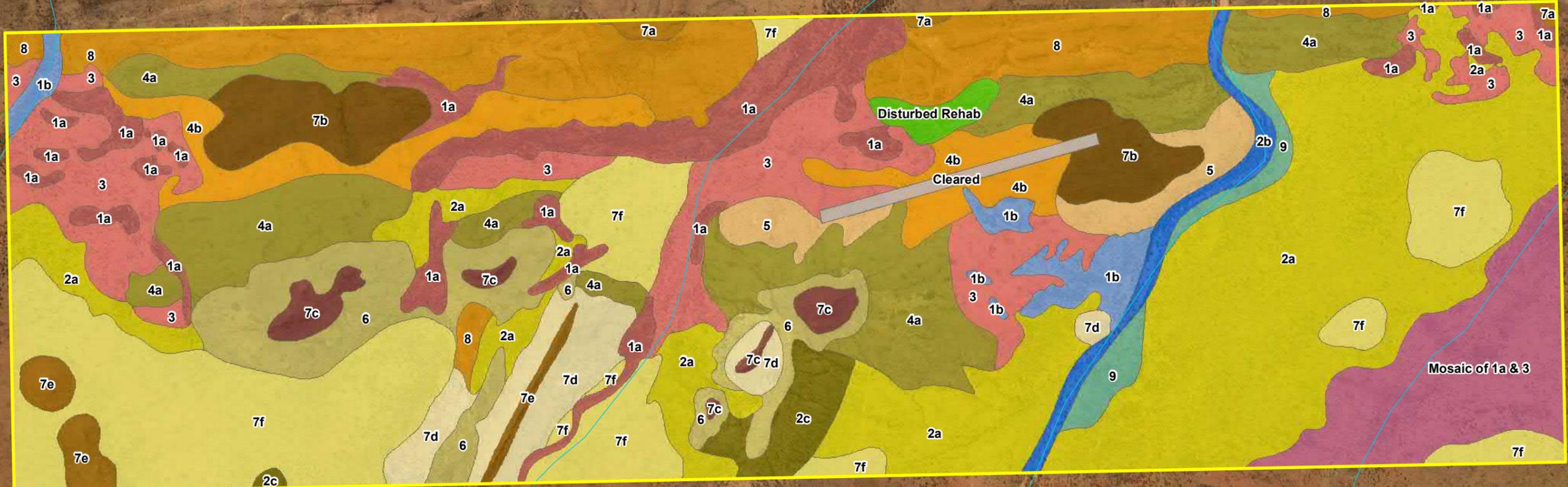
Broad Floristic Formation	Code	Vegetation Code	Vegetation Description	Condition
Acacia Low Open Forest	1a	HP Aa AriEuaDib BbChsiEva	Low Open Forest of <i>Acacia aptaneura</i> over Open Tussock Grassland of <i>Aristida inaequiglumis</i> , <i>Eulalia aurea</i> and <i>Digitaria brownii</i> over Very Open Herbs of * <i>Bidens bipinnata</i> , <i>Cheilanthes sieberi</i> and <i>Evolvulus alsinoides</i> on brown sandy clay loam on hardpan plains	Poor
	1b	ME AaHall ErfrAteAsy AriTtDib	Low Open Forest of <i>Acacia aptaneura</i> and <i>Hakea lorea</i> subsp. <i>lorea</i> over High Open Shrubland of <i>Eremophila fraseri</i> , <i>Acacia tetragonophylla</i> and <i>Acacia synchronicia</i> over Open Tussock Grassland of <i>Aristida inaequiglumis</i> , <i>Themeda triandra</i> and <i>Digitaria brownii</i> on brown loamy sand on medium drainage lines	Poor
Acacia Low Woodland	2a	SA AaAprHall Tb Erff	Low Woodland of <i>Acacia aptaneura</i> , <i>Acacia pruinocarpa</i> and <i>Hakea lorea</i> subsp. <i>lorea</i> over Open Hummock Grassland of <i>Triodia basedowii</i> with Open Shrubland of <i>Eremophila forrestii</i> subsp. <i>forrestii</i> on brown loamy sand on plains	Good
	2b	MA AcpEvAa TtEuaCc EcEv	Low Woodland of <i>Acacia coriacea</i> subsp. <i>pendens</i> , <i>Eucalyptus victrix</i> and <i>Acacia aptaneura</i> over Open Tussock Grassland of <i>Themeda triandra</i> , <i>Eulalia aurea</i> and * <i>Cenchrus ciliaris</i> with Open Woodland of <i>Eucalyptus camaldulensis</i> and <i>Eucalyptus victrix</i> on brown sand on major drainage lines	Good
	2c	FS Apt AteAsyAr Segl	Low Woodland of <i>Acacia pteraneura</i> over High Open Shrubland of <i>Acacia tetragonophylla</i> , <i>Acacia synchronicia</i> and <i>Acacia rhodophloia</i> over Open Shrubland of <i>Senna glutinosa</i> subsp. x <i>luerssenii</i> on brown sandy loam on footslopes and low hills	Very Good
Acacia Low Open Woodland	3	HP AaHallApt ArcAriEnpo SccnSol	Low Open Woodland of <i>Acacia aptaneura</i> , <i>Hakea lorea</i> subsp. <i>lorea</i> and <i>Acacia pteraneura</i> over Very Open Tussock Grassland of <i>Aristida contorta</i> , <i>Aristida inaequiglumis</i> and <i>Enneapogon polyphyllus</i> over Scattered Low Shrubs of <i>Sclerolaena cornishiana</i> and <i>Solanum lasiophyllum</i> on brown sandy loam on hardpan plains	Poor
Acacia High Open Shrubland	4a	FS AteAsy SeglAsyAte Ercu	High Open Shrubland of <i>Acacia tetragonophylla</i> and <i>Acacia synchronicia</i> over Open Shrubland of <i>Senna glutinosa</i> subsp. <i>luerssenii</i> , <i>Acacia synchronicia</i> and <i>Acacia tetragonophylla</i> over Low Open Shrubland of <i>Eremophila cuneifolia</i> on brown silty loam on footslopes	Good
	4b	SP AsyAte SeahSeaoSegl SccnScctSol	High Open Shrubland of <i>Acacia synchronicia</i> and <i>Acacia tetragonophylla</i> over Open Shrubland of <i>Senna artemisioides</i> subsp. <i>helmsii</i> , <i>Senna artemisioides</i> subsp. <i>oligophylla</i> and <i>Senna glutinosa</i> subsp. x <i>luerssenii</i> and Low Open Shrubland of <i>Sclerolaena cornishiana</i> , <i>Sclerolaena cuneata</i> and <i>Solanum lasiophyllum</i> on brown loam on stony plains	Poor
<i>Eremophila</i> High Open Shrubland	5	SP ErfrAte SeahErfr ArcCyaTrl	High Open Shrubland of <i>Eremophila fraseri</i> and <i>Acacia tetragonophylla</i> over Open Shrubland of <i>Senna artemisioides</i> subsp. <i>helmsii</i> and <i>Eremophila fraseri</i> over Very Open Tussock Grassland of <i>Aristida contorta</i> , <i>Cymbopogon ambiguus</i> and <i>Tripogonella loliiformis</i> on brown silty loam on stony plains	Good

Broad Floristic Formation	Code	Vegetation Code	Vegetation Description	Condition
Frankenia Low Shrubland	6	FS FrsErcu AaAp AsyAte	Low Shrubland of <i>Frankenia setosa</i> and <i>Eremophila cuneifolia</i> with Low Open Woodland of <i>Acacia aptaneura</i> and <i>Acacia paraneura</i> and High Open Shrubland of <i>Acacia synchronicia</i> and <i>Acacia tetragonophylla</i> on brown silty loam on footslopes	Good
Triodia Hummock Grassland	7a	HS Tv EIApr AhiAaaCaca	Hummock Grassland of <i>Triodia vanleeuwenii</i> with Low Open Woodland of <i>Eucalyptus leucophloia</i> and <i>Acacia pruinocarpa</i> over Low Open Shrubland of <i>Acacia hilliana</i> , <i>Acacia adoxa</i> var. <i>adoxo</i> and <i>Calytrix carinata</i> on brown sandy loam on hillslopes	Very Good
	7b	HS Te ErfrAte Erfr	Hummock Grassland of <i>Triodia epactia</i> with High Open Shrubland of <i>Eremophila fraseri</i> and <i>Acacia tetragonophylla</i> and Open Shrubland of <i>Eremophila fraseri</i> on brown sandy loam on hillslopes	Very Good
	7c	HC TpTe Aa ErllAteSegl	Hummock Grassland of <i>Triodia pungens</i> or <i>Triodia epactia</i> with Low Open Woodland of <i>Acacia aptaneura</i> and Open Shrubland of <i>Eremophila latrobei</i> subsp. <i>latrobei</i> , <i>Acacia tetragonophylla</i> and <i>Senna glutinosa</i> subsp. <i>x luerssenii</i> on brown sandy loam on hillcrests	Very Good
	7d	FS TvTe Atru AbAanc	Hummock Grassland of <i>Triodia vanleeuwenii</i> and <i>Triodia epactia mini</i> with High Open Shrubland of <i>Acacia trudgeniana</i> and Open Shrubland of <i>Acacia bivenosa</i> and <i>Acacia ancistrocarpa</i> on brown sandy loam on footslopes	Very Good
	7e	HS TeTv AbSegp AprChAa	Hummock Grassland of <i>Triodia mini epactia</i> and <i>Triodia vanleeuwenii</i> with Open Shrubland of <i>Acacia bivenosa</i> and <i>Senna glutinosa</i> subsp. <i>pruinosa</i> and Scattered Low Trees of <i>Acacia pruinocarpa</i> , <i>Corymbia hamersleyana</i> and <i>Acacia aptaneura</i> on brown loamy sand on hillslopes	Very Good
	7f	SA Tb Hall ApaAmeAanc	Hummock Grassland of <i>Triodia basedowii</i> with Low Open Woodland of <i>Hakea lorea</i> subsp. <i>lorea</i> with High Open Shrubland of <i>Acacia pachyacra</i> , <i>Acacia melleodora</i> and <i>Acacia ancistrocarpa</i> on brown loamy sand on sandplains	Very Good
Triodia Open Hummock Grassland	8	HS TvTaTp AwAsyAte Ercu	Open Hummock Grassland of <i>Triodia vanleeuwenii</i> , <i>Triodia angusta</i> and <i>Triodia pungens</i> with High Open Shrubland of <i>Acacia wanyu</i> , <i>Acacia synchronicia</i> and <i>Acacia tetragonophylla</i> and Low Open Shrubland of <i>Eremophila cuneifolia</i> on brown sandy loam on hillslopes	Very Good
*Cenchrus Open Tussock Grassland	9	FP CcAriTt ChApt AsApyApa	Open Tussock Grassland of <i>*Cenchrus ciliaris</i> , <i>Aristida inaequiglumis</i> , and <i>Themeda triandra</i> with Low Open Woodland of <i>Corymbia hamersleyana</i> and <i>Acacia pteraneura</i> and High Open Shrubland of <i>Acacia sclerosperma</i> , <i>Acacia pyrifolia</i> and <i>Acacia pachyacra</i> on brown loamy sand on floodplains	Poor

Shearers West Figure 9 Vegetation Types

Legend

Study



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Shearers West Figure 9

Vegetation Types Legend

Legend

 Study Area

Vegetation Types

Hill Crest

 HC TpTe Aa ErllAteSegl

Hummock Grassland of *Triodia pungens* or *Triodia epactia* with Low Open Woodland of *Acacia aptaneura* and Open Shrubland of *Eremophila latrobei* subsp. *latrobei*, *Acacia tetragonophylla* and *Senna glutinosa* subsp. *x luerssenii* on brown sandy loam on hillcrests

Hillslopes

 HS Te ErfrAte Erfr

Hummock Grassland of *Triodia epactia* with High Open Shrubland of *Eremophila fraseri* and *Acacia tetragonophylla* and Open Shrubland of *Eremophila fraseri* on brown sandy loam on hillslopes

 HS TeTv AbSegp AprChAa

Hummock Grassland of *Triodia mini epactia* and *Triodia vanleeuwenii* with Open Shrubland of *Acacia bivenosa* and *Senna glutinosa* subsp. *pruinosa* and Scattered Low Trees of *Acacia pruinocarpa*, *Corymbia hamersleyana* and *Acacia aptaneura* on brown loamy sand on hillslopes

 HS Tv EIApr AhiAaCaca

Hummock Grassland of *Triodia vanleeuwenii* with Low Open Woodland of *Eucalyptus leucophloia* and *Acacia pruinocarpa* over Low Open Shrubland of *Acacia hilliana*, *Acacia adoxa* var. *adoxo* and *Calytrix carinata* on brown sandy loam on hillslopes

 HS TvTaTp AwAsyAte Ercu

Open Hummock Grassland of *Triodia vanleeuwenii*, *Triodia angusta* and *Triodia pungens* with High Open Shrubland of *Acacia wanyu*, *Acacia synchronicia* and *Acacia tetragonophylla* and Low Open Shrubland of *Eremophila cuneifolia* on brown sandy loam on hillslopes

Foot Slopes

 FS Apt AteAsyAr Segl

Low Woodland of *Acacia pteraneura* over High Open Shrubland of *Acacia tetragonophylla*, *Acacia synchronicia* and *Acacia rhodophloia* over Open Shrubland of *Senna glutinosa* subsp. *luerssenii* on brown sandy loam on footslopes and low hills

 FS AteAsy SeglAsyAte Ercu

High Open Shrubland of *Acacia tetragonophylla* and *Acacia synchronicia* over Open Shrubland of *Senna glutinosa* subsp. *luerssenii*, *Acacia synchronicia* and *Acacia tetragonophylla* over Low Open Shrubland of *Eremophila cuneifolia* on brown silty loam on footslopes

 FS FrsErcu AaAp AsyAte

Low Shrubland of *Frankenia setosa* and *Eremophila cuneifolia* with Low Open Woodland of *Acacia aptaneura* and *Acacia paraneura* and High Open Shrubland of *Acacia synchronicia* and *Acacia tetragonophylla* on brown silty loam on footslopes

 FS TvTe Atru AbAanc

Hummock Grassland of *Triodia vanleeuwenii* and *Triodia epactia mini* with High Open Shrubland of *Acacia trudgeniana* and Open Shrubland of *Acacia bivenosa* and *Acacia ancistrocarpa* on brown sandy loam on footslopes

Hardpan Plains

 HP Aa AriEuaDib BbChsiEva

Low Open Forest of *Acacia aptaneura* over Open Tussock Grassland of *Aristida inaequiglumis*, *Eulalia aurea* and *Digitaria brownii* over Very Open Herbs of *Bidens bipinnata*, *Cheilanthes sieberi* and *Evolvulus alsinoides* on brown sandy clay loam on hardpan plains

 HP AaHallApt ArcAriEnpo SccnSol

Low Open Woodland of *Acacia aptaneura*, *Hakea lorea* subsp. *lorea* and *Acacia pteraneura* over Very Open Tussock Grassland of *Aristida contorta*, *Aristida inaequiglumis* and *Enneapogon polyphyllus* over Scattered Low Shrubs of *Sclerolaena cornishiana* and *Solanum lasiophyllum* on brown sandy loam on hardpan plains

Flood Plain

 FP CcAriTt ChApt AsApyApa

Open Tussock Grassland of *Cenchrus ciliaris*, *Aristida inaequiglumis*, and *Themeda triandra* with Low Open Woodland of *Corymbia hamersleyana* and *Acacia pteraneura* and High Open Shrubland of *Acacia sclerosperma*, *Acacia pyriformis* and *Acacia pachyacra* on brown loamy sand on floodplains

Sandplains

 SA AaAprHall Tb Erff

Low Woodland of *Acacia aptaneura*, *Acacia pruinocarpa* and *Hakea lorea* subsp. *lorea* over Open Hummock Grassland of *Triodia basedowii* with Open Shrubland of *Eremophila forrestii* subsp. *forrestii* on brown loamy sand on plains

 SA Tb Hall ApaAmeAanc

Hummock Grassland of *Triodia basedowii* with Low Open Woodland of *Hakea lorea* subsp. *lorea* with High Open Shrubland of *Acacia pachyacra*, *Acacia melleodora* and *Acacia ancistrocarpa* on brown loamy sand on sandplains

Stony Plains

 SP AsyAte SeahSeaoSegl SccnScctSol

High Open Shrubland of *Acacia synchronicia* and *Acacia tetragonophylla* over Open Shrubland of *Senna artemisioides* subsp. *helmsii*, *Senna artemisioides* subsp. *oligophylla* and *Senna glutinosa* subsp. *luerssenii* and Low Open Shrubland of *Sclerolaena cornishiana*, *Sclerolaena cuneata* and *Solanum lasiophyllum* on brown loam on stony plains

 SP ErfrAte SeahErfr ArcCyaTrl

High Open Shrubland of *Eremophila fraseri* and *Acacia tetragonophylla* over Open Shrubland of *Senna artemisioides* subsp. *helmsii* and *Eremophila fraseri* over Very Open Tussock Grassland of *Aristida contorta*, *Cymbopogon ambiguus* and *Triopogonella loliiformis* on brown silty loam on stony plains

Major Drainage Line

 MA AcpEvAa TtEuaCc EcEv

Low Woodland of *Acacia coriacea* subsp. *pendens*, *Eucalyptus victrix* and *Acacia aptaneura* over Open Tussock Grassland of *Themeda triandra*, *Eulalia aurea* and *Cenchrus ciliaris* with Open Woodland of *Eucalyptus camaldulensis* and *Eucalyptus victrix* on brown sand on major drainage lines

Medium Drainage Line

 ME AaHall ErfrAteAsy AriTtDib

Low Open Forest of *Acacia aptaneura* and *Hakea lorea* subsp. *lorea* over High Open Shrubland of *Eremophila fraseri*, *Acacia tetragonophylla* and *Acacia synchronicia* over Open Tussock Grassland of *Aristida inaequiglumis*, *Themeda triandra* and *Digitaria brownii* on brown loamy sand on medium drainage lines

Mosaics

 Mosaic of HP Aa AriEuaDib BbChsiEva & HP AaHallApt ArcAriEnpo SccnSol

Mosaic of Low Open Forest of *Acacia aptaneura* over Open Tussock Grassland of *Aristida inaequiglumis*, *Eulalia aurea* and *Digitaria brownii* over Very Open Herbs of *Bidens bipinnata*, *Cheilanthes sieberi* and *Evolvulus alsinoides* on brown sandy clay loam on hardpan plains & Low Open Woodland of *Acacia aptaneura*, *Hakea lorea* subsp. *lorea* and *Acacia pteraneura* over Very Open Tussock Grassland of *Aristida contorta*, *Aristida inaequiglumis* and *Enneapogon polyphyllus* over Scattered Low Shrubs of *Sclerolaena cornishiana* and *Solanum lasiophyllum* on brown sandy loam on hardpan plains

Other

 Cleared

 Disturbed Rehab

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Broad Floristic Formation

1a. HP Aa AriEuaDib BbChsiEva
Acacia Low Woodland

Vegetation Association

Low Open Forest of *Acacia aptaneura* over Open Tussock Grassland of *Aristida inaequiglumis*, *Eulalia aurea* and *Digitaria brownii* over Very Open Herbs of **Bidens bipinnata*, *Cheilanthes sieberi* and *Evolvulus alsinoides* on brown sandy clay loam on hardpan plains



Quadrats Sampled	SW01, SW23, SW38
Soils and Geology	Brown sandy clay loam
Land Form	Hardpan plains and drainage areas
TEC or PEC	No
Conservation Significant Flora	None
Introduced (Weed) Species	<i>*Bidens bipinnata</i>
Vegetation Condition	Poor
Disturbances	Weeds, cattle grazing, mine exploration, road access track
Average Fire Age	Old (6+ years)
Vegetation Structure & Floristics	
Trees < 10m	<i>Acacia aptaneura</i> , <i>Corymbia aspera</i> , <i>Eucalyptus xerothermica</i>
Shrubs >2m	<i>Acacia aptaneura</i> , <i>Acacia tetragonophylla</i> , <i>Psydrax latifolia</i>
Shrubs 1-2m	<i>Sida ectogama</i>
Shrubs <1m	<i>Ptilotus obovatus</i> , <i>Sclerolaena cornishiana</i> , <i>Sida platycalyx</i> , <i>Sida</i> sp. verrucose glands (F.H. Mollemans 2423)
Tussock Grasses	<i>Aristida inaequiglumis</i> , <i>Digitaria brownii</i> , <i>Eulalia aurea</i> , <i>Digitaria ammophila</i> , <i>Perotis rara</i>
Herbs	<i>*Bidens bipinnata</i> , <i>Cheilanthes sieberi</i> , <i>Evolvulus alsinoides</i>

Broad Floristic Formation

1b. ME AaHall ErfrAteAsy AriTtDib
Acacia Low Open Forest

Vegetation Association

Low Open Forest of *Acacia aptaneura* and *Hakea lorea* subsp. *lorea* over High Open Shrubland of *Eremophila fraseri*, *Acacia tetragonophylla* and *Acacia synchronicia* over Open Tussock Grassland of *Aristida inaequiglumis*, *Themeda triandra* and *Digitaria brownii* on brown loamy sand on medium drainage lines



Quadrats Sampled	SW06, SW05, RSW18
Soils and Geology	Brown loamy sand
Land Form	Medium drainage lines and hardpan plains
TEC or PEC	No
Conservation Significant Flora	None
Introduced (Weed) Species	* <i>Bidens bipinnata</i> , * <i>Cenchrus ciliaris</i>
Vegetation Condition	Poor
Disturbances	Weeds, road/access track, cattle grazing
Average Fire Age	Old (5+ years)
Vegetation Structure & Floristics	
Trees < 10m	<i>Acacia aptaneura</i> , <i>Hakea lorea</i> subsp. <i>lorea</i> , <i>Acacia pteraneura</i> , <i>Corymbia aspera</i> , <i>Corymbia hamersleyana</i>
Shrubs >2m	<i>Eremophila fraseri</i> , <i>Acacia tetragonophylla</i> , <i>Acacia synchronicia</i>
Shrubs <1m	<i>Sida</i> sp. verrucose glands (F.H. Mollemans 2423), <i>Pterocaulon sphacelatum</i> , <i>Ptilotus obovatus</i> , <i>Isotropis forrestii</i>
Tussock Grasses	<i>Aristida inaequiglumis</i> , <i>Themeda triandra</i> , <i>Digitaria brownii</i> , <i>Bothriochloa ewartiana</i> , <i>Chrysopogon fallax</i> , <i>Enneapogon polyphyllus</i>
Herbs	* <i>Bidens bipinnata</i> , <i>Evolvulus alsinoides</i>
Creepers	<i>Ipomoea calobra</i> , <i>Duperreya commixta</i>

Broad Floristic Formation

2a. SA AaAprHall Tb Erff
Acacia Low Woodland

Vegetation Association

Low Woodland of *Acacia aptaneura*, *Acacia pruinocarpa* and *Hakea lorea* subsp. *lorea* over Open Hummock Grassland of *Triodia basedowii* with Open Shrubland of *Eremophila forrestii* subsp. *forrestii* on brown loamy sand on plains



Quadrats Sampled	SW34, SW20, SW10
Soils and Geology	Brown loamy sand
Land Form	Hardpan plains, stony/sandy plains and sand plains
TEC or PEC	No
Conservation Significant Flora	None
Introduced (Weed) Species	* <i>Cenchrus ciliaris</i>
Vegetation Condition	Good
Disturbances	Weeds, cattle grazing
Average Fire Age	Old (6+ years)
Vegetation Structure & Floristics	
Trees < 10m	<i>Acacia aptaneura</i> , <i>Acacia pruinocarpa</i> , <i>Hakea lorea</i> subsp. <i>lorea</i>
Shrubs >2m	<i>Acacia aptaneura</i> , <i>Acacia pruinocarpa</i> , <i>Acacia pachyacra</i> , <i>Acacia tetragonophylla</i>
Shrubs 1-2m	<i>Eremophila forrestii</i> subsp. <i>forrestii</i> , <i>Senna glutinosa</i> subsp. <i>luerssenii</i>
Hummock Grassland	<i>Triodia basedowii</i>
Tussock Grasses	<i>Aristida inaequiglumis</i> , <i>Aristida contorta</i> , <i>Eragrostis eriopoda</i> , <i>Digitaria brownii</i> , <i>Themeda triandra</i>

Broad Floristic Formation

2b. MA AcpEvAa TtEuaCc EcEv
Acacia Low Woodland

Vegetation Association

Low Woodland of *Acacia coriacea* subsp. *pendens*, *Eucalyptus victrix* and *Acacia aptaneura* over Open Tussock Grassland of *Themeda triandra*, *Eulalia aurea* and **Cenchrus ciliaris* with Open Woodland of *Eucalyptus camaldulensis* var. *obtusa* and *Eucalyptus victrix* on brown sand on major drainage lines



Quadrats Sampled	SW18, SW25, SW49
Soils and Geology	Brown sand with minor dolerite outcropping
Land Form	Major drainage lines
TEC or PEC	No
Conservation Significant Flora	None
Introduced (Weed) Species	* <i>Cenchrus ciliaris</i>
Vegetation Condition	Good
Disturbances	Cattle grazing, weeds
Average Fire Age	Old (6+ years)
Vegetation Structure & Floristics	
Trees >10m	<i>Eucalyptus camaldulensis</i> var. <i>obtusa</i> , <i>Eucalyptus victrix</i>
Trees < 10m	<i>Acacia coriacea</i> subsp. <i>pendens</i> , <i>Eucalyptus victrix</i> , <i>Acacia aptaneura</i> , <i>Acacia macraneura</i> , <i>Acacia paraneura</i>
Shrubs 1-2m	<i>Acacia pyrifolia</i> , <i>Eremophila fraseri</i> , <i>Androcalva luteiflora</i>
Shrubs <1m	<i>Acacia pyrifolia</i> , <i>Tephrosia rosea</i> var. Fortescue Creeks (M.I.H. Brooker 2186)
Tussock Grasses	<i>Eulalia aurea</i> , * <i>Cenchrus ciliaris</i> , <i>Themeda triandra</i> , <i>Bothriochloa ewartiana</i> , <i>Cymbopogon ambiguus</i>

Broad Floristic Formation

2c. FS Apt AteAsyAr Segl
Acacia Low Woodland

Vegetation Association

Low Woodland of *Acacia pteraneura* over High Open Shrubland of *Acacia tetragonophylla*, *Acacia synchronicia* and *Acacia rhodophloia* over Open Shrubland of *Senna glutinosa* subsp. x *luerssenii* on brown sandy loam on footslopes and low hills



Quadrats Sampled	SW15, SW37
Soils and Geology	Brown sandy loam
Land Form	Footslopes and undulating low hills
TEC or PEC	No
Conservation Significant Flora	None
Introduced (Weed) Species	None
Vegetation Condition	Very Good
Disturbances	Cattle grazing
Average Fire Age	Old (6+ years)
Vegetation Structure & Floristics	
Trees < 10m	<i>Acacia pteraneura</i> , <i>Acacia rhodophloia</i> , <i>Acacia pruinocarpa</i>
Shrubs >2m	<i>Acacia synchronicia</i> , <i>Acacia tetragonophylla</i> , <i>Acacia kempeana</i> , <i>Acacia rhodophloia</i> , <i>Eremophila fraseri</i>
Shrubs 1-2m	<i>Senna glutinosa</i> subsp. x <i>luerssenii</i> , <i>Acacia rhodophloia</i> , <i>Eremophila latrobei</i> subsp. <i>latrobei</i>
Shrubs <1m	<i>Eremophila cuneifolia</i> , <i>Senna Meekatharra</i> (E. Bailey 1-26), <i>Frankenia setosa</i> , <i>Maireana melanocoma</i>
Hummock Grasses	<i>Triodia epactia</i> , <i>Triodia basedowii</i> , <i>Triodia vanleeuwenii</i>
Tussock Grasses	<i>Enteropogon ramosus</i> , <i>Enneapogon polyphyllus</i> , <i>Aristida contorta</i> , <i>Tripogonella loliiformis</i> , <i>Aristida inaequiglumis</i>

Broad Floristic Formation

3. HP AaHallApt ArcAriEnpo SccnSol
Acacia Low Open Woodland

Vegetation Association

Low Open Woodland of *Acacia aptaneura*, *Hakea lorea* subsp. *lorea* and *Acacia pteraneura* over Very Open Tussock Grassland of *Aristida contorta*, *Aristida inaequiglumis* and *Enneapogon polyphyllus* over Scattered Low Shrubs of *Sclerolaena cornishiana* and *Solanum lasiophyllum* on brown sandy loam on hardpan plains



Quadrats Sampled	SW02, SW21, SW41
Soils and Geology	Red/brown sand loam or clay loam
Land Form	Hardpan plains
TEC or PEC	No
Conservation Significant Flora	None
Introduced (Weed) Species	None
Vegetation Condition	Poor
Disturbances	Cattle grazing, road/access tracks, fenceline
Average Fire Age	Old (6+ years)
Vegetation Structure & Floristics	
Trees < 10m	<i>Acacia aptaneura</i> , <i>Hakea lorea</i> subsp. <i>lorea</i> , <i>Acacia pteraneura</i> , <i>Acacia paraneura</i>
Shrubs 1-2m	<i>Senna artemisioides</i> subsp. <i>oligophylla</i> , <i>Senna artemisioides</i> subsp. <i>helmsii</i> , <i>Eremophila forrestii</i> , <i>Eremophila latrobei</i> subsp. <i>filifolia</i>
Shrubs <1m	<i>Sclerolaena cornishiana</i> , <i>Solanum lasiophyllum</i> , <i>Maireana villosa</i> , <i>Ptilotus obovatus</i>
Tussock Grasses	<i>Aristida contorta</i> , <i>Aristida contorta</i> , <i>Enneapogon polyphyllus</i>

Broad Floristic Formation

4a. FS AteAsy SeglAsyAte Ercu
Acacia High Open Shrubland

Vegetation Association

High Open Shrubland of *Acacia tetragonophylla* and *Acacia synchronicia* over Open Shrubland of *Senna glutinosa* subsp. x *luerssenii*, *Acacia synchronicia* and *Acacia tetragonophylla* over Low Open Shrubland of *Eremophila cuneifolia* on brown silty loam on footslopes



Quadrats Sampled	SW03, SW30, SW45
Soils and Geology	Brown silty/sandy loam with limited quartz outcropping
Land Form	Footslopes
TEC or PEC	No
Conservation Significant Flora	None
Introduced (Weed) Species	* <i>Cenchrus ciliaris</i> , * <i>Cenchrus setiger</i>
Vegetation Condition	Good
Disturbances	Cattle grazing, road access track, weeds
Average Fire Age	Old (6+ years)
Vegetation Structure & Floristics	
Trees < 10m	<i>Acacia aptaneura</i> , <i>Acacia rhodophloia</i> , <i>Acacia pteraneura</i> ,
Shrubs >2m	<i>Acacia tetragonophylla</i> , <i>Acacia synchronicia</i>
Shrubs 1-2m	<i>Senna glutinosa</i> subsp. x <i>luerssenii</i> , <i>Senna artemisioides</i> subsp. <i>helmsii</i> , <i>Acacia synchronicia</i> , <i>Acacia tetragonophylla</i>
Shrubs <1m	<i>Eremophila cuneifolia</i> , <i>Senna</i> sp. Meekatharra (E. Bailey 1-26), <i>Solanum lasiophyllum</i> , <i>Maireana triptera</i> , <i>Acacia synchronicia</i>
Tussock Grasses	<i>Eragrostis xerophila</i> , <i>Enteropogon ramosus</i> , <i>Enneapogon polyphyllus</i> , * <i>Cenchrus ciliaris</i> , * <i>Cenchrus setiger</i> , <i>Aristida contorta</i>

Broad Floristic Formation

4b. SP AsyAte SeahSeaoSegl SccnScctSol
Acacia High Open Shrubland

Vegetation Association

High Open Shrubland of *Acacia synchronicia* and *Acacia tetragonophylla* over Open Shrubland of *Senna artemisioides* subsp. *helmsii*, *Senna artemisioides* subsp. *oligophylla* and *Senna glutinosa* subsp. *x luerssenii* and Low Open Shrubland of *Sclerolaena cornishiana*, *Sclerolaena cuneata* and *Solanum lasiophyllum* on brown loam on stony plains



Quadrats Sampled	SW17, SW40, SW48
Soils and Geology	Brown loam
Land Form	Stony plains
TEC or PEC	No
Conservation Significant Flora	None
Introduced (Weed) Species	* <i>Cenchrus ciliaris</i>
Vegetation Condition	Poor
Disturbances	Road/access track, cattle grazing, weeds
Average Fire Age	Old (6+ years)
Vegetation Structure & Floristics	
Trees < 10m	<i>Acacia pteraneura</i> , <i>Acacia aptaneura</i> , <i>Hakea lorea</i> subsp. <i>lorea</i>
Shrubs >2m	<i>Acacia tetragonophylla</i> , <i>Acacia synchronicia</i>
Shrubs 1-2m	<i>Senna artemisioides</i> subsp. <i>helmsii</i> , <i>Senna artemisioides</i> subsp. <i>oligophylla</i> , <i>Senna glutinosa</i> subsp. <i>x luerssenii</i> , <i>Eremophila fraseri</i>
Shrubs <1m	<i>Sclerolaena cornishiana</i> , <i>Solanum lasiophyllum</i> , <i>Eremophila cuneifolia</i> , <i>Acacia synchronicia</i> , <i>Senna glutinosa</i> subsp. <i>x luerssenii</i> , <i>Maireana triptera</i> ,
Tussock Grasses	<i>Aristida inaequiglumis</i> , <i>Aristida contorta</i> , <i>Enteropogon ramosus</i> , <i>Tripogonella loliiformis</i> , * <i>Cenchrus ciliaris</i>

Broad Floristic Formation

5. SP ErfrAte SeahErfr ArcCyaTrl
Eremophila High Open Shrubland

Vegetation Association

High Open Shrubland of *Eremophila fraseri* and *Acacia tetragonophylla* over Open Shrubland of *Senna artemisioides* subsp. *helmsii* and *Eremophila fraseri* over Very Open Tussock Grassland of *Aristida contorta*, *Cymbopogon ambiguus* and *Tripogonella loliiformis* on brown silty loam on stony plains



Quadrats Sampled	SW44, SW27
Soils and Geology	Brown silty/sandy loam
Land Form	Stony plain
TEC or PEC	No
Conservation Significant Flora	None
Introduced (Weed) Species	* <i>Cenchrus ciliaris</i>
Vegetation Condition	Good
Disturbances	Cattle grazing, weeds
Average Fire Age	Old (6+years)
Vegetation Structure & Floristics	
Trees < 10m	<i>Acacia aptaneura</i> , <i>Acacia paraneura</i> , <i>Hakea lorea</i> subsp. <i>lorea</i>
Shrubs >2m	<i>Eremophila fraseri</i> , <i>Acacia tetragonophylla</i>
Shrubs <1m	<i>Senna artemisioides</i> subsp. <i>helmsii</i> , <i>Eremophila fraseri</i>
Hummock Grasses	<i>Triodia epactia</i>
Tussock Grasses	<i>Aristida contorta</i> , <i>Cymbopogon ambiguus</i> , <i>Tripogonella loliiformis</i> , <i>Enneapogon polyphyllus</i>

Broad Floristic Formation

6. FS FrsErcu AaAp AsyAte
Frankenia Low Shrubland

Vegetation Association

Low Shrubland of *Frankenia setosa* and *Eremophila cuneifolia* with Low Open Woodland of *Acacia aptaneura* and *Acacia paraneura* and High Open Shrubland of *Acacia synchronicia* and *Acacia tetragonophylla* on brown silty loam on footslopes



Quadrats Sampled	SW04, SW31, SW43
Soils and Geology	Brown silty/sandy loam
Land Form	Footslopes and hillslopes
TEC or PEC	No
Conservation Significant Flora	None
Introduced (Weed) Species	None
Vegetation Condition	Good
Disturbances	Cattle grazing, mine exploration
Average Fire Age	Old (6+ years)
Vegetation Structure & Floristics	
Trees < 10m	<i>Acacia aptaneura</i> , <i>Acacia paraneura</i>
Shrubs >2m	<i>Acacia synchronicia</i> , <i>Acacia tetragonophylla</i> , <i>Acacia wanyu</i>
Shrubs 1-2m	<i>Eremophila cuneifolia</i> , <i>Senna glutinosa</i> subsp. x <i>luerssenii</i>
Shrubs <1m	<i>Frankenia setosa</i> , <i>Eremophila cuneifolia</i> , <i>Senna</i> sp. Meekatharra (E. Bailey 1-26), <i>Sclerolaena cuneata</i>
Hummock Grassland	<i>Triodia epactia</i>
Tussock Grasses	<i>Enteropogon ramosus</i> , <i>Eragrostis xerophila</i> , <i>Oxychloris scariosa</i> , <i>Tripogonella loliiformis</i>

Broad Floristic Formation

7a. HS Tv EIApr AhiAaaCaca
Triodia Hummock Grassland

Vegetation Association

Hummock Grassland of *Triodia vanleeuwenii* with Low Open Woodland of *Eucalyptus leucophloia* and *Acacia pruinocarpa* over Low Open Shrubland of *Acacia hilliana*, *Acacia adoxa* var. *adoxo* and *Calytrix carinata* on brown sandy loam on hillslopes



Quadrats Sampled	SW29, SW47
Soils and Geology	Brown sandy/silty loam with limited BIF and detrital outcropping
Land Form	Hillslopes and hillcrests
TEC or PEC	No
Conservation Significant Flora	None
Introduced (Weed) Species	* <i>Cenchrus ciliaris</i>
Vegetation Condition	Very Good
Disturbances	Cattle grazing, road/access track, communications tower, water tank, dust
Average Fire Age	Old (6+ years)
Vegetation Structure & Floristics	
Trees < 10m	<i>Eucalyptus leucophloia</i> , <i>Acacia pruinocarpa</i> , <i>Hakea chordophylla</i> , <i>Grevillea berryana</i> , <i>Acacia aptaneura</i>
Shrubs 1-2m	<i>Senna glutinosa</i> subsp. <i>pruinosa</i> , <i>Acacia bivenosa</i> , <i>Senna glutinosa</i> subsp. <i>luerssenii</i>
Shrubs <1m	<i>Acacia hilliana</i> , <i>Acacia adoxa</i> var. <i>adoxo</i> , <i>Calytrix carinata</i> , <i>Ptilotus obovata</i>
Tussock Grasses	<i>Triodia vanleeuwenii</i>

Broad Floristic Formation

7b. HS Te ErfrAte Erfr
Triodia Hummock Grassland

Vegetation Association

Hummock Grassland of *Triodia epactia* with High Open Shrubland of *Eremophila fraseri* and *Acacia tetragonophylla* and Open Shrubland of *Eremophila fraseri* on brown sandy loam on hillslopes



Quadrats Sampled	SW12, SW28, SW39
Soils and Geology	Brown sandy loam with major dolerite outcropping
Land Form	Hillslopes and low undulating hills with rockpiles
TEC or PEC	No
Conservation Significant Flora	None
Introduced (Weed) Species	* <i>Cenchrus ciliaris</i>
Vegetation Condition	Very Good
Disturbances	Cattle grazing, road/access track, weeds
Average Fire Age	Old (6+ years)
Vegetation Structure & Floristics	
Trees < 10m	<i>Acacia aptaneura</i>
Shrubs >2m	<i>Eremophila fraseri</i> , <i>Acacia tetragonophylla</i>
Shrubs 1-2m	<i>Eremophila fraseri</i> , <i>Senna glutinosa</i> subsp. <i>luerssenii</i> , <i>Acacia sibirica</i>
Shrubs <1	<i>Senna artemisioides</i> subsp. <i>helmsii</i> , <i>Senna glutinosa</i> subsp. <i>luerssenii</i>
Hummock Grasses	<i>Triodia pungens</i> , <i>Triodia epactia</i>
Tussock Grasses	<i>Eriachne mucronata</i> , <i>Cymbopogon ambiguus</i> , <i>Themeda triandra</i> , <i>Enneapogon caeruleus</i>

Broad Floristic Formation

7c. HC TpTe Aa ErIIAteSegI
Triodia Hummock Grassland

Vegetation Association

Hummock Grassland of *Triodia pungens* or *Triodia epactia* with Low Open Woodland of *Acacia aptaneura* and Open Shrubland of *Eremophila latrobei* subsp. *latrobei*, *Acacia tetragonophylla* and *Senna glutinosa* subsp. *x luerksenii* on brown sandy loam on hillcrests



Quadrats Sampled	SW13, SW32, SW42
Soils and Geology	Brown sandy loam with moderate ironstone outcropping
Land Form	Hillcrests
TEC or PEC	No
Conservation Significant Flora	None
Introduced (Weed) Species	* <i>Cenchrus ciliaris</i>
Vegetation Condition	Very Good
Disturbances	Weeds, cattle grazing
Average Fire Age	Old (6+ years)
Vegetation Structure & Floristics	
Trees < 10m	<i>Acacia aptaneura</i> , <i>Acacia pruinocarpa</i> , <i>Acacia rhodophloia</i> , <i>Grevillea berryana</i>
Shrubs >2m	<i>Eremophila latrobei</i> subsp. <i>latrobei</i> , <i>Eremophila forrestii</i> , <i>Rhagodia eremaea</i> , <i>Acacia synchronicia</i> , <i>Acacia tetragonophylla</i>
Shrubs 1-2m	<i>Senna glutinosa</i> subsp. <i>luerksenii</i> , <i>Acacia tetragonophylla</i> , <i>Dodonaea petiolaris</i>
Shrubs <1m	<i>Eremophila cuneifolia</i> , <i>Atriplex bunburyana</i> , <i>Senna stricta</i> , <i>Dodonaea petiolaris</i> , <i>Maireana melanocoma</i>
Hummock Grasses	<i>Triodia epactia</i> , <i>Triodia angusta</i> , <i>Triodia pungens</i>
Tussock Grasses	<i>Eriachne mucronata</i> , <i>Digitaria brownii</i> , * <i>Cenchrus ciliaris</i>

Broad Floristic Formation

7d. FS TvTe Atru AbAanc
Triodia Hummock Grassland

Vegetation Association

Hummock Grassland of *Triodia vanleeuwenii* and *Triodia epactia mini* with High Open Shrubland of *Acacia trudgeniana* and Open Shrubland of *Acacia bivenosa* and *Acacia ancistrocarpa* on brown sandy loam on footslopes



Quadrats Sampled	SW16, SW33, SW36
Soils and Geology	Brown sandy loam with minor quartz/chert outcropping,
Land Form	Footslopes
TEC or PEC	No
Conservation Significant Flora	None
Introduced (Weed) Species	None
Vegetation Condition	Very Good
Disturbances	Cattle grazing
Average Fire Age	Moderate (3-5 years)
Vegetation Structure & Floristics	
Trees < 10m	<i>Hakea lorea</i> subsp. <i>lorea</i> , <i>Acacia pruinocarpa</i> , <i>Hakea chordophylla</i> , <i>Eucalyptus leucophloia</i> , <i>Acacia aptaneura</i>
Shrubs >2m	<i>Acacia trudgeniana</i> , <i>Acacia synchronicia</i> , <i>Senna glutinosa</i> subsp. <i>luerssenii</i> , <i>Acacia tetragonophylla</i> ,
Shrubs 1-2m	<i>Acacia bivenosa</i> , <i>Acacia ancistrocarpa</i> , <i>Acacia trudgeniana</i> , <i>Senna glutinosa</i> subsp. <i>pruinocarpa</i>
Shrubs <1m	<i>Acacia hilliana</i> , <i>Acacia adoxa</i> var. <i>adoxo</i> , <i>Eremophila cuneifolia</i> , <i>Acacia synchronicia</i> , <i>Seringia elliptica</i> , <i>Indigofera monophylla</i>
Hummock Grasses	<i>Triodia vanleeuwenii</i> , <i>Triodia epactia</i>
Tussock Grasses	<i>Eriachne mucronata</i> , <i>Amphipogon sericeus</i> , <i>Aristida holathera</i> var. <i>holathera</i> , <i>Paraneurachne muelleri</i> , <i>Eragrostis eriopoda</i>

Broad Floristic Formation

7e. HS TeTv AbSegp AprChAa
Triodia Hummock Grassland

Vegetation Association

Hummock Grassland of *Triodia mini epactia* and *Triodia vanleeuwenii* with Open Shrubland of *Acacia bivenosa* and *Senna glutinosa* subsp. *pruinosa* and Scattered Low Trees of *Acacia pruinocarpa*, *Corymbia hamersleyana* and *Acacia aptaneura* on brown loamy sand on hillslopes



Quadrats Sampled	SW09, SW07, SW35
Soils and Geology	Brown loamy sand or silty loam with major quartz outcropping
Land Form	Hillslopes
TEC or PEC	No
Conservation Significant Flora	None
Introduced (Weed) Species	* <i>Cenchrus ciliaris</i>
Vegetation Condition	Very Good
Disturbances	Cattle grazing, weeds
Average Fire Age	Old (6+ years)
Vegetation Structure & Floristics	
Trees < 10m	<i>Corymbia hamersleyana</i> , <i>Acacia pruinocarpa</i> , <i>Acacia aptaneura</i> , <i>Eucalyptus leucophloia</i> , <i>Acacia aptaneura</i>
Shrubs 1-2m	<i>Senna glutinosa</i> subsp. <i>pruinocarpa</i> , <i>Acacia bivenosa</i> , <i>Acacia pachyacra</i> , <i>Acacia synchronicia</i>
Shrubs <1m	<i>Eremophila cuneifolia</i> , <i>Acacia bivenosa</i>
Hummock Grasses	<i>Triodia epactia</i> , <i>Triodia vanleeuwenii</i>
Tussock Grasses	<i>Eriachne mucronata</i> , <i>Digitaria brownii</i>

Broad Floristic Formation

7f. SA Tb Hall ApaAmeAanc
Triodia Hummock Grassland

Vegetation Association

Hummock Grassland of *Triodia basedowii* with Low Open Woodland of *Hakea lorea* subsp. *lorea* with High Open Shrubland of *Acacia pachyacra*, *Acacia melleodora* and *Acacia ancistrocarpa* on brown loamy sand on sandplains



Quadrats Sampled	SW08, SW22, SW14
Soils and Geology	Brown loamy sand
Land Form	Sandplain
TEC or PEC	No
Conservation Significant Flora	None
Introduced (Weed) Species	None
Vegetation Condition	Very Good
Disturbances	Cattle grazing
Average Fire Age	Old (6+ years)
Vegetation Structure & Floristics	
Trees < 10m	<i>Hakea lorea</i> subsp. <i>lorea</i> , <i>Acacia pruinocarpa</i> , <i>Corymbia hamersleyana</i> , <i>Acacia aptaneura</i> , <i>Corymbia deserticola</i>
Shrubs >2m	<i>Acacia pachyacra</i> , <i>Acacia pruinocarpa</i> , <i>Acacia melleodora</i> , <i>Acacia ancistrocarpa</i>
Shrubs 1-2m	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>
Shrubs <1m	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i> , <i>Androcalva loxophylla</i> , <i>Acacia ancistrocarpa</i> , <i>Kennedia prorepens</i> , <i>Sida cardiophylla</i> , <i>Bonamia erecta</i>
Hummock Grasses	<i>Triodia basedowii</i> , <i>Triodia schinzii</i>
Tussock Grasses	<i>Aristida holathera</i> var. <i>holathera</i> , <i>Eragrostis eriopoda</i> , <i>Paraneurachne muelleri</i>

Broad Floristic Formation

8. HS TvTaTp AwAsyAte Ercu
Triodia Open Hummock Grassland

Vegetation Association

Open Hummock Grassland of *Triodia vanleeuwenii*, *Triodia angusta* and *Triodia pungens* with High Open Shrubland of *Acacia wanyu*, *Acacia synchronicia* and *Acacia tetragonophylla* and Low Open Shrubland of *Eremophila cuneifolia* on brown sandy loam on hillslopes



Quadrats Sampled	SW11, SW26, SW46,
Soils and Geology	Brown sandy loam with minor ironstone outcropping
Land Form	Hillslopes
TEC or PEC	No
Conservation Significant Flora	None
Introduced (Weed) Species	None
Vegetation Condition	Very Good
Disturbances	Cattle grazing, mine exploration, road/access track
Average Fire Age	Old (6+ years)
Vegetation Structure & Floristics	
Trees < 10m	<i>Acacia aptaneura</i> , <i>Eucalyptus leucophloia</i> , <i>Acacia paraneura</i> ,
Shrubs >2m	<i>Acacia wanyu</i> , <i>Acacia synchronicia</i> , <i>Acacia tetragonophylla</i>
Shrubs 1-2 m	<i>Acacia wanyu</i> , <i>Senna glutinosa</i> subsp. <i>luerssenii</i>
Shrubs <1m	<i>Eremophila cuneifolia</i> , <i>Ptilotus obovatus</i> , <i>Maireana melanocoma</i>
Hummock Grasses	<i>Triodia vanleeuwenii</i> , <i>Triodia pungens</i> , <i>Triodia angusta</i>

Broad Floristic Formation

9. FP CcAriTt ChApt AsApyApa
**Cenchrus* Open Tussock Grassland

Vegetation Association

Open Tussock Grassland of **Cenchrus ciliaris*, *Aristida inaequiglumis* and *Themeda triandra* with Low Open Woodland of *Corymbia hamersleyana* and *Acacia pteraneura* and High Open Shrubland of *Acacia sclerosperma*, *Acacia pyrifolia* and *Acacia pachyacra* on brown loamy sand on floodplains



Quadrats Sampled	SW19, SW24
Soils and Geology	Brown sandy loam
Land Form	Floodplains
TEC or PEC	No
Conservation Significant Flora	None
Introduced (Weed) Species	* <i>Cenchrus ciliaris</i>
Vegetation Condition	Poor
Disturbances	Cattle grazing, weeds
Average Fire Age	Old (6+ years)
Vegetation Structure & Floristics	
Trees < 10m	<i>Corymbia hamersleyana</i> , <i>Acacia pteraneura</i> , <i>Acacia coriacea</i> subsp. <i>pendens</i> , <i>Hakea lorea</i> subsp. <i>lorea</i> , <i>Acacia paraneura</i>
Shrubs >2m	<i>Acacia sclerosperma</i> , <i>Acacia pachyacra</i> , <i>Acacia pyrifolia</i> , <i>Acacia macraneura</i>
Shrubs <1m	<i>Tephrosia rosea</i> var. <i>Fortescue Creeks</i> (M.I.H. Brooker 2186)
Hummock Grasses	<i>Triodia basedowii</i>
Tussock Grasses	* <i>Cenchrus ciliaris</i> , <i>Eragrostis eriopoda</i> , <i>Aristida inaequiglumis</i> , <i>Themeda triandra</i> , <i>Eulalia aurea</i>

3.8 Vegetation Condition

Vegetation condition within the study area ranged from *very good* to *completely degraded* (Figure 10). The condition of vegetation across the hillslopes, hillcrests and footslopes of the study area were generally rated as *very good*. Condition was reduced to *good* or *poor* in areas of lower relief including drainage lines and hardpan plains dominated by mulga. The vegetation of the study area showed obvious signs of degradation by cattle grazing. **Cenchrus ciliaris* was a dominant component of two vegetation associations along the major drainage line, occurring on the banks of the drainage line and extending to dense stands across the floodplains. Two areas were mapped as *completely degraded*, one area was cleared, and the other area has previously been disturbed and with signs of rehabilitation.

The majority of the study area was long unburnt (>6 years) with patches of moderate burn age (3-5 years) forming a mosaic.

Shearers West
Figure 10
Vegetation Condition

Legend

 Study Area

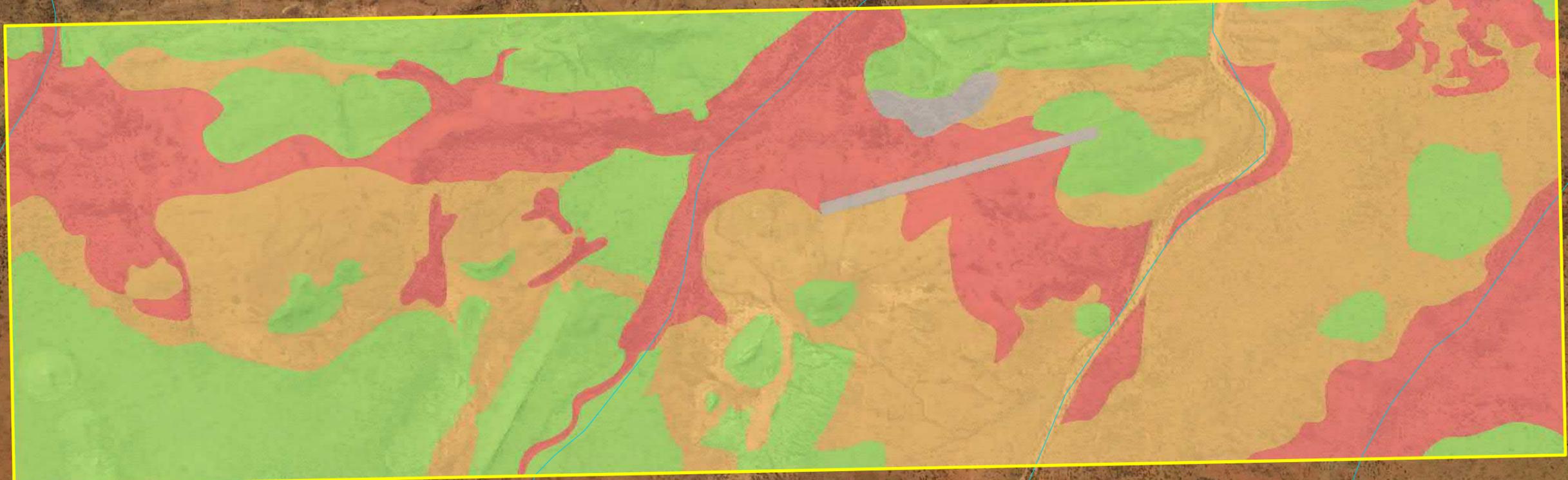
Vegetation Condition

 Completely Degraded

 Poor

 Good

 Very Good



N



Meters
1:20,000
Datum: GDA94
Projection: MGA Zone 50

Date: 02/11/2018
Status: Final
Figure: 10
Sheet Size: A3
Internal Reference: SW_Veg_Cond
Drawn by: GSM
Requested by: DB

4.0 SUMMARY

The single season detailed flora and vegetation survey of the Shearers West tenement was completed between the 7th and 13th of May 2018.

The survey recorded 264 plant taxa (including varieties and subspecies) from 38 families and 110 genera. There were no plant taxa gazetted as Threatened Flora pursuant to subsection (2) of section 23F of the WC Act, or listed under the EPBC Act recorded from the study area. Additionally, no Priority listed flora were recorded from the study area. Two of the taxa recorded were identified as range extensions; *Euphorbia multifaria* and *Ipomoea coptica*.

A total of 18 vegetation associations, classified into nine broad floristic formations, were described and mapped within the study area. None of the vegetation associations within the study area had any affiliation with Federal or State listed TECs or PECs.

Six introduced flora (weed) species were recorded from the study area, none of which are listed as a Declared Pest under the BAM Act. Vegetation condition within the study area ranged from *very good* to *completely degraded*.

5.0 STUDY TEAM

The detailed flora and vegetation survey for the Shearers West study area was planned, coordinated and executed by the following personnel:

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Mrs Kerry Keenan		Data Analyst
Mr Todd Griffin		GIS Specialist

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APPENDIX 1

Summary of background and results for previous flora and
vegetation surveys

Project	Survey Timing	Season	Survey Type	Area (ha)	No. Sites	No. Taxa	Significant Flora	Introduced Flora
Surveys completed within, or partly within, the study area								
Onshore Environmental (2017) Jimblebar South Tenement E52/3413 Flora and Vegetation Desktop Review	NA	NA	Desktop assessment	-	-	-	11 taxa listed as likely to occur within the study area: <i>Acacia</i> sp. East Fortescue (J. Bull & D. Roberts ONS A 27.01) (P1), <i>Aristida jerichoensis</i> var. <i>subspinulifera</i> (P3), <i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i> (P2), <i>Goodenia berringbinensis</i> (P4), <i>Goodenia nuda</i> (P4), <i>Ipomoea racemigera</i> (P2), <i>Isotropis parviflora</i> (P2), <i>Josephinia</i> sp. Marandoo (M.E. Trudgen 1554) (P1), <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (P4), <i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739) (P3), <i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwen 4684) (P1)	-
Surveys completed in close proximity to the study area								
GHD (2009) Caramulla Exploration Area Flora and Vegetation Survey	December 2008	Poor	Single season Level 2	5,300	26	225	<i>Crotalaria smithiana</i> (P3)	* <i>Malvastrum americanum</i> , * <i>Cenchrus ciliaris</i>

Project	Survey Timing	Season	Survey Type	Area (ha)	No. Sites	No. Taxa	Significant Flora	Introduced Flora
Onshore Environmental (2018, <i>in prep</i>) Reconnaissance Flora and Vegetation Survey Caramulla	February 2018	Poor	Level 1	12,500	-	-	<i>Eremophila capricornica</i> (P1), <i>Ipomoea racemigera</i> (P2), <i>Crotalaria smithiana</i> (P3), <i>Rhagodia</i> sp. Hammersley (M. Trudgen 17794) (P3), <i>Goodenia nuda</i> (P4) Species of interest: <i>Indigofera</i> sp. indet and <i>Tephrosia</i> sp. Willowra (G.M. Chippendale 4809)	* <i>Bidens bipinnata</i> , * <i>Cenchrus ciliaris</i> , * <i>Citrullus</i> sp. indet, * <i>Malvastrum americanum</i> , * <i>Vachellia farnesiana</i>
Astron (2017a) Mines, Port, Rail & NPI – Weed Mapping & Control – Jimblebar, March 2017	March 2017	Good	Weed survey and spraying	-	-	-	None recorded	* <i>Aerva javanica</i> , * <i>Cenchrus setiger</i> , * <i>Chloris barbata</i> , * <i>Chloris virgata</i> , * <i>Citrullus lanatus</i> , * <i>Cynodon dactylon</i> , * <i>Lactuca serriola</i> , * <i>Rumex vesicarius</i> , * <i>Sonchus oleraceus</i> , * <i>Vachellia farnesiana</i>
Astron (2017b) Mines, Port, Rail & NPI – Weed Mapping & Control – Jimblebar, May 2017	May 2017	Good	Weed survey and spraying	-	-	-	None recorded	* <i>Aerva javanica</i> , * <i>Chloris barbata</i> , * <i>Chloris virgata</i> , * <i>Citrullus lanatus</i> , * <i>Lactuca serriola</i> , * <i>Malvastrum americanum</i> , * <i>Rumex vesicarius</i> , * <i>Solanum nigrum</i> , * <i>Sonchus oleraceus</i> , * <i>Vachellia farnesiana</i>

Project	Survey Timing	Season	Survey Type	Area (ha)	No. Sites	No. Taxa	Significant Flora	Introduced Flora
Onshore Environmental (2016) Level 2 Riparian & Aquatic Flora & Vegetation Survey Jimblebar Creek and Innawally Pool	25th and 29th May 2016	Poor	Single season Level 2 and riparian vegetation monitoring	-	15	242	<i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (P3), <i>Goodenia nuda</i> (P4)	* <i>Cenchrus ciliaris</i> , * <i>Cynodon dactylon</i> , * <i>Echinochloa colona</i> , * <i>Malvastrum americanum</i> , * <i>Tribulus terrestris</i>
Onshore Environmental (2015a) Dynasty and West Jimblebar Flora and Vegetation Survey	February-March 2015	Good	Single season Level 2	3,358	29	263	<i>Ipomoea racemigera</i> (P2), <i>Goodenia nuda</i> (P4), <i>Goodenia berringbinensis</i> (P4) Five Range extensions: <i>Eragrostis speciosa</i> , <i>Hibiscus verdcourtii</i> , <i>Goodenia berringbinensis</i> , <i>Eleocharis pallens</i> , <i>Tribulus</i> cf. <i>eichlerianus</i>	* <i>Aerva javanica</i> , * <i>Bidens bipinnata</i> , * <i>Cenchrus ciliaris</i> , * <i>Malvastrum americanum</i>
Onshore Environmental (2015b) OB31 Jimblebar Access Track VCP Level 1 Flora & Vegetation Survey and Vertebrate Fauna Assessment	15 th -16 th July 2015	Excellent	Level 1	-	-	-	<i>Acacia clelandii</i> (range extension)	* <i>Cenchrus ciliaris</i>
Onshore Environmental (2015c) Jimblebar Creek Riparian Flora and Vegetation Baseline Survey	8 th – 12 th September 2014	Poor	Single season Level 2 and riparian vegetation monitoring	-	13	167	<i>Chamaecrista symonii</i> , <i>Eragrostis speciosa</i> , <i>Halgania erecta</i> (range extensions)	* <i>Cenchrus ciliaris</i> , * <i>Cenchrus setiger</i> , * <i>Bidens bipinnata</i>
Onshore Environmental (2015d) Targeted Flora Survey <i>Acacia</i> sp. East Fortescue	March 2015, August 2015	NA	Targeted	-	-	-	None recorded	None
Onshore Environmental (2014a) Consolidation of Regional Vegetation Mapping BHP Billiton Iron Ore Pilbara Tenure	24 th -30 th July 2013, 20 th - 30 th August 2013	-	Vegetation mapping assessment	-	-	-	None recorded	-

Project	Survey Timing	Season	Survey Type	Area (ha)	No. Sites	No. Taxa	Significant Flora	Introduced Flora
Onshore Environmental (2014b) Tenement E52/2238 Level 1 Flora and Vegetation Level 1 Vertebrate Fauna Survey	8 th -10 th July 2014	Good	Level 1	-	-	-	None recorded	* <i>Cenchrus ciliaris</i> , * <i>Vachellia farnesiana</i>
Onshore Environmental (2014c) OB 19 Level 2 Flora and Vegetation Assessment	19 th -27 th March 2013, 9 th - 22 nd September 2013	Good	Two season Level 2	-	30	276	<i>Isotropis parviflora</i> (P2), <i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739) (P3)	* <i>Cenchrus ciliaris</i> , * <i>Bidens bipinnata</i>
Onshore Environmental (2014d) OB 31 Targeted Significant Flora Survey	April 2014	Excellent	Targeted Flora Survey	-	-	-	<i>Acacia</i> sp. East Fortescue (J. Bull & D. Roberts ONS A 27.01) (P1), <i>Rhagodia</i> sp. Hamersley (M. Trudgen 12739) (P3), <i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739) (P3), <i>Goodenia nuda</i> (P4), <i>Acacia clelandii</i> (Range extension)	Not Recorded
Onshore Environmental (2014e) Orebody 31 Level 2 Flora and Vegetation Survey	October 2013	Good	Two season Level 2	-	45	280	<i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739) (P3), <i>Rhagodia</i> sp. Hamersley (M. Trudgen 12739) (P3), <i>Acacia</i> sp. East Fortescue (J. Bull & D. Roberts ONS A 27.01) (P1)	* <i>Cenchrus ciliaris</i> , * <i>Malvastrum americanum</i>

Project	Survey Timing	Season	Survey Type	Area (ha)	No. Sites	No. Taxa	Significant Flora	Introduced Flora
Onshore Environmental (2014f) Dynasty Tenement E52/2591 Flora and Vegetation Desktop Assessment	February 2014	NA	Desktop assessment	1,866	-	-	Eight taxa considered likely to occur within the study area: <i>Aristida jerichoensis</i> var. <i>subspinulifera</i> (P3), <i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i> (P2), <i>Gymnanthera cunninghamii</i> (P3), <i>Goodenia nuda</i> (P4), <i>Josephinia</i> sp. Marandoo (M.E. Trudgen 1554) (Priority 1), <i>Rhodanthe frenchii</i> (P2), <i>Rostellularia adscendens</i> var. <i>latifolia</i> (P3), <i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwen 4684) (P1)	-
Onshore Environmental (2014g) OB18 to OB31 Infrastructure Corridor Targeted Flora Survey	September 2014	Good	Targeted Flora Survey	-	-	-	<i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739) (P3), <i>Goodenia nuda</i> (P4)	Not Recorded

Project	Survey Timing	Season	Survey Type	Area (ha)	No. Sites	No. Taxa	Significant Flora	Introduced Flora
Syrinx (2014) South West Jimblebar Level 2 Flora and Vegetation Survey	14 th -18 th March 2011 and 27 th -4 th September 2013	Good-Excellent	Single season Level 2	2,050	38	330	<i>Aristida jerichoensis</i> subsp. <i>subspinulifera</i> (P3), <i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwen 4684) (P1), <i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i> (P1), Range extensions: <i>Abutilon malvifolium</i> , <i>Brachyscome ciliaris</i> , <i>Euphorbia porcata</i> , <i>Diplachne fusca</i> subsp. <i>muelleri</i> , <i>Tephrosia sphaerospora</i>	* <i>Bidens bipinnata</i> , * <i>Cenchrus ciliaris</i> , * <i>Cenchrus setiger</i> , * <i>Cucumis melo</i> , * <i>Malvastrum americanum</i> , * <i>Taraxacum khatoonae</i> ⁴ , * <i>Vachellia farnesiana</i>
Onshore Environmental (2013) Orebody 17/18 Derived Vegetation Association Mapping Report	No field survey	Desktop only	Desktop	-	-	-	None recorded	Not recorded
Astron (2012) Eastern Mines Weed Survey, Jimblebar	May 2012	-	Weed survey	-	25 project monitor sites and 6 reference sites	-	Not recorded	* <i>Rumex vesicarius</i> , * <i>Aerva javanica</i> , * <i>Bidens bipinnata</i> , * <i>Cenchrus ciliaris</i> , * <i>Chloris barbata</i> , * <i>Chloris virgata</i> , * <i>Citrullus colocynthis</i> , * <i>Cynodon dactylon</i> , * <i>Malvastrum americanum</i> , <i>Portulaca oleracea</i> ⁵ , * <i>Solanum nigrum</i> , * <i>Sonchus asper</i> , * <i>Vachellia farnesiana</i>

⁴ Recorded as **Taraxacum officinale*

⁵ No longer considered a weed in the Pilbara (naturalised)

Project	Survey Timing	Season	Survey Type	Area (ha)	No. Sites	No. Taxa	Significant Flora	Introduced Flora
Syrinx (2012a) South West Jimblebar Flora and Vegetation Survey	March 2011	Good	Single season Level 2	2,050	19	202	<i>Aristida ?jerichoensis</i> var. <i>subspinulifera</i> (P1), <i>Goodenia ?nuda</i> (P4) Five range extensions: <i>Alloteropsis cimicina</i> , <i>Brachyscome ciliaris</i> var. <i>ciliaris</i> , <i>Evolvulus alsinoides</i> var. <i>decumbens</i> , <i>Tephrosia sphaerospora</i> , <i>Tribulopsis angustifolia</i>	* <i>Bidens bipinnata</i> , * <i>Cenchrus ciliaris</i> , * <i>Cucumis melo</i> , <i>Portulaca oleracea</i> ⁶
Syrinx (2012b) Wheelarra Hill North Level 2 Flora and Vegetation Assessment	May 2011 and October 2011	Good	Two season Level 2	4,972	83	411 (392 fully identified)	<i>Aristida ?jerichoensis</i> var. <i>subspinulifera</i> ⁷ Nine range extensions: <i>Sclerolaena minuta</i> , <i>Eragrostis olida</i> , <i>Oldenlandia galioides</i> , <i>Evolvulus alsinoides</i> var. <i>decumbens</i> , <i>Phyllanthus erwinii</i> , <i>Phyllanthus maderaspatensis</i> , <i>Santalum spicatum</i> , <i>Cyperus ixiocarpus</i> , <i>Abutilon cunninghamii</i> , and two possible range extensions; <i>Tephrosia</i> aff. <i>sphaerospora</i> , <i>Hibiscus</i> aff. <i>apodus</i>	* <i>Bidens bipinnata</i> , * <i>Cenchrus ciliaris</i> , * <i>Malvastrum americanum</i> , <i>Portulaca oleracea</i> ⁸

⁶ No longer considered a weed in the Pilbara (naturalised)

⁷ Targeted searches by Onshore Environmental (2014b) confirmed this taxon to be *Aristida inaequiglumis* (not Threatened or Priority flora)

⁸ No longer considered a weed in the Pilbara (naturalised)

Project	Survey Timing	Season	Survey Type	Area (ha)	No. Sites	No. Taxa	Significant Flora	Introduced Flora
Eco Logical (2012) Level 1 flora and fauna surveys along the Great Northern Highway for Jimblebar mine module transport.	August 2011	Good	Level 1	-	3	52	None recorded	* <i>Cenchrus ciliaris</i>
Syrinx (2011) OB 31 Flora and Vegetation Assessment	February and March 2011	Good	Two season, Level 2	-	29	206	None recorded	* <i>Cenchrus ciliaris</i> , * <i>Malvastrum americanum</i> , <i>Portulaca oleracea</i> ⁴
ENV (2010a) RGP6 Jimblebar Hub (Water Pipeline) Flora and Vegetation Assessment	November 2009	-	Single Season Level 2	-	16	166	None recorded	* <i>Cenchrus ciliaris</i> , * <i>Malvastrum americanum</i>
ENV (2010b) Jimblebar Wye Targeted Declared Rare Flora and Priority Listed Flora Assessment	March 2010, June 2010	-	Targeted	-	-	-	<i>Gymnanthera cunninghamii</i> (P3)	Not recorded
Outback Ecology (2010) Jimblebar Iron Ore Project Flora and Vegetation Assessment	July and September 2008, January and March 2009	Poor	Two season Level 2	6,685	128	326	<i>Josephinia</i> sp. Marandoo (M.E. Trudgen 1554) (P1), <i>Goodenia nuda</i> (P4)	* <i>Rumex vesicarius</i> , * <i>Bidens bipinnata</i> , * <i>Cenchrus ciliaris</i> , * <i>Cucumis melo</i> , * <i>Cucumis myriocarpus</i> , * <i>Malvastrum americanum</i>
ENV Australia (2009a) Ammonium Nitrate Storage Facility Flora and Vegetation Assessment	September 2009	-	Single season Level 2	-	7	123	None	* <i>Cenchrus ciliaris</i> , <i>Portulaca oleracea</i> ⁹
ENV Australia (2009b) Construction Water Supply Pipeline and Ammonium Nitrate Storage Facility Flora and Vegetation Assessment	September and November 2009	-	Two season Level 2	-	23	213	<i>Goodenia nuda</i> (P4)	* <i>Cenchrus ciliaris</i> , * <i>Malvastrum americanum</i> , <i>Portulaca oleracea</i> ⁵

⁹ No longer considered a weed in the Pilbara (naturalised)

Project	Survey Timing	Season	Survey Type	Area (ha)	No. Sites	No. Taxa	Significant Flora	Introduced Flora
ENV Australia (2009c) Newman to Jimblebar Transmission Line and Newman Town Substation Flora and Vegetation Assessment	April 2009	Good	Single season Level 2	-	48	365	<i>Goodenia nuda</i> (P4) Species of interest: <i>Muelleranthus trifoliolatus</i>	* <i>Datura leichhardtii</i> , * <i>Rumex vesicarius</i> , * <i>Aerva javanica</i> , * <i>Cenchrus ciliaris</i> , * <i>Cenchrus setiger</i> , * <i>Vachellia farnesiana</i> , * <i>Cynodon dactylon</i> , * <i>Malvastrum americanum</i> , * <i>Sonchus oleraceus</i> , * <i>Echinochloa colona</i> , * <i>Setaria verticillata</i> , * <i>Bidens bipinnata</i> , * <i>Cucumis melo</i> , * <i>Tribulus terrestris</i>
ENV Australia (2009d) Jimblebar Spur 2 Flora and Vegetation Assessment	September 2009	Poor	Single season Level 2	153	10	152	None	* <i>Bidens bipinnata</i> , * <i>Cenchrus ciliaris</i> , * <i>Malvastrum americanum</i>
Outback Ecology (2009a) Eastern Pilbara Accommodation Camp Flora and Fauna Assessment	October – November 2008	Poor	Single season Level 2	493	15	115	None	None
Outback Ecology (2009b) Wheelarra Hill Iron Ore Mine Modification Flora and Fauna Assessment	October and November 2008, January 2009	October: Poor January: Good	Two season Level 2	-	22	146	<i>Goodenia nuda</i> (P4)	* <i>Cenchrus ciliaris</i>

Project	Survey Timing	Season	Survey Type	Area (ha)	No. Sites	No. Taxa	Significant Flora	Introduced Flora
Outback Ecology (2009c) BHP Billiton Iron Ore Jimblebar Linear Development Flora and Vegetation Assessment	October 2008, March 2009	October: Poor March: Good	Two season Level 2		66	275	<i>Aristida jerichoensis</i> var. <i>subspinulifera</i> (P3)	* <i>Aerva javanica</i> , * <i>Bidens bipinnata</i> , * <i>Cenchrus ciliaris</i> , * <i>Cenchrus setiger</i> , * <i>Cucumis melo subsp. agrestis</i> , * <i>Cynodon dactylon</i> , * <i>Echinochloa colona</i> , * <i>Malvastrum americanum</i> , * <i>Setaria verticillata</i> , * <i>Tribulus terrestris</i> , * <i>Vachellia farnesiana</i> .
GHD (2008a) Draft Report for Wheelarra Hill (Jimblebar Mine Site) Priority Species Verification – <i>Goodenia hartiana</i> Species Verification	September 2007	Poor	Targeted	-	12	-	None recorded	Not recorded
GHD (2008b) Mesa Gap Biological Survey	October 2007	Poor	Single season Level 2	-	40	133	None recorded	None
GHD (2008c) Ninga Declared Rare and Priority Flora Survey	October 2007	Poor	Targeted	-	-	-	None recorded Species of interest: <i>Aenictophyton</i> aff <i>reconditum</i> (G. Davis 120)	None

Project	Survey Timing	Season	Survey Type	Area (ha)	No. Sites	No. Taxa	Significant Flora	Introduced Flora
ENV (2008a) Rapid Growth Project 5: Repeater 9 Access Road Flora and Vegetation Assessment	June 2008	Poor	Single season Level 2	12	6	163	<i>Rostellularia adscendens</i> var. <i>latifolia</i> (P3)	* <i>Rumex vesicarius</i> , * <i>Aerva javanica</i> , * <i>Brassica tournefortii</i> , * <i>Cenchrus ciliaris</i> , * <i>Citrullus lanatus</i> , * <i>Cucumis melo</i> , * <i>Cynodon dactylon</i> , * <i>Datura leichhardtii</i> , * <i>Malvastrum americanum</i> , <i>Portulaca oleracea</i> ¹⁰ , * <i>Setaria verticillata</i> , * <i>Sonchus asper</i> , * <i>Sonchus oleraceus</i> , * <i>Vachellia farnesiana</i>
ENV (2008b) Jimblebar Access Road Flora and Vegetation Assessment	May 2007	Poor	Single season Level 2	-	22	112	None	* <i>Cenchrus ciliaris</i> , * <i>Aerva javanica</i> , * <i>Citrullus lanatus</i>
Pilbara Flora (2008) OB17 Flora and Vegetation Survey	October 2008	Poor	Single season Level 2	-	-	61	None	None
ENV Australia (2007a) West Jimblebar Exploration Lease Flora and Vegetation Assessment - Management Recommendations	May 2007	Average	Single season Level 2	-	29	318	<i>Goodenia nuda</i> (P4) One range extension: <i>Thyridolepis xerophila</i>	* <i>Bidens bipinnata</i> , * <i>Cenchrus ciliaris</i> , * <i>Malvastrum americanum</i>
ENV (2007b) OB 18 Flora and Vegetation Assessment Phase II	July and August 2006	Good	Single season Level 2	-	71	276	None	* <i>Rumex vesicarius</i> , * <i>Cenchrus ciliaris</i>
ENV (2007c) Jimblebar Stage 2, Levee Banks and Communications Tower Redevelopment Flora and Vegetation Assessments	April – June 2007	Average	Two season Level 2	-	4	103	None	* <i>Cenchrus ciliaris</i> , * <i>Cenchrus setiger</i> , * <i>Citrullus lanatus</i> , * <i>Bidens bipinnata</i> , * <i>Cynodon dactylon</i>

¹⁰ No longer considered a weed in the Pilbara (naturalised)

Project	Survey Timing	Season	Survey Type	Area (ha)	No. Sites	No. Taxa	Significant Flora	Introduced Flora
ENV (2007d) RGP4 Jimblebar Rail Loop Flora and Vegetation Assessment	November - December 2006	Good	Single season Level 2	-	4	65	None	* <i>Bidens bipinnata</i> , * <i>Cenchrus ciliaris</i>
Ecologia Environment (2007) Hashimoto Exploration Project Biological Survey: Flora and Vegetation	August/September 2005, February 2006	-	Two season Level 2	2,000	44	372	<i>Goodenia hartiana</i> ¹¹ (P2), <i>Goodenia nuda</i> (P3)	* <i>Cenchrus ciliaris</i> , * <i>Bidens bipinnata</i> , * <i>Sonchus oleraceus</i> ¹²
Ecologia Environment (2006) Jimblebar Marra Mamba Exploration Biological Survey	May 2006	Good	Single season Level 2	-	105	267	<i>Goodenia nuda</i> (P4)	* <i>Rumex vesicarius</i> , * <i>Cenchrus ciliaris</i>
Ecologia Environment (2005) Jimblebar East Exploration Project Biological Survey	February 2005	-	Single season Level 2	-	26	155	None	* <i>Cenchrus ciliaris</i>
Ecologia Environment (2004a) OB 18 Flora and Fauna Review	July 2004	-	Targeted	-	-	155	<i>Rhodanthe frenchii</i> (P2) ¹³	* <i>Cenchrus ciliaris</i>
Ecologia Environment (2004b) Jimblebar-Wheelarra Hill Expansion Biological Study	February–March 2004	-	Single season Level 2	-	44	181	None	* <i>Cenchrus ciliaris</i>
Ecologia Environment (2004c) Orebodies 18, 23 & 25 Flora and Fauna Review	May 2004	-	Targeted	-	-	-	<i>Eremophila magnifica</i> ¹⁴	Not recorded
Biota (2004) Jimblebar – Wheelarra Hill 3 Flora and Fauna Assessment	August 2003	-	Single season Level 2	-	-	227	None	* <i>Rumex vesicarius</i>
Ecologia Environmental (1999) Jimblebar Flora and Soil Survey	June 1998	Poor	Single season Level 2	24km ²	-	179	None recorded	* <i>Cenchrus ciliaris</i> , * <i>Malvastrum americanum</i> , * <i>Lactuca serriola</i> , * <i>Sonchus oleraceus</i>

¹¹ Fieldwork completed in the Jimblebar area by GHD (2008) found the previously recorded *Goodenia hartiana* plants to be *Goodenia* sp. Sandy Creek. It is likely that this specimen is also this taxon.

¹² **Pseudognaphalium luteoalbum* was also recorded but is no longer considered to be a weed species

¹³ It is noted that the original identification was not confirmed through the WAH and the collection represents a 300 km range extension to the east. It has not been recorded locally during numerous surveys over a 17-year period since the original record

¹⁴ The two subspecies were not differentiated at the time of survey; *Eremophila magnifica* subsp. *magnifica* (P4) and *Eremophila magnifica* subsp. *velutina* (P3).

Project	Survey Timing	Season	Survey Type	Area (ha)	No. Sites	No. Taxa	Significant Flora	Introduced Flora
Ecologia Environment (1996) Jimblebar Rail Spur Biological Assessment Survey	June 1995	-	Single season Level 2	-	2	106	None recorded	* <i>Cenchrus ciliaris</i> , * <i>Rumex vesicarius</i> , * <i>Malvastrum americanum</i> , * <i>Sonchus oleraceus</i>
Ecologia Environment (1995) Orebody 18 Biological Assessment Survey	August 1995	Good	Single season Level 2	-	32	250	<i>Triumfetta maconochieana</i> ¹⁵	* <i>Sonchus oleraceus</i> , * <i>Rumex vesicarius</i> , * <i>Bidens bipinnata</i>
BHP Iron Ore (1994) Jimblebar Mine Site Biological Survey	June 1994	-	Single season Level 2	-	22	132	None recorded	* <i>Rumex vesicarius</i>
Dames and Moore (1993) Ecological Observations Jimblebar Railway Line	November 1992	-	Borrow pit survey	-	41	-	None recorded	Not recorded

¹⁵ No longer listed as a priority species. Priority 2 at the time of survey.

APPENDIX 2

Vegetation condition scale
(as developed by Keighery 1994)

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

APPENDIX 3

Vegetation Classifications for the Pilbara based on Specht (1970), as modified by Aplin (1979) and Trudgen (2002)

Height Class	Canopy Cover				
	100 - 70%	70 - 30%	30 - 10%	10 - 2%	< 2%
Trees > 30 m	High Closed Forest	High Open Forest	High Woodland	High Open Woodland	Scattered Tall Trees
Trees 10-30m	Closed Forest	Open Forest	Woodland	Open Woodland	Scattered Trees
Trees < 10 m	Low Closed Woodland	Low Open Forest	Low Woodland	Low Open Woodland	Scattered Low Trees
Mallee	Closed Mallee	Mallee	Open Mallee	Very Open Mallee	Scattered Mallees
Shrubs > 2 m	Closed Scrub	Open Scrub	High Shrubland	High Open Shrubland	Scattered Tall Shrubs
Shrubs 1-2 m	Closed Heath	Open Heath	Shrubland	Open Shrubland	Scattered Shrubs
Shrubs < 1 m	Low Closed Heath	Low Open Heath	Low Shrubland	Low Open Shrubland	Low Scattered Shrubs
Hummock Grass	Closed Hummock Grassland	Hummock Grassland	Open Hummock Grassland	Very Open Hummock Grassland	Scattered Hummock Grass
Tussock Grass	Closed Tussock Grassland	Tussock Grassland	Open Tussock Grassland	Very Open Tussock Grassland	Scattered Tussock Grass
Bunch Grass	Closed Bunch Grassland	Bunch Grassland	Open Bunch Grassland	Very Open Bunch Grassland	Scattered Bunch Grass
Sedges	Closed Sedges	Sedges	Open Sedges	Very Open Sedges	Scattered Sedges
Herbs	Closed Herbs	Herbs	Open Herbs	Very Open Herbs	Scattered Herbs

Source: S. Van Leeuwen (DBCA)

APPENDIX 4

Conservation categories for flora described under the EPBC Act

Category	Description
Extinct	A species is extinct if there is no reasonable doubt that the last member of the species has died.
Extinct in the Wild	A species is categorised as extinct in the wild if it is only known to survive in cultivations, in captivity, or as a naturalised population well outside its past range; or if it has not been recorded in its known/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	The species is facing an extremely high risk of extinction in the wild and in the immediate future.
Endangered	The species is likely to become extinct unless the circumstances and factors threatening its abundance, survival, or evolutionary development cease to operate; or its numbers have been reduced to such a critical level, or its habitats have been so drastically reduced, that it is in immediate danger of extinction.
Vulnerable	Within the next 25 years, the species is likely to become endangered unless the circumstances and factors threatening its abundance, survival or evolutionary development cease to operate.
Conservation Dependent	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 within a period of 5 years.

APPENDIX 5

Conservation Codes for Western Australian Flora

T: Threatened (Declared Rare) Flora - Extant Taxa

Taxa which have been adequately searched for, and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.

1: Priority One - Poorly Known Taxa

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 localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

2: Priority Two - Poorly Known Taxa

Species that are known from one or a few collections (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 localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

3: Priority Three - Poorly Known Taxa

Species that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities 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 localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

4: Priority Four - Rare, Near Threatened and other taxa in need of monitoring

- (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These taxa are usually represented on conservation lands.
- (b) Near Threatened. Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.
- (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

APPENDIX 6

Total flora list from the study area

FAMILY	GENUS	SPECIES	INF_RANK	INF_NAME
Aizoaceae	<i>Trianthema</i>	<i>triquetrum</i>		
Amaranthaceae	<i>Alternanthera</i>	<i>nana</i>		
Amaranthaceae	<i>Alternanthera</i>	<i>nodiflora</i>		
Amaranthaceae	<i>Gomphrena</i>	<i>cunninghamii</i>		
Amaranthaceae	<i>Gomphrena</i>	<i>kanisii</i>		
Amaranthaceae	<i>Gomphrena</i>		sp.	indet
Amaranthaceae	<i>Ptilotus</i>	<i>calostachyus</i>		
Amaranthaceae	<i>Ptilotus</i>	<i>nobilis</i>		
Amaranthaceae	<i>Ptilotus</i>	<i>obovatus</i>		
Amaranthaceae	<i>Ptilotus</i>	<i>rotundifolius</i>		
Amaranthaceae	<i>Ptilotus</i>	<i>schwartzii</i>		
Amaranthaceae	<i>Ptilotus</i>		sp.	indet
Apocynaceae	<i>Cynanchum</i>	<i>floribundum</i>		
Araliaceae	<i>Trachymene</i>	<i>oleracea</i>		
Asteraceae	<i>Bidens</i>	<i>bispinnata</i>		
Asteraceae	<i>Pluchea</i>	<i>dentex</i>		
Asteraceae	<i>Pterocaulon</i>	<i>sphacelatum</i>		
Asteraceae	<i>Streptoglossa</i>	<i>decurrens</i>		
Asteraceae	<i>Streptoglossa</i>	<i>macrocephala</i>		
Boraginaceae	<i>Heliotropium</i>		cf.	<i>cunninghamii</i>
Boraginaceae	<i>Heliotropium</i>		sp.	indet
Brassicaceae	<i>Lepidium</i>	<i>pedicellosum</i>		
Brassicaceae	<i>Lepidium</i>	<i>platypetalum</i>		
Brassicaceae	<i>Stenopetalum</i>	<i>decipiens</i>		
Caryophyllaceae	<i>Polycarpaea</i>	<i>corymbosa</i>		
Celastraceae	<i>Stackhousia</i>		sp.	indet
Chenopodiaceae	<i>Atriplex</i>	<i>codonocarpa</i>		
Chenopodiaceae	<i>Atriplex</i>		cf.	<i>bunburyana</i>
Chenopodiaceae	<i>Atriplex</i>		cf.	<i>vesicaria</i>
Chenopodiaceae	<i>Dysphania</i>	<i>rhadinostachya</i>		
Chenopodiaceae	<i>Enchylaena</i>	<i>tomentosa</i>		
Chenopodiaceae	<i>Maireana</i>	<i>georgei</i>		
Chenopodiaceae	<i>Maireana</i>	<i>melanocoma</i>		
Chenopodiaceae	<i>Maireana</i>	<i>planifolia</i>		
Chenopodiaceae	<i>Maireana</i>	<i>pyramidata</i>		
Chenopodiaceae	<i>Maireana</i>	<i>tomentosa</i>		
Chenopodiaceae	<i>Maireana</i>	<i>triptera</i>		
Chenopodiaceae	<i>Maireana</i>	<i>villosa</i>		
Chenopodiaceae	<i>Maireana</i>		sp.	indet
Chenopodiaceae	<i>Rhagodia</i>	<i>eremaea</i>		

FAMILY	GENUS	SPECIES	INF_RANK	INF_NAME
Chenopodiaceae	<i>Salsola</i>	<i>australis</i>		
Chenopodiaceae	<i>Sclerolaena</i>	<i>cornishiana</i>		
Chenopodiaceae	<i>Sclerolaena</i>	<i>costata</i>		
Chenopodiaceae	<i>Sclerolaena</i>	<i>cuneata</i>		
Chenopodiaceae	<i>Sclerolaena</i>	<i>densiflora</i>		
Chenopodiaceae	<i>Sclerolaena</i>	<i>eriacantha</i>		
Chenopodiaceae	<i>Sclerolaena</i>		cf.	<i>densiflora</i>
Chenopodiaceae	<i>Sclerolaena</i>		sp.	indet
Chenopodiaceae	<i>Tecticornia</i>	<i>disarticulata</i>		
Cleomaceae	<i>Cleome</i>	<i>viscosa</i>		
Convolvulaceae	<i>Bonamia</i>	<i>erecta</i>		
Convolvulaceae	<i>Duperreya</i>	<i>commixta</i>		
Convolvulaceae	<i>Evolvulus</i>	<i>alsinoides</i>	var.	<i>decumbens</i>
Convolvulaceae	<i>Evolvulus</i>	<i>alsinoides</i>	var.	<i>villosicalyx</i>
Convolvulaceae	<i>Evolvulus</i>	<i>alsinoides</i>		
Convolvulaceae	<i>Ipomoea</i>	<i>calobra</i>		
Convolvulaceae	<i>Ipomoea</i>	<i>coptica</i>		
Convolvulaceae	<i>Ipomoea</i>	<i>muelleri</i>		
Cucurbitaceae	<i>Citrullus</i>	<i>lanatus</i>		
Cucurbitaceae	<i>Cucumis</i>	<i>variabilis</i>		
Cyperaceae	<i>Bulbostylis</i>	<i>barbata</i>		
Cyperaceae	<i>Cyperus</i>	<i>cunninghamii</i>		
Cyperaceae	<i>Cyperus</i>	<i>ixiocarpus</i>		
Cyperaceae	<i>Fimbristylis</i>	<i>dichotoma</i>		
Euphorbiaceae	<i>Euphorbia</i>	<i>australis</i>	var.	<i>hispidula</i>
Euphorbiaceae	<i>Euphorbia</i>	<i>australis</i>	var.	<i>subtomentosa</i>
Euphorbiaceae	<i>Euphorbia</i>	<i>biconvexa</i>		
Euphorbiaceae	<i>Euphorbia</i>	<i>coghlanii</i>		
Euphorbiaceae	<i>Euphorbia</i>	<i>ferdinandi</i>	var.	<i>ferdinandi</i>
Euphorbiaceae	<i>Euphorbia</i>	<i>multifaria</i>		
Euphorbiaceae	<i>Euphorbia</i>		sp.	indet
Fabaceae	<i>Acacia</i>	<i>adoxa</i>	var.	<i>adoxa</i>
Fabaceae	<i>Acacia</i>	<i>adsurgens</i>		
Fabaceae	<i>Acacia</i>	<i>ancistrocarpa</i>		
Fabaceae	<i>Acacia</i>	<i>aptaneura</i>		
Fabaceae	<i>Acacia</i>	<i>bivenosa</i>		
Fabaceae	<i>Acacia</i>	<i>colei</i>		
Fabaceae	<i>Acacia</i>	<i>coriacea</i>	subsp.	<i>pendens</i>
Fabaceae	<i>Acacia</i>	<i>dictyophleba</i>		
Fabaceae	<i>Acacia</i>	<i>hilliana</i>		

FAMILY	GENUS	SPECIES	INF_RANK	INF_NAME
Fabaceae	<i>Acacia</i>	<i>kempeana</i>		
Fabaceae	<i>Acacia</i>	<i>macraneura</i>		
Fabaceae	<i>Acacia</i>	<i>marramamba</i>		
Fabaceae	<i>Acacia</i>	<i>melleodora</i>		
Fabaceae	<i>Acacia</i>	<i>pachyacra</i>		
Fabaceae	<i>Acacia</i>	<i>paraneura</i>		
Fabaceae	<i>Acacia</i>	<i>pruinocarpa</i>		
Fabaceae	<i>Acacia</i>	<i>pteraneura</i>		
Fabaceae	<i>Acacia</i>	<i>pyrifolia</i>		
Fabaceae	<i>Acacia</i>	<i>rhodophloia</i>		
Fabaceae	<i>Acacia</i>	<i>sclerosperma</i>		
Fabaceae	<i>Acacia</i>	<i>sibirica</i>		
Fabaceae	<i>Acacia</i>	<i>synchronicia</i>		
Fabaceae	<i>Acacia</i>	<i>tenuissima</i>		
Fabaceae	<i>Acacia</i>	<i>tetragonophylla</i>		
Fabaceae	<i>Acacia</i>	<i>trudgeniana</i>		
Fabaceae	<i>Acacia</i>	<i>wanyu</i>		
Fabaceae	<i>Glycine</i>	<i>canescens</i>		
Fabaceae	<i>Gompholobium</i>	<i>oreophilum</i>		
Fabaceae	<i>Indigofera</i>	<i>georgei</i>		
Fabaceae	<i>Indigofera</i>	<i>monophylla</i>		
Fabaceae	<i>Isotropis</i>	<i>atropurpurea</i>		
Fabaceae	<i>Isotropis</i>	<i>forrestii</i>		
Fabaceae	<i>Kennedia</i>	<i>prorepens</i>		
Fabaceae	<i>Leptosema</i>	<i>chambersii</i>		
Fabaceae	<i>Rhynchosia</i>	<i>minima</i>		
Fabaceae	<i>Senna</i>	<i>artemisioides</i>	subsp.	<i>filifolia</i>
Fabaceae	<i>Senna</i>	<i>artemisioides</i>	subsp.	<i>helmsii</i>
Fabaceae	<i>Senna</i>	<i>artemisioides</i>	subsp.	<i>oligophylla</i>
Fabaceae	<i>Senna</i>	<i>glaucifolia</i>		
Fabaceae	<i>Senna</i>	<i>glutinosa</i>	subsp.	<i>glutinosa</i>
Fabaceae	<i>Senna</i>	<i>glutinosa</i>	subsp.	<i>pruinosa</i>
Fabaceae	<i>Senna</i>	<i>glutinosa</i>	subsp.	<i>x luerssenii</i>
Fabaceae	<i>Senna</i>	<i>notabilis</i>		
Fabaceae	<i>Senna</i>	<i>stricta</i>		
Fabaceae	<i>Senna</i>		sp.	Meekatharra (E. Bailey 1-26)
Fabaceae	<i>Tephrosia</i>	<i>rosea</i>	var.	Fortescue creeks (M.I.H. Brooker 2186)

FAMILY	GENUS	SPECIES	INF_RANK	INF_NAME
Fabaceae	<i>Tephrosia</i>		sp.	Newman (A.A. Mitchell PRP 29)
Fabaceae	<i>Tephrosia</i>		cf.	<i>supina</i>
Fabaceae	<i>Vachellia</i>	<i>farnesiana</i>		
Frankeniaceae	<i>Frankenia</i>	<i>setosa</i>		
Goodeniaceae	<i>Dampiera</i>	<i>candicans</i>		
Goodeniaceae	<i>Goodenia</i>	<i>prostrata</i>		
Goodeniaceae	<i>Goodenia</i>	<i>stobbsiana</i>		
Goodeniaceae	<i>Goodenia</i>	<i>triodiophila</i>		
Goodeniaceae	<i>Goodenia</i>		sp.	Sandy Creek (R.D. Royce 1653)
Goodeniaceae	<i>Scaevola</i>	<i>parvifolia</i>	subsp.	<i>pilbarae</i>
Goodeniaceae	<i>Scaevola</i>	<i>spinescens</i>		
Gyrostemonaceae	<i>Codonocarpus</i>	<i>cotinifolius</i>		
Lamiaceae	<i>Dicrastylis</i>	<i>cordifolia</i>		
Lauraceae	<i>Cassytha</i>	<i>capillaris</i>		
Loranthaceae	<i>Amyema</i>	<i>fitzgeraldii</i>		
Loranthaceae	<i>Amyema</i>	<i>hilliana</i>		
Lythraceae	<i>Ammannia</i>	<i>baccifera</i>		
Malvaceae	<i>Abutilon</i>	<i>cryptopetalum</i>		
Malvaceae	<i>Abutilon</i>	<i>lepidum</i>		
Malvaceae	<i>Abutilon</i>	<i>macrum</i>		
Malvaceae	<i>Abutilon</i>		sp.	indet
Malvaceae	<i>Androcalva</i>	<i>loxophylla</i>		
Malvaceae	<i>Androcalva</i>	<i>luteiflora</i>		
Malvaceae	<i>Corchorus</i>	<i>crozophorifolius</i>		
Malvaceae	<i>Corchorus</i>	<i>lasiocarpus</i>		
Malvaceae	<i>Corchorus</i>		sp.	indet
Malvaceae	<i>Gossypium</i>	<i>australe</i>		
Malvaceae	<i>Hibiscus</i>	<i>burtonii</i>		
Malvaceae	<i>Hibiscus</i>	<i>coatesii</i>		
Malvaceae	<i>Hibiscus</i>	<i>sturtii</i>	var.	<i>truncatus</i>
Malvaceae	<i>Hibiscus</i>		sp.	Gardneri (A.L. Payne PRP 1435)
Malvaceae	<i>Hibiscus</i>		cf.	<i>sturtii</i>
Malvaceae	<i>Malvastrum</i>	<i>americanum</i>		
Malvaceae	<i>Seringia</i>	<i>elliptica</i>		
Malvaceae	<i>Sida</i>	<i>arenicola</i>		
Malvaceae	<i>Sida</i>	<i>brownii</i>		
Malvaceae	<i>Sida</i>	<i>cardiophylla</i>		
Malvaceae	<i>Sida</i>	<i>echinocarpa</i>		

FAMILY	GENUS	SPECIES	INF_RANK	INF_NAME
Malvaceae	<i>Sida</i>	<i>ectogama</i>		
Malvaceae	<i>Sida</i>	<i>platycalyx</i>		
Malvaceae	<i>Sida</i>		sp.	dark green fruits (S. van Leeuwen 2260)
Malvaceae	<i>Sida</i>		sp.	Excedentifolia (J.L. Egan 1925)
Malvaceae	<i>Sida</i>		sp.	Golden calyces glabrous (H.N. Foote 32)
Malvaceae	<i>Sida</i>		sp.	indet
Malvaceae	<i>Sida</i>		sp.	Pilbara (A.A. Mitchell PRP 1543)
Malvaceae	<i>Sida</i>		sp.	spiciform panicles (E. Leyland s.n. 14/8/90)
Malvaceae	<i>Sida</i>		sp.	verrucose glands (F.H. Mollemans 2423)
Malvaceae	<i>Triumfetta</i>	<i>maconochieana</i>		
Myrtaceae	<i>Calytrix</i>	<i>carinata</i>		
Myrtaceae	<i>Corymbia</i>	<i>aspera</i>		
Myrtaceae	<i>Corymbia</i>	<i>deserticola</i>		
Myrtaceae	<i>Corymbia</i>	<i>hamersleyana</i>		
Myrtaceae	<i>Eucalyptus</i>	<i>camaldulensis</i>	subsp.	<i>obtusa</i>
Myrtaceae	<i>Eucalyptus</i>	<i>leucophloia</i>	subsp.	<i>leucophloia</i>
Myrtaceae	<i>Eucalyptus</i>	<i>victrix</i>		
Myrtaceae	<i>Melaleuca</i>	<i>eleuterostachya</i>		
Nyctaginaceae	<i>Boerhavia</i>	<i>coccinea</i>		
Phyllanthaceae	<i>Phyllanthus</i>	<i>maderaspatensis</i>		
Poaceae	<i>Amphipogon</i>	<i>sericeus</i>		
Poaceae	<i>Aristida</i>	<i>contorta</i>		
Poaceae	<i>Aristida</i>	<i>holathera</i>	var.	<i>holathera</i>
Poaceae	<i>Aristida</i>	<i>inaequiglumis</i>		
Poaceae	<i>Bothriochloa</i>	<i>ewartiana</i>		
Poaceae	<i>Cenchrus</i>	<i>ciliaris</i>		
Poaceae	<i>Cenchrus</i>	<i>setiger</i>		
Poaceae	<i>Chrysopogon</i>	<i>fallax</i>		
Poaceae	<i>Cymbopogon</i>	<i>ambiguus</i>		
Poaceae	<i>Cymbopogon</i>	<i>obtectus</i>		
Poaceae	<i>Cymbopogon</i>		sp.	indet
Poaceae	<i>Cynodon</i>	<i>prostratus</i>		
Poaceae	<i>Dactyloctenium</i>	<i>radulans</i>		
Poaceae	<i>Dichanthium</i>	<i>sericeum</i>	subsp.	<i>humilius</i>
Poaceae	<i>Digitaria</i>	<i>ammophila</i>		

FAMILY	GENUS	SPECIES	INF_RANK	INF_NAME
Poaceae	<i>Digitaria</i>	<i>brownii</i>		
Poaceae	<i>Enneapogon</i>	<i>caerulescens</i>		
Poaceae	<i>Enneapogon</i>	<i>polyphyllus</i>		
Poaceae	<i>Enneapogon</i>	<i>robustissimus</i>		
Poaceae	<i>Enteropogon</i>	<i>ramosus</i>		
Poaceae	<i>Eragrostis</i>	<i>cumingii</i>		
Poaceae	<i>Eragrostis</i>	<i>eriopoda</i>		
Poaceae	<i>Eragrostis</i>	<i>leptocarpa</i>		
Poaceae	<i>Eragrostis</i>	<i>pergracilis</i>		
Poaceae	<i>Eragrostis</i>	<i>tenellula</i>		
Poaceae	<i>Eragrostis</i>	<i>xerophila</i>		
Poaceae	<i>Eragrostis</i>		sp.	indet
Poaceae	<i>Eriachne</i>	<i>lanata</i>		
Poaceae	<i>Eriachne</i>	<i>mucronata</i>		
Poaceae	<i>Eriachne</i>	<i>obtusa</i>		
Poaceae	<i>Eriachne</i>	<i>pulchella</i>	subsp.	<i>dominii</i>
Poaceae	<i>Eriachne</i>		sp.	indet
Poaceae	<i>Eulalia</i>	<i>aurea</i>		
Poaceae	<i>Iseilema</i>	<i>dolichotrichum</i>		
Poaceae	<i>Iseilema</i>		sp.	indet
Poaceae	<i>Oxychloris</i>	<i>scariosa</i>		
Poaceae	<i>Panicum</i>	<i>decompositum</i>		
Poaceae	<i>Panicum</i>	<i>effusum</i>		
Poaceae	<i>Paraneurachne</i>	<i>muelleri</i>		
Poaceae	<i>Paspalidium</i>	<i>clementii</i>		
Poaceae	<i>Paspalidium</i>	<i>rarum</i>		
Poaceae	<i>Perotis</i>	<i>rara</i>		
Poaceae	<i>Poaceae</i>		sp.	indet
Poaceae	<i>Schizachyrium</i>	<i>fragile</i>		
Poaceae	<i>Sporobolus</i>	<i>actinocladus</i>		
Poaceae	<i>Sporobolus</i>	<i>australasicus</i>		
Poaceae	<i>Themeda</i>	<i>avenacea</i>		
Poaceae	<i>Themeda</i>	<i>triandra</i>		
Poaceae	<i>Tragus</i>	<i>australianus</i>		
Poaceae	<i>Triodia</i>	<i>angusta</i>		
Poaceae	<i>Triodia</i>	<i>basedowii</i>		
Poaceae	<i>Triodia</i>	<i>brizoides</i>		
Poaceae	<i>Triodia</i>	<i>epactia</i>		
Poaceae	<i>Triodia</i>	<i>longiceps</i>		
Poaceae	<i>Triodia</i>	<i>pungens</i>		

FAMILY	GENUS	SPECIES	INF_RANK	INF_NAME
Poaceae	<i>Triodia</i>	<i>schinzii</i>		
Poaceae	<i>Triodia</i>	<i>vanleeuwenii</i>		
Poaceae	<i>Tripogonella</i>	<i>loliiformis</i>		
Portulacaceae	<i>Portulaca</i>	<i>filifolia</i>		
Portulacaceae	<i>Portulaca</i>	<i>oleracea</i>		
Proteaceae	<i>Grevillea</i>	<i>berryana</i>		
Proteaceae	<i>Grevillea</i>	<i>striata</i>		
Proteaceae	<i>Grevillea</i>	<i>wickhamii</i>		
Proteaceae	<i>Hakea</i>	<i>chordophylla</i>		
Proteaceae	<i>Hakea</i>	<i>lorea</i>	subsp.	<i>lorea</i>
Pteridaceae	<i>Cheilanthes</i>	<i>sieberi</i>		
Pteridaceae	<i>Cheilanthes</i>		cf.	<i>brownii</i>
Rubiaceae	<i>Psyrax</i>	<i>latifolia</i>		
Rubiaceae	<i>Psyrax</i>	<i>suaveolens</i>		
Rubiaceae	<i>Synaptantha</i>	<i>tillaeacea</i>	var.	<i>tillaeacea</i>
Santalaceae	<i>Anthobolus</i>	<i>leptomerioides</i>		
Santalaceae	<i>Santalum</i>	<i>lanceolatum</i>		
Sapindaceae	<i>Dodonaea</i>	<i>coriacea</i>		
Sapindaceae	<i>Dodonaea</i>	<i>pachyneura</i>		
Sapindaceae	<i>Dodonaea</i>	<i>petiolaris</i>		
Scrophulariaceae	<i>Eremophila</i>	<i>cuneifolia</i>		
Scrophulariaceae	<i>Eremophila</i>	<i>exilifolia</i>		
Scrophulariaceae	<i>Eremophila</i>	<i>forrestii</i>	subsp.	<i>forrestii</i>
Scrophulariaceae	<i>Eremophila</i>	<i>fraseri</i>		
Scrophulariaceae	<i>Eremophila</i>	<i>latrobei</i>	subsp.	<i>filiformis</i>
Scrophulariaceae	<i>Eremophila</i>	<i>latrobei</i>	subsp.	<i>latrobei</i>
Scrophulariaceae	<i>Eremophila</i>	<i>longifolia</i>		
Scrophulariaceae	<i>Eremophila</i>	<i>oppositifolia</i>	subsp.	<i>angustifolia</i>
Solanaceae	<i>Solanum</i>	<i>centrale</i>		
Solanaceae	<i>Solanum</i>	<i>horridum</i>		
Solanaceae	<i>Solanum</i>	<i>lasiophyllum</i>		
Solanaceae	<i>Solanum</i>		sp.	indet
Violaceae	<i>Hybanthus</i>	<i>aurantiacus</i>		
Zygophyllaceae	<i>Tribulus</i>	<i>suberosus</i>		

APPENDIX 7

Records for introduced species recorded from the study area

GENUS	SPECIES	# INDIVIDUALS	COUNT OR ESTIMATE	COVERAGE	PLANT HEIGHT
* <i>Bidens</i>	<i>bipinnata</i>	200	Estimate	3	0.2
* <i>Bidens</i>	<i>bipinnata</i>	300	Count	8	0.3
* <i>Bidens</i>	<i>bipinnata</i>	200	Count	2	0.2
* <i>Bidens</i>	<i>bipinnata</i>	100	Count	1	0.2
* <i>Bidens</i>	<i>bipinnata</i>	5	Count	<1	0.1
* <i>Bidens</i>	<i>bipinnata</i>	300	Count	2	0.3
* <i>Cenchrus</i>	<i>ciliaris</i>	1	Count	<1	0.3
* <i>Cenchrus</i>	<i>ciliaris</i>	150	Count	1	0.2
* <i>Cenchrus</i>	<i>ciliaris</i>	50	Count	1	0.2
* <i>Cenchrus</i>	<i>ciliaris</i>	2	Count	<1	0.3
* <i>Cenchrus</i>	<i>ciliaris</i>	300	Count	5	0.3
* <i>Cenchrus</i>	<i>ciliaris</i>	100	Count	1	0.2
* <i>Cenchrus</i>	<i>ciliaris</i>	200	Count	5	0.3
* <i>Cenchrus</i>	<i>ciliaris</i>	500	Count	15	0.5
* <i>Cenchrus</i>	<i>ciliaris</i>	15	Count	<1	0.3
* <i>Cenchrus</i>	<i>ciliaris</i>	500	Count	20	0.5
* <i>Cenchrus</i>	<i>ciliaris</i>	50	Count	1	0.3
* <i>Cenchrus</i>	<i>ciliaris</i>	25	Count	<1	0.3
* <i>Cenchrus</i>	<i>ciliaris</i>	5	Count	<1	0.4
* <i>Cenchrus</i>	<i>ciliaris</i>	20	Count	<1	0.3
* <i>Cenchrus</i>	<i>ciliaris</i>	400	Count	15	0.5
* <i>Cenchrus</i>	<i>ciliaris</i>	10	Count	<1	0.3
* <i>Cenchrus</i>	<i>ciliaris</i>	15	Count	<1	0.4
* <i>Cenchrus</i>	<i>ciliaris</i>	30	Count	<1	0.4
* <i>Cenchrus</i>	<i>ciliaris</i>	300	Count	5	0.5
* <i>Cenchrus</i>	<i>setiger</i>	50	Count	0.5	0.2
* <i>Citrullus</i>	<i>lanatus</i>	1	Count	<1	0.1
* <i>Citrullus</i>	<i>lanatus</i>	4	Count	<1	0.1
* <i>Malvastrum</i>	<i>americanum</i>	150	Estimate	1.5	0.3
* <i>Malvastrum</i>	<i>americanum</i>	10	Count	<1	0.5
* <i>Malvastrum</i>	<i>americanum</i>	50	Count	<1	0.5
* <i>Vachellia</i>	<i>farnesiana</i>	1	Count	<1	1.5

APPENDIX 8

Site sheets summarising raw data for quadrats within the study area and adjacent drainageline

SITE ID	VEG ASSOC	VEG COND	ASPECT	SLOPE	SOIL TYPE	SOIL COLOUR	FIRE	DISTURBANCE	EASTING	NORTHING
SW-01	Low Woodland of <i>Acacia aptaneura</i> over High Shrubland of <i>Acacia aptaneura</i> over Open Tussock Grassland of <i>Aristida inaequiglumis</i> , <i>Digitaria ammophila</i> and <i>Perotis rara</i>	Poor	Flat	Flat	Sandy Clay Loam	Brown	Old (6+ yr)	Cattle Grazing, Mine Exploration, Road/ Access Track, Weeds	203913	7409048
SW-02	Low Open Woodland of <i>Acacia aptaneura</i> and <i>Hakea lorea</i> subsp. <i>lorea</i> over Open Shrubland of <i>Senna artemisioides</i> subsp. <i>oligophylla</i> over Low Open Shrubland of <i>Sclerolaena cornishiana</i> , <i>Maireana villosa</i> and <i>Ptilotus obovatus</i>	Poor	Flat	Flat	Sandy Loam	Brown	Old (6+ yr)	Cattle Grazing, Road/ Access Track	204019	7408764
SW-03	Shrubland of <i>Senna glutinosa</i> subsp. <i>x luerssenii</i> , <i>Senna artemisioides</i> subsp. <i>helmsii</i> and <i>Acacia synchronicia</i> with High Open Shrubland of <i>Acacia synchronicia</i> and <i>Acacia tetragonophylla</i> over Low Open Shrubland of <i>Eremophila cuneifolia</i> , <i>Senna</i> sp. <i>Meekatharra</i> (E. Bailey 1-26) and <i>Maireana triptera</i>	Good	North	Low	Silty Loam	Brown	Old (6+ yr)	Cattle Grazing, Mine Exploration, Weeds	204686	7408563
SW-04	Low Open Woodland of <i>Acacia paraneura</i> and <i>Acacia aptaneura</i> with High Open Shrubland of <i>Acacia wanyu</i> , <i>Acacia synchronicia</i> and <i>Acacia tetragonophylla</i> over Low Open Shrubland of <i>Frankenia setosa</i> , <i>Eremophila cuneifolia</i> and <i>Sclerolaena cuneata</i>	Good	South/ West	Low	Sandy Loam	Brown	Old (6+ yr)	Cattle Grazing	204702	7408250
SW-05	Low Open Forest of <i>Acacia aptaneura</i> and <i>Hakea lorea</i> subsp. <i>lorea</i> with Open Tussock Grassland of <i>Chrysopogon fallax</i> , <i>Aristida inaequiglumis</i> and <i>Themeda triandra</i> with High Open Shrubland of <i>Eremophila fraseri</i> and <i>Acacia synchronicia</i>	Poor	North	Low	Loamy Sand	Brown	Old (6+ yr)	Cattle Grazing, Road/ Access Track, Weeds	203161	7408210
SW-06	Low Open Forest of <i>Acacia aptaneura</i> over Open Tussock Grassland of <i>Themeda triandra</i> , <i>Digitaria brownii</i> and <i>Acacia inaequiglumis</i> with High Open Shrubland of <i>Eremophila forrestii</i> and <i>Acacia aptaneura</i>	Poor	North/ East	Low	Loamy Sand	Brown	Old (6+ yr)	Cattle Grazing, Road/ Access Track, Weeds	202418	7407591

SITE ID	VEG ASSOC	VEG COND	ASPECT	SLOPE	SOIL TYPE	SOIL COLOUR	FIRE	DISTURBANCE	EASTING	NORTHING
SW-07	Hummock Grassland of <i>Triodia epactia</i> and <i>Triodia vanleeuwenii</i> with Open Shrubland of <i>Senna glutinosa</i> subsp. <i>pruinosa</i> over Low Open Shrubland of <i>Acacia bivenosa</i> and <i>Eremophila cuneifolia</i>	Very Good	East	Low	Silty Loam	Brown	Moderate (3 to 5 yr)	Cattle Grazing, Weeds	203997	7407440
SW-08	Hummock Grassland of <i>Triodia basedowii</i> with Low Open Woodland of <i>Hakea lorea</i> subsp. <i>lorea</i> , <i>Acacia aptaneura</i> and <i>Corymbia deserticola</i> over Open Shrubland of <i>Acacia pachyacra</i> and <i>Acacia melleodora</i>	Very Good	North	Low	Sandy Loam	Brown	Old (6+ yr)	Cattle Grazing	204310	7407859
SW-09	Hummock Grassland of <i>Triodia epactia</i> and <i>Triodia vanleeuwenii</i> with Open Shrubland of <i>Acacia pachyacra</i> , <i>Acacia bivenosa</i> and <i>Acacia marramamba</i> over Low Open Shrubland of <i>Senna glutinosa</i> subsp. <i>pruinosa</i> and <i>Acacia bivenosa</i>	Very Good	South/ West	Moderate	Loamy Sand	Brown	Old (6+ yr)	Mining Exploration	203773	7407865
SW-10	Low Woodland of <i>Acacia aptaneura</i> and <i>Acacia pruinocarpa</i> over Open Hummock Grassland of <i>Triodia basedowii</i> with High Open Shrubland of <i>Acacia aptaneura</i> , <i>Acacia pruinocarpa</i> and <i>Acacia pachyacra</i>	Good	Flat	Flat	Loamy Sand	Brown	Old (6+ yr)	Cattle Grazing, Weeds	203772	7408485
SW-11	Shrubland of <i>Acacia wanyu</i> and <i>Senna glutinosa</i> subsp. <i>x luerssenii</i> over Open Hummock Grassland of <i>Triodia vanleeuwenii</i> , <i>Triodia brizoides</i> and <i>Triodia angusta</i> with Low Open Woodland of <i>Acacia aptaneura</i> and <i>Acacia paraneura</i>	Good	West	Low	Loamy Sand	Brown	Old (6+ yr)	Cattle Grazing, Mine Exploration, Weeds	204621	7409301
SW-12	Hummock Grassland of <i>Triodia brizoides</i> with Open Shrubland of <i>Eremophila fraseri</i> and <i>Senna glutinosa</i> subsp. <i>x luerssenii</i> over Low Open Shrubland of <i>Senna glutinosa</i> subsp. <i>x luerssenii</i> and <i>Senna artemisioides</i> subsp. <i>helmsii</i>	Very Good	North/ East	Low	Sandy Loam	Brown	Old (6+ yr)	Cattle Grazing, Road/ Access Track	204768	7408987
SW-13	Hummock Grassland of <i>Triodia brizoides</i> with Low Open Woodland of <i>Acacia aptaneura</i> over High Open Shrubland of <i>Eremophila latrobei</i> subsp. <i>latrobei</i> , <i>Acacia synchronicia</i> and <i>Acacia tetragonophylla</i>	Very Good	Flat	Flat	Sandy Loam	Brown	Old (6+ yr)	Weed Invasion	204868	7408194

SITE ID	VEG ASSOC	VEG COND	ASPECT	SLOPE	SOIL TYPE	SOIL COLOUR	FIRE	DISTURBANCE	EASTING	NORTHING
SW-14	Hummock Grassland of <i>Triodia schinzii</i> and <i>Triodia basedowii</i> with Low Open Shrubland of <i>Acacia ancistrocarpa</i> , <i>Androcalva loxophylla</i> and <i>Scaevola parvifolia</i> subsp. <i>pilbarae</i> with Scattered Low Trees of <i>Corymbia hamersleyana</i> and <i>Hakea lorea</i> subsp. <i>lorea</i>	Very Good	North	Low	Loamy Sand	Brown	Moderate (3 to 5 yr)	Cattle Grazing	205102	7407740
SW-15	Low Shrubland of <i>Eremophila cuneifolia</i> , <i>Frankenia setosa</i> and <i>Senna</i> sp. <i>Meekatharra</i> (E. Bailey 1-26) with Low Open Woodland of <i>Acacia pteraneura</i> over High Open Shrubland of <i>Acacia synchronicia</i> , <i>Acacia tetragonophylla</i> and <i>Acacia kempeana</i>	Very Good	North	Low	Sandy Loam	Brown	Old (6+ yr)	Cattle Grazing	204757	7407388
SW-16	Hummock Grassland of <i>Triodia vanleeuwenii</i> and <i>Triodia epactia</i> with Open Shrubland of <i>Acacia ancistrocarpa</i> , <i>Acacia trudgeniana</i> and <i>Acacia bivenosa</i> over Low Open Shrubland of <i>Acacia hilliana</i> , <i>Seringia elliptica</i> and <i>Indigofera monophylla</i>	Very Good	North/ West	Low	Sandy Loam	Brown	Moderate (3 to 5 yr)	Cattle Grazing	205534	7407778
SW-17	High Open Shrubland of <i>Acacia synchronicia</i> with Open Shrubland of <i>Senna artemisioides</i> subsp. <i>oligophylla</i> and <i>Senna glutinosa</i> subsp. <i>x luerssenii</i> over Low Open Shrubland of <i>Sclerolaena cuneata</i> , <i>Maireana triptera</i> and <i>Solanum lasiophyllum</i>	Poor	Flat	Flat	Clay Loam	Brown	Old (6+ yr)	Cattle Grazing, Other	205285	7408841
SW-18	High Open Shrubland of <i>Acacia synchronicia</i> with Open Shrubland of <i>Senna artemisioides</i> subsp. <i>oligophylla</i> and <i>Senna glutinosa</i> subsp. <i>x luerssenii</i> over Low Open Shrubland of <i>Sclerolaena cuneata</i> , <i>Maireana triptera</i> and <i>Solanum lasiophyllum</i>	Good	North/ East	Low	Sand	Brown	Old (6+ yr)	Cattle Grazing, Weeds	208171	7407633
SW-19	Open Hummock Grassland of <i>Triodia basedowii</i> over Open Tussock Grassland of <i>*Cenchrus ciliaris</i> and <i>Eragrostis eriopoda</i> with Low Open Woodland of <i>Acacia aptaneura</i> , <i>Corymbia hamersleyana</i> and <i>Hakea lorea</i> subsp. <i>lorea</i>	Poor	Flat	Flat	Sandy Loam	Brown	Old (6+ yr)	Cattle Grazing, Weeds	208433	7407900

SITE ID	VEG ASSOC	VEG COND	ASPECT	SLOPE	SOIL TYPE	SOIL COLOUR	FIRE	DISTURBANCE	EASTING	NORTHING
SW-20	Hummock Grassland of <i>Triodia basedowii</i> with High Shrubland of <i>Acacia pteraneura</i> , <i>Acacia pachyacra</i> and <i>Acacia tetragonophylla</i> with Low Open Woodland of <i>Acacia pteraneura</i> , <i>Acacia pruinocarpa</i> and <i>Hakea lorea</i> subsp. <i>lorea</i>	Good	Flat	Flat	Loamy Sand	Red	Moderate (3 to 5 yr)	Cattle Grazing	209003	7408058
SW-21	Low Open Woodland of <i>Acacia pteraneura</i> over Very Open Tussock Grassland of <i>Aristida contorta</i> and <i>Aristida inaequiglumis</i> with Scattered Low Shrubs of <i>Solanum lasiophyllum</i> and <i>Sclerolaena cornishiana</i>	Poor	Flat	Flat	Clay Loam	Red	Old (6+ yr)	Cattle Grazing, Road/ Access Track, Other (fenceline)	210148	7409181
SW-22	Hummock Grassland of <i>Triodia basedowii</i> with Low Open Woodland of <i>Acacia pruinocarpa</i> , <i>Hakea lorea</i> subsp. <i>lorea</i> over High Open Shrubland of <i>Acacia pachyacra</i> and <i>Acacia pruinocarpa</i>	Very Good	Flat	Flat	Loamy Sand	Brown	Old (6+ yr)	Cattle Grazing	209977	7408681
SW-23	Low Woodland of <i>Acacia aptaneura</i> over High Shrubland of <i>Acacia aptaneura</i> over Open Tussock Grassland of <i>Aristida inaequiglumis</i> , <i>Digitaria brownii</i> and <i>Eulalia aurea</i>	Poor	Flat	Flat	Sandy Clay Loam	Brown	Old (6+ yr)	Cattle Grazing, Weeds	210146	7407971
SW-24	Tussock Grassland of <i>*Cenchrus ciliaris</i> , <i>Aristida inaequiglumis</i> and <i>Themeda triandra</i> with Low Open Woodland of <i>Corymbia hamersleyana</i> , <i>Acacia pteraneura</i> and <i>Acacia coriacea</i> subsp. <i>pendens</i> over High Open Shrubland of <i>Acacia macraneura</i> and <i>Acacia pyrifolia</i>	Poor	West	Low	Loamy Sand	Brown	Old (6+ yr)	Cattle Grazing, Weeds	209211	7408917
SW-25	Low Woodland of <i>Eucalyptus victrix</i> and <i>Acacia coriacea</i> subsp. <i>pendens</i> over Open Tussock Grassland of <i>Cymbopogon ambiguus</i> , <i>Themeda triandra</i> and <i>Eulalia aurea</i> with Open Shrubland of <i>Acacia pyrifolia</i>	Good	North	Low	Sand	Brown	Old (6+ yr)	Cattle Grazing, Weeds	308975	7409165
SW-26	Open Hummock Grassland of <i>Triodia angustifolium</i> and <i>Triodia vanleeuwenii</i> with Low Open Woodland of <i>Acacia aptaneura</i> over High Open Shrubland of <i>Acacia wanyu</i> and <i>Acacia tetragonophylla</i>	Very Good	South/ West	Low	Sandy Loam	Brown	Old (6+ yr)	Cattle Grazing	208445	7409343

SITE ID	VEG ASSOC	VEG COND	ASPECT	SLOPE	SOIL TYPE	SOIL COLOUR	FIRE	DISTURBANCE	EASTING	NORTHING
SW-27	Open Hummock Grassland of <i>Triodia epactia</i> with High Open Shrubland of <i>Acacia tetragonophylla</i> and <i>Eremophila fraseri</i> over Open Shrubland of <i>Senna artemisioides</i> subsp. <i>helmsii</i>	Good	South/ East	Low	Sandy Loam	Brown	Old (6+ yr)	Cattle Grazing	208418	7408575
SW-28	Hummock Grassland of <i>Triodia epactia</i> with High Open Shrubland of <i>Eremophila fraseri</i> and <i>Acacia tetragonophylla</i> over Open Shrubland of <i>Eremophila fraseri</i>	Very Good	West	Low	Sandy Loam	Brown	Old (6+ yr)	Cattle Grazing	208207	7409011
SW-29	Hummock Grassland of <i>Triodia vanleeuwenii</i> with Low Open Woodland of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> , <i>Acacia pruinocarpa</i> and <i>Hakea chordophylla</i> over Open Shrubland of <i>Senna glutinosa</i> subsp. <i>pruinosa</i>	Good	South/ West	Moderate	Silty Loam	Brown	Old (6+ yr)	Cattle Grazing, Road/ Access Track, Communication Tower	207642	7409447
SW-30	Low Open Woodland of <i>Acacia rhodophloia</i> , <i>Acacia pteraneura</i> and <i>Acacia aptaneura</i> over High Open Shrubland of <i>Acacia tetragonophylla</i> and <i>Acacia synchronicia</i> over Open Shrubland of <i>Senna glutinosa</i> subsp. <i>x luerssenii</i>	Good	East	Low	Silty Loam	Brown	Old (6+ yr)	Cattle Grazing, Road/ Access Track	207495	7408290
SW-31	Low Shrubland of <i>Frankenia setosa</i> , <i>Eremophila cuneifolia</i> and <i>Senna</i> sp. <i>Meekatharra</i> (E. Bailey 1-26) with Open Shrubland of <i>Eremophila cuneifolia</i> over Very Open Tussock Grassland of <i>Enteropogon ramosus</i> , <i>Oxychloris scariosa</i> and <i>Tripogonella loliformis</i>	Good	West	Low	Silty Loam	Brown	Old (6+ yr)	Cattle Grazing	206987	7407814
SW-32	Open Hummock Grassland of <i>Triodia epactia</i> with Low Open Woodland of <i>Acacia pruinocarpa</i> , <i>Acacia aptaneura</i> and <i>Acacia rhodophloia</i> over Open Shrubland or <i>Eremophila latrobei</i> subsp. <i>latrobei</i> , <i>Eremophila forrestii</i> and <i>Rhagodia eremaea</i>	Very Good	West	Low	Sandy Loam	Brown	Old (6+ yr)	Cattle Grazing	206884	7407984

SITE ID	VEG ASSOC	VEG COND	ASPECT	SLOPE	SOIL TYPE	SOIL COLOUR	FIRE	DISTURBANCE	EASTING	NORTHING
SW-33	Hummock Grassland of <i>Triodia vanleeuwenii</i> and <i>Triodia epactia</i> with Low Open Woodland of <i>Hakea chordophylla</i> , <i>Hakea lorea</i> subsp. <i>lorea</i> and <i>Acacia pruinocarpa</i> over High Open Shrubland <i>Acacia synchronicia</i> , <i>Senna glutinosa</i> subsp. <i>x luerssenii</i> and <i>Acacia tetragonophylla</i>	Very Good	North/ West	Low	Sandy Loam	Brown	Old (6+ yr)	None Discernible	306900	7408010
SW-34	Low Woodland of <i>Acacia aptaneura</i> over Open Hummock Grassland of <i>Triodia basedowii</i> with High Open Shrubland of <i>Acacia tetragonophylla</i> and <i>Acacia aptaneura</i>	Good	Flat	Flat	Sandy Clay Loam	Brown	Old (6+ yr)	Cattle Grazing	206554	7408018
SW-35	Hummock Grassland of <i>Triodia epactia</i> with Low Open Woodland of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> and <i>Acacia aptaneura</i> over Scattered Low Shrubs of <i>Acacia synchronicia</i> and <i>Sida</i> sp. <i>Golden calyces glabrous</i> (H.N. Foote 32)	Very Good	Flat	Flat	Sandy Loam	Brown	Moderate (3 to 5 yr)	Cattle Grazing	205922	7407857
SW-36	Hummock Grassland of <i>Triodia vanleeuwenii</i> and <i>Triodia epactia</i> with Open Shrubland of <i>Acacia trudgeniana</i> , <i>Acacia bivenosa</i> and <i>Senna glutinosa</i> subsp. <i>pruinosa</i> over Low Open Shrubland of <i>Acacia bivenosa</i> , <i>Acacia hilliana</i> and <i>Acacia adoxa</i> var. <i>adoxia</i>	Very Good	South/ East	Low	Sandy Loam	Brown	Moderate (3 to 5 yr)	Cattle Grazing	205816	7407524
SW-37	Low Woodland of <i>Acacia aptaneura</i> over High Open Shrubland of <i>Acacia tetragonophylla</i> and <i>Eremophila fraseri</i> over Open Shrubland of <i>Acacia rhodophloia</i> , <i>Senna glutinosa</i> subsp. <i>x luerssenii</i> and <i>Acacia tetragonophylla</i>	Very Good	South/ East	Low	Silty Loam	Brown	Old (6+ yr)	Cattle Grazing	206995	7407525
SW-38	Low Open Forest of <i>Acacia aptaneura</i> and <i>Corymbia aspera</i> over Low Open Shrubland of <i>Sida</i> sp. <i>verrucose glands</i> (F.H. Mollemans 2423) and <i>Ptilotus obovatus</i> over Very Open Herbs of <i>*Bidens bipinnata</i> , <i>Cheilanthes sieberi</i> and <i>Evolvulus alsinoides</i>	Poor	Flat	Flat	Clay Loam	Brown	Old (6+ yr)	Cattle Grazing, Road/ Access Track, Weeds	206353	7408951

SITE ID	VEG ASSOC	VEG COND	ASPECT	SLOPE	SOIL TYPE	SOIL COLOUR	FIRE	DISTURBANCE	EASTING	NORTHING
SW-39	Hummock Grassland of <i>Triodia epactia</i> with Shrubland of <i>Eremophila fraseri</i> , <i>Senna artemisioides</i> subsp. <i>helmsii</i> and <i>Acacia sibirica</i> over Open Tussock Grassland of <i>Eriachne mucronata</i> , <i>Cymbopogon ambiguus</i> and <i>Themeda triandra</i>	Good	East	Moderate	Sandy Loam	Brown	Old (6+ yr)	Cattle Grazing, Road/ Access Track, Weeds	205291	7409031
SW-40	High Open Shrubland of <i>Acacia synchronicia</i> and <i>Acacia tetragonophylla</i> over Open Shrubland of <i>Acacia synchronicia</i> over Low Open Shrubland of <i>Eremophila cuneifolia</i> and <i>Acacia synchronicia</i>	Good	North	Low	Silty Loam	Brown	Old (6+ yr)	Cattle Grazing, Road/ Access Track, Weeds	204527	7408676
SW-41	Low Open Woodland of <i>Acacia aptaneura</i> , <i>Hakea lorea</i> subsp. <i>lorea</i> and <i>Acacia pruinocarpa</i> with Open Shrubland of <i>Senna artemisioides</i> subsp. <i>helmsii</i> and <i>Eremophila forrestii</i> over Very Open Tussock Grassland of <i>Enneapogon polyphyllus</i> , <i>Aristida contorta</i> and <i>Aristida inaequiglumis</i>	Good	Flat	Flat	Sandy Loam	Brown	Old (6+ yr)	Cattle Grazing	205753	7408794
SW-42	Hummock Grassland of <i>Triodia angusta</i> and <i>Triodia epactia</i> over Open Tussock Grassland of <i>Cenchrus ciliaris</i> with Low Open Woodland of <i>Acacia aptaneura</i>	Good	North	Moderate	Silty Loam	Brown	Old (6+ yr)	Weed Invasion	205787	7408371
SW-43	Low Shrubland of <i>Frankenia setosa</i> , <i>Eremophila cuneifolia</i> and <i>Sclerolaena cuneata</i> with Low Open Woodland of <i>Acacia aptaneura</i> over High Open Shrubland of <i>Acacia tetragonophylla</i> and <i>Acacia synchronicia</i>	Very Good	North/ West	Low	Silty Loam	Brown	Old (6+ yr)	Cattle Grazing	206056	7408252
SW-44	Shrubland of <i>Senna artemisioides</i> subsp. <i>helmsii</i> and <i>Eremophila fraseri</i> with High Open Shrubland of <i>Eremophila fraseri</i> and <i>Acacia tetragonophylla</i> over Very Open Tussock Grassland of <i>Aristida contorta</i> and <i>Cymbopogon ambiguus</i>	Good	North/ West	Low	Silty Loam	Brown	Old (6+ yr)	Cattle Grazing, Weeds	207003	7408454

SITE ID	VEG ASSOC	VEG COND	ASPECT	SLOPE	SOIL TYPE	SOIL COLOUR	FIRE	DISTURBANCE	EASTING	NORTHING
SW-45	High Open Shrubland of <i>Acacia tetragonophylla</i> and <i>Acacia synchronicia</i> over Open Shrubland of <i>Senna glutinosa</i> subsp. x <i>luerssenii</i> , <i>Acacia synchronicia</i> and <i>Acacia tetragonophylla</i> over Low Open Shrubland of <i>Eremophila cuneifolia</i> and <i>Acacia synchronicia</i>	Good	North/ West	Low	Loamy Sand	Brown	Old (6+ yr)	Cattle Grazing	206859	7408286
SW-46	Hummock Grassland of <i>Triodia vanleeuwenii</i> and <i>Triodia angusta</i> with High Open Shrubland of <i>Acacia manyu</i> and <i>Acacia synchronicia</i> over Open Shrubland of <i>Acacia bivenosa</i> and <i>Senna glutinosa</i> subsp. x <i>luerssenii</i>	Very Good	South/ East	Low	Sandy Loam	Brown	Old (6+ yr)	Cattle Grazing, Mine Exploration, Weeds	206657	7409348
SW-47	Hummock Grassland of <i>Triodia vanleeuwenii</i> with Low Open Woodland of <i>Acacia pruinocarpa</i> and <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> over Open Shrubland of <i>Acacia bivenosa</i> , <i>Senna glutinosa</i> subsp. x <i>luerssenii</i> and <i>Senna glutinosa</i> subsp. <i>pruinosa</i>	Very Good	North	Low	Sandy Loam	Brown	Old (6+ yr)	Cattle Grazing, Mine Exploration, Dust	206425	7409408
SW-48	Open Shrubland of <i>Senna artemisioides</i> subsp. <i>helmsii</i> and <i>Eremophila fraseri</i> over Low Open Shrubland of <i>Sclerolaena cornishiana</i> and <i>Solanum lasiophyllum</i> over Very Open Tussock Grassland of <i>Aristida inaequiglumis</i> and <i>Aristida contorta</i>	Poor	Flat	Flat	Loam	Brown	Old (6+ yr)	Cattle Grazing	207925	7408856
SW-49	Low Woodland of <i>Acacia coriacea</i> subsp. <i>pendens</i> , <i>Eucalyptus victrix</i> and <i>Acacia macraneura</i> over Open Tussock Grassland of <i>Themeda triandra</i> , <i>Bothriochloa ewartiana</i> and * <i>Cenchrus ciliaris</i> with Open Woodland of <i>Eucalyptus camaldulensis</i> and <i>Eucalyptus victrix</i>	Good	North	Low	Sand	Brown	Old (6+ yr)	Cattle Grazing, Weeds	208564	7408194