



## **Western Ridge**

# **Detailed Flora and Vegetation Survey**

BHP Western Australian Iron Ore

10 January 2020



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## EXECUTIVE SUMMARY

BHP Western Australian Iron Ore commissioned Biologic Environmental Survey Pty Ltd to undertake a single season Detailed Flora and Vegetation Survey of the Western Ridge exploration tenement. The Study Area is wholly located within tenement E52/3448.1 and is approximately 1204 hectares (ha) in size. The Study Area is located approximately 4 kilometres (km) to the south of the Mt Whaleback mine site and 10 km southwest of the Newman township, between the Coombanbunna Well exploration tenements (E52/3361 and E52/3360). The Study area includes a Targeted Diversion Area (approximately 73 ha) that was intensively searched for conservation significant flora.

The Detailed Flora and Vegetation Assessment was undertaken over eight days between 11 and 18 March 2019, with all major vegetation communities visited and sampled. The Study Area is located adjacent to the Coombanbunna Well Project (E52/3361 and E52/3360), at which Biologic completed a single season Detailed Flora and Vegetation Survey in 2019. The two Study Areas were considered as one Survey Area for the purposes of sampling, delineating and describing the vegetation communities. The Coombanbunna Well Survey was completed over 5 days between 25 and 29 March 2019. During the field survey, daytime climatic conditions were hot temperatures with clear skies, however, below-average rainfall in the months before resulted in a lack of annuals, ephemerals, and floral material.

The vegetation in the Study Area was sampled with 34 quadrats and 5 relevés, while an additional 45 quadrats and five relevés were sampled in the Coombanbunna Well Study Area. The data collected from the sample sites was used to record the vegetation communities and their condition, as well as collecting an inventory of flora species present.

A total of 152 vascular flora taxa, from 29 families and 70 genera, comprising 149 native species and three introduced taxa were recorded from the Study Area. An additional 66 native taxa and six introduced species were recorded from the Coombanbunna Well Project, for a total of 209 native taxa and nine introduced taxa. The desktop assessment identified that it was highly unlikely that any threatened flora would occur within the Study Area, while it was highly likely that one priority listed taxon and likely that five priority listed taxa, could occur in the Study Area. An additional seven priority listed taxa could potentially occur in the Study Area. The field survey did not record any threatened or priority listed taxa within the Study Area.

Following the field survey, the likelihood of occurrence for the 13 priority listed taxa considered highly likely, likely or with potential to occur was revised. The likelihood of occurrence now suggests one taxon is considered highly likely (*Goodenia nuda* (P4)); no taxa are considered likely; and three taxa (*Indigofera gilesii* (P3), *Ipomoea racemigera* (P2) and *Aristida jerichoensis* var. *subspinulifera* (P3)) are considered as possibly occurring in the Study Area. The remaining taxa are considered unlikely or highly unlikely to occur in the Study Area.

The three introduced taxa, *\*Cenchrus ciliaris*, *\*Malvastrum americanum* and *\*Vachellia farnesiana*, recorded from the Study Area are not listed as weeds of national significance or declared plant pests listed under the *Biosecurity and Agriculture Management Act 2007*. The three introduced taxa have



been previously recorded from the region based on the desktop and literature review and are common species in the Pilbara.

A total of 16 vegetation associations were described and delineated from the Study Area. The 16 vegetation associations were grouped into seven broad floristic formations: *Acacia* low open woodland; *Eragrostis* low open tussock grassland; *Senna* mid open shrubland; *Tecticornia* low scattered shrubs; *Themeda* mid tussock grassland; *Triodia* mid hummock grassland; and *Triodia* mid open hummock grassland.

The vegetation associations described from the Study Area are not considered to be analogous with the known Threatened and Priority Ecological Communities occurring in the Pilbara region. Review of the vegetation units and floristic assemblage indicates that none of the drainage lines or areas are Groundwater Dependent Ecosystems due to the absence of phreatophytic flora taxa.

The Study Area is unlikely to support sheet flow dependent Mulga communities. Mulga dominated communities (represented by *Acacia aptaneura*, *Acacia paraneura* and *Acacia pteraneura*) or communities with Mulga species present, were mapped within the Boolgeeda and Elimunna land system. However, the vegetation associations did not display the prominent groving and inter-groving consistent with sheet flow dependent mulga communities.

The condition of the vegetation in the Study Area ranged from Degraded to Excellent, with the majority in Excellent condition. The most common impacts to the vegetation were from cattle grazing and trampling, which is evident across and the unnamed creeks and their associated floodplains, resulting in many of the native understorey species not being present. The understorey mainly consists of an introduced tussock grass layer of *\*Cenchrus ciliaris*. Fires have temporarily altered the vegetation structure in the central portions of the Study Area. The remainder of the Study Area was mostly mapped as Excellent.

## 1 INTRODUCTION

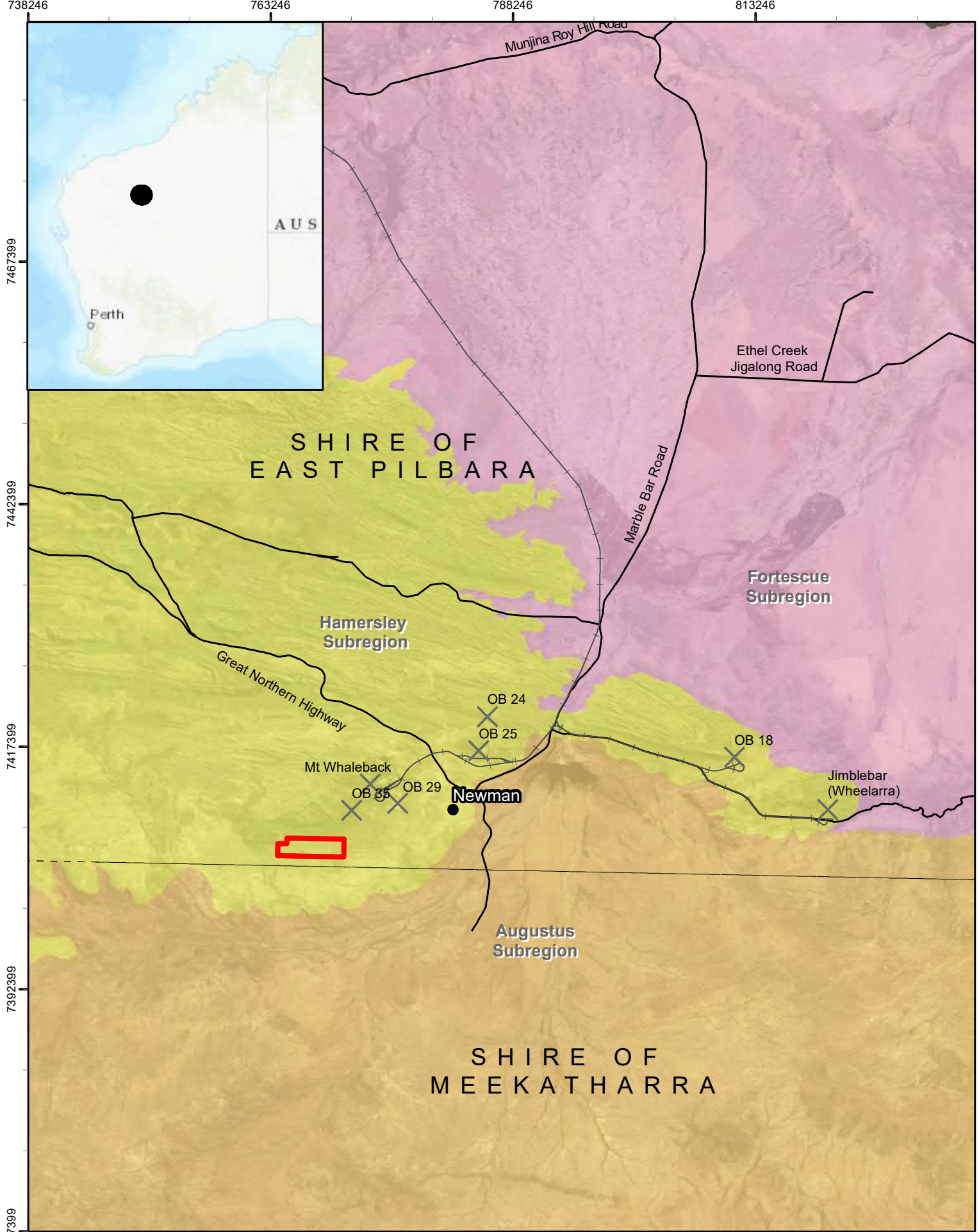
### 1.1 Background

BHP Western Australian Iron Ore (BHP WAIO) commissioned Biologic Environmental Survey Pty Ltd (Biologic) to undertake a single season Detailed Flora and Vegetation Survey as per the EPA guidance (EPA, 2016a), of the Western Ridge tenement (E52/3448.1), hereafter referred to as the Study Area. The Study Area is located within the Pilbara bioregion, just north of the boundary with the Gascoyne bioregion (Figure 1.1). The Study Area is wholly located within tenement E52/3448.1 (Figure 1.2) and is approximately 1,204 hectares (ha) in size. The Study Area is located approximately 4 kilometres (km) to the south of the Whaleback (Mt Whaleback) mine site and 10 km southwest of the Newman township, between the Coombanbunna Well exploration tenements (E52/3361 and E52/3360). The Study area includes a Targeted Diversion Area (approximately 73 ha) to allow the potential diversion of unnamed creek.

### 1.2 Objectives

The overarching objective of the single season Detailed Flora and Vegetation Assessment (hereafter referred to as the Survey) was to identify the flora and vegetation values of the Study Area and to determine if there are any conservation significant values that need to be considered during any future environmental approvals across the Study Area. The overarching objective was achieved via the following scope of works:

- The completion of a desktop assessment, including the review of previous biological surveys and government and non-government databases;
- The completion of a single season Detailed Flora and Vegetation Survey across the Study Area and relevant regional context;
- An intensive search for conservation significant flora within the Targeted Diversion Area;
- A review of the results of the flora and vegetation assessment to determine if there are any significant environmental values within the Study Area;
- A discussion of the significant environmental values (and remaining environmental values) from a regional and local context; and
- The provision of advice and guidance related to the environmental approval process, with respect to any significant flora and vegetation values identified from the Study Area.



738246  
7467399  
7442399  
7417399  
7392399  
7367399

Munjina Roy Hill Road  
Ethel Creek Jigalong Road  
Marble Bar Road  
SHIRE OF EAST PILBARA  
Hamersley Subregion  
Fortescue Subregion  
Augustus Subregion  
SHIRE OF MEEKATHARRA  
Great Northern Highway  
Mt Whaleback  
Newman  
Jimblebar (Wheelarra)  
OB 24  
OB 25  
OB 29  
OB 35  
OB 18

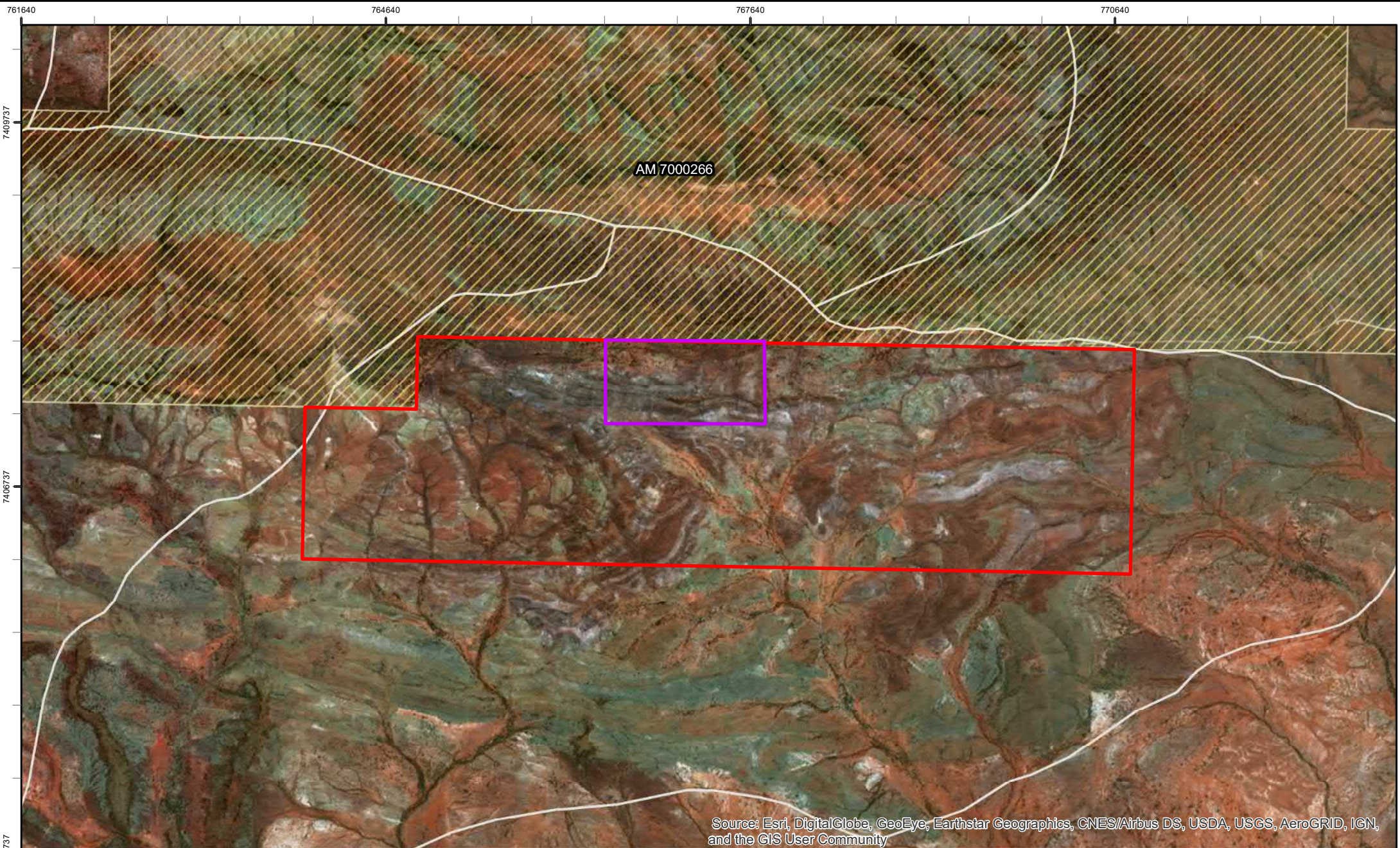
**Legend**

Study Area	Local Government Areas
BHP_mines_important	<b>IBRA subregions</b>
Town	Augustus
Railway	Fortescue
Road	Hamersley

N  
1:500,000  
0 4.5 9 18  
km

**BHP Western Australian Iron Ore  
Western Ridge Detailed Flora  
and Vegetation Survey**  
**Fig. 1.1: Study Area and Regional  
Location**

Coordinate System: GDA 1994 MGA Zone 50  
Projection: Transverse Mercator  
Datum: GDA 1994  
Size A4. Created 28/02/2019



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

**Legend**

- Study Area
- Targeted Diversion Area
- BHP Tenements
- Roads (unsealed)

biologic  
Environmental Survey

N  
1:40,000  
0 0.45 0.9 1.8 km

**BHP Western Australian Iron Ore  
Western Ridge Detailed Flora and  
Vegetation Survey**

**Figure 1.2: Study Area and BHP WAIO Tenure**

Coordinate System: GDA 1994 MGA Zone 50  
Projection: Transverse Mercator  
Datum: GDA 1994

Size A4. Created 13/03/2019

### 1.3 Background to Protection of Flora and Vegetation

Within Western Australia, all native flora is protected under the *Biodiversity Conservation Act 2016* (BC Act) and any action that has the potential to impact on native flora needs to be approved by relevant State and/ or Federal departments as dictated by the Western Australian *Environmental Protection Act 1986* (EP Act) and the Federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Some species of flora that are determined to be at risk of extinction or in decline are afforded extra protection under these Acts. For the purposes of this report, these species are called conservation significant species. A summary of applicable legislation and status codes is provided in Table 1.1. Additional information on conservation status codes is provided in Appendix A.

The EPBC Act identifies Threatened Ecological Communities (TECs) as ecological communities at risk of extinction. The BC Act provides for the statutory listing of TECs by the Minister. The WA Minister for Environment has endorsed 69 ecological communities as threatened under critically endangered (20 communities), endangered (17 communities), vulnerable (28 communities) and presumed totally destroyed (four communities).

For some species and ecological communities, there is insufficient information to determine their status. These species are generally considered by the Environmental Protection Authority (EPA)/ Department of Biodiversity, Conservation and Attractions (DBCA) as ‘conservation significant’ for all development related approvals and are listed on a ‘Priority List’. The Priority List is regularly reviewed and maintained by DBCA. Possible TECs that do not meet the criteria for statutory listing by the Minister for Environment are added to DBCA’s ‘Priority Ecological Communities’ (PECs) lists under Priorities 1, 2, 3, 4 (near threatened) or 5 (conservation dependent).

**Table 1.1: Conservation significance assessment guidelines**

Agreement, Act or List	Status Codes
<b>FEDERAL</b>	
<p><i>Environment Protection and Biodiversity Conservation Act 1999</i> DoEE lists threatened flora, which are determined by the Threatened Species Scientific Committee (TSSC) according to criteria set out in the Act. The Act lists flora that are considered to be of conservation significance under one of eight categories (listed under ‘Status Codes’).</p> <p>Threatened Ecological Communities (TECs) are those that are at risk of extinction.</p>	<ul style="list-style-type: none"> <li>• Extinct (EX)</li> <li>• Extinct in the Wild (EW)</li> <li>• Critically Endangered (CE)</li> <li>• Endangered (EN)</li> <li>• Vulnerable (VU)</li> <li>• Conservation Dependent (CD)</li> </ul> <ul style="list-style-type: none"> <li>• Critically Endangered (CE)</li> <li>• Endangered (EN)</li> <li>• Vulnerable (VU)</li> </ul>
Agreement, Act or List	Status Codes
<b>STATE</b>	
<p><i>Biodiversity Conservation Act 2016</i> The <i>Biodiversity Conservation Act 2016</i> provides for the listing of threatened native flora and Threatened Ecological Communities that need protection as critically endangered, endangered or vulnerable species or ecological communities because they are under identifiable threat of extinction (species) or collapse (ecological communities).</p>	<ul style="list-style-type: none"> <li>• Schedule 1 (Critically Endangered) (S1 or CR)</li> <li>• Schedule 2 (Endangered) (S2 or EN)</li> <li>• Schedule 3 (Vulnerable) (S3 or VU)</li> <li>• Schedule 4 (Extinct) (S4 or EX)</li> </ul>

Agreement, Act or List	Status Codes
<p><b>DBCA Priority list (DBCA)</b>                      DBCA produces a list of Priority species and ecological communities (e.g. Priority Ecological Communities) that have not been assigned statutory protection under the <i>Biodiversity Conservation Act 2016</i>. This system gives a ranking from Priority 1 to Priority 5.</p>	<ul style="list-style-type: none"> <li>• Priority 1 (P1)</li> <li>• Priority 2 (P2)</li> <li>• Priority 3 (P3)</li> <li>• Priority 4 (P4)</li> <li>• Priority 5 (P5)</li> </ul>

## 2 ENVIRONMENT

### 2.1 Biogeographical Regionalisation of Australia

The Study Area is located in the southern section of the Pilbara Craton (Kendrick, 2001) in the Pilbara bioregion (Figure 1.1), as defined by the Interim Biogeographic Regionalisation of Australia (IBRA; Thackway & Cresswell, 1995). The Pilbara bioregion is characterised by vast coastal plains and inland mountain ranges with cliffs and deep gorges (Thackway & Cresswell, 1995). Vegetation is predominantly mulga low woodlands or snappy gum over bunch and hummock grasses (Bastin, 2008).

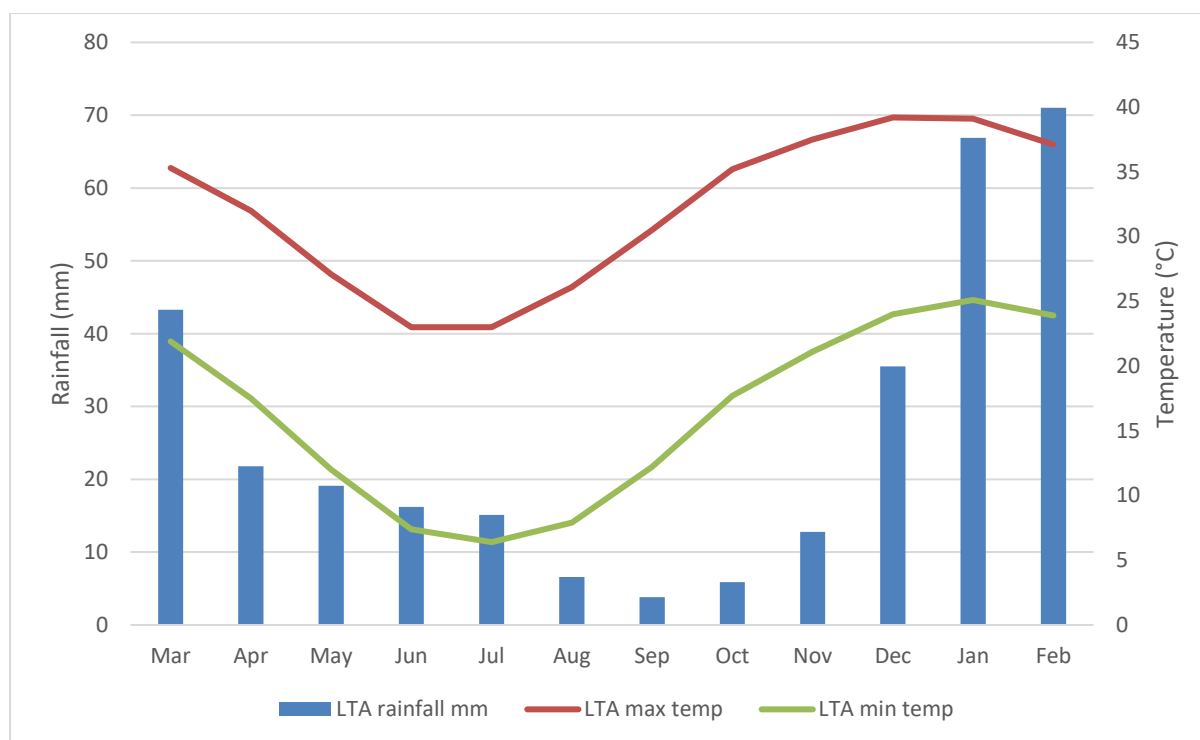
The Pilbara bioregion is characterised by four separate subregions, Chichester (PIL01), Fortescue (PIL02), Hamersley (PIL03) and Roebourne (PIL04), of which the Study Area is located within the Hamersley (PIL03) subregion (Figure 1.1). The Hamersley subregion is characterised by mountainous area of sedimentary ranges and plateaux, dissected by gorges (Kendrick, 2001). The Hamersley contains extensive open snappy gum woodland and hummock grassland communities on ranges and plateaux, with low mulga woodlands over bunch grasses on fine textured soils in lower areas and valley floors (Kendrick, 2001).

The significant and dominant feature of this subregion is the Hamersley Range. This prominent range feature, 450 kilometres (km) long, is a mountainous plateau which receives significantly higher rainfall than the surrounding subregion giving rise to deeply incised gorges, up to 100 metres (m) deep, containing extensive permanent spring-fed streams and pools (Kendrick, 2001). The Hamersley and Chichester Ranges drain to give rise to the Fortescue Marsh and Fortescue River system (McKenzie *et al.*, 2002).

### 2.2 Climate

The Pilbara bioregion has a semi-desert to tropical climate, with rainfall occurring sporadically throughout the year, although mostly during summer (Thackway & Cresswell, 1995). Summer rainfall is usually the result of tropical storms in the north or tropical cyclones that impact upon the coast and move inland (Leighton, 2004). The winter rainfall is generally lighter and is the result of cold fronts moving north easterly across the state (Leighton, 2004). The average annual rainfall ranges from 200–400 millimetres (mm), although there are significant fluctuations between years (BoM, 2019), with up to 1,200 mm falling in some locations in some years (McKenzie *et al.*, 2009). Annual rainfall on the Chichester and Hamersley Ranges increases to 400 mm (Tille, 2006).

Long-term climatic data are not available for the Study Area itself; however, long term climatic data are available from the Bureau of Meteorology (BoM) weather station at Newman Airport (Station 7176), 15 km east of the Study Area (BoM, 2019). Newman Airport is expected to provide the most accurate long-term average (LTA) dataset for climatic conditions experienced within the Study Area (Figure 2.1).



**Figure 2.1: Long-term climatic averages (LTA) of monthly rainfall and temperature from Newman Airport (station 7176; BoM, 2018)**

### 2.3 Existing Land Use and Tenure

The Study Area comprises the entirety of exploration tenement E52/3448.1, held by BHP Iron Ore (Jimblebar) Pty Ltd (a subsidiary of the BHP Group). The Study Area is located within the Ethel Creek and Prairie Downs pastoral leases, which are actively utilised for the grazing of cattle. The majority of the Study Area is located within the Ethel Creek Pastoral Lease, while a smaller portion in the west of The Study Area is located within Prairie Downs pastoral lease. Pastoral infrastructure, including tracks and fences, exists along the boundaries of the Study Area. Mining and exploration works occur to the north of the Study Area (Mt Whaleback).

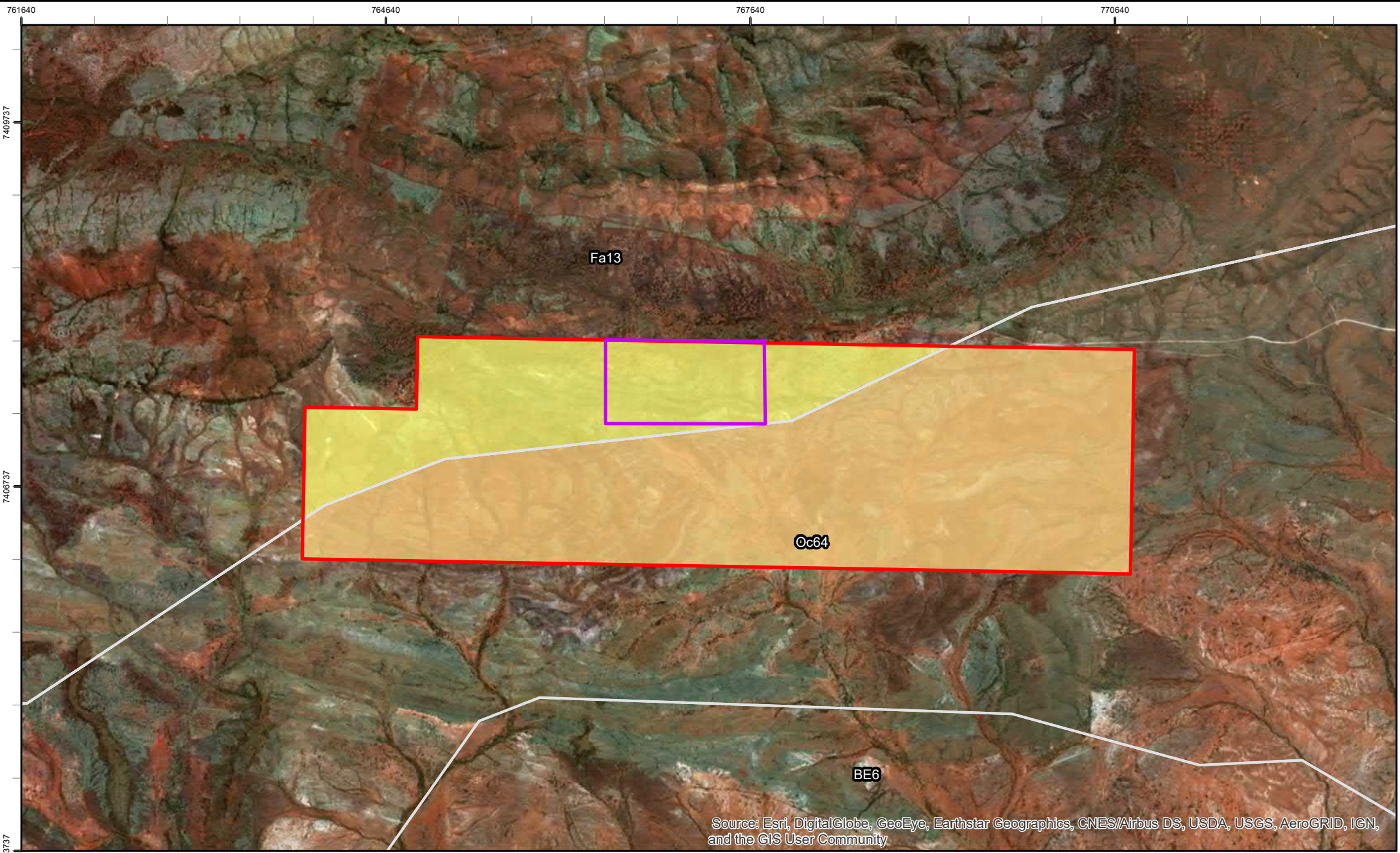
The Study Area is wholly located within the Shire of East Pilbara local government authority (LGA) (Figure 1.1). The boundary between the Shire of East Pilbara and the Shire of Meekatharra is located less than 1 km to the south of the Study Area.

### 2.4 Soils and Landforms

The Atlas of Australian Soils (Northcote *et al.*, 1960-1968) was compiled by CSIRO (Commonwealth Scientific and Industrial Research Organisation) in the 1960s to provide a consistent national description of Australia's soils. It comprises of a series of ten maps and associated explanatory notes and is published at a scale of 1:2,000,000, but the original compilation was at scales from 1:250,000 to 1:500,000.

The broad soil landscape units that have been mapped across the Study Area comprise Oc64 and Fa13 (Northcote *et al.*, 1960-1968) (Table 2.1 and Figure 2.2). The majority of the Study Area is mapped as Oc64, with a portion in the northwest mapped as Fa13 (Table 2.1).





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

**Legend**

- Study Area
- Targeted Diversion Area

**CSIRO Soil Unit**

- Fa13 - Ranges of banded jaspilite and chert along with shales
- Oc64 - Low stony hills and dissected pediments on granite with occasional basic dykes

Scale: 1:40,000

0 0.45 0.9 1.8 km

N

**BHP Western Australian Iron Ore  
Western Ridge Detailed Flora and  
Vegetation Survey  
Figure 2.2: Soil landscape units of the Study Area**

Coordinate System: GDA 1994 MGA Zone 50  
Projection: Transverse Mercator  
Datum: GDA 1994  
Size A4. Created 13/03/2019

**Table 2.1: Soil landscape units mapped within the Study Area**

Code & Description	Study Area	
	ha	%
<b>Oc64:</b> Low stony hills and dissected pediments on granite with occasional basic dykes: chief soils are hard. Soils with predominantly physical limitations; hard-setting soils with dispersible clay subsoils.	840	70%
<b>Fa13:</b> Ranges of banded jaspilite and chert along with shales, dolomites, and iron ore formations; some areas of ferruginous duricrust as well as occasional narrow winding valley plains and steeply dissected pediments. This unit is largely associated with the Hamersley and Ophthalmia Ranges. The soils are frequently stony and shallow and there are extensive areas without soil cover: chief soils are shallow stony earthy loams along with some soils on the steeper slopes.	364	30%
<b>Total</b>	<b>1,204</b>	<b>100</b>

NB: values have been rounded to the nearest whole number

At a finer scale, the Study Area consists of shallow sands with red sandy earths, deeps sands and loamy earths. Soils on the ranges are predominantly stony soils with significant stone through the soil profile and high proportions of surface outcropping. Less dominant areas of red shallow loams, red brown hardpan shallow loams and calcareous shallow loams occur across the Study Area (van Vreeswyk *et al.*, 2004). Calcareous shallow loams are mostly common on hills based on basalt, and shallow red/brown non-cracking clays occur as isolated pockets of soil within the hill systems and within hill valleys. Soils become deeper downslope from the ranges. The Study Area consisted of erosional surfaces, resulting from the higher relief, associated with the stony hills, ridges and plains (van Vreeswyk *et al.*, 2004).

The Study area occurs within the Hamersley Plateaux Zone. The dominant broad landforms in the Study Area are low stony hills, ranges with dykes and dissections, and extensive flat and gently sloping plains (Northcote *et al.*, 1960-1968). The northwestern portion of the Study Area broadly coincide with stony hills, ridges, and dissected ranges of the Hamersley while the remaining southern areas coincide with granitic hills and outcrops that give way to gently sloping red sandy loam plains and stony plains (van Vreeswyk *et al.*, 2004).

## 2.5 Geology

According to the Australian Geological Provinces database, the Study Area is located within the Warakurna Large Igneous Province (Wingate *et al.*, 2004). The spatial data has been captured largely at approximately 1:1 million scale. The Warakurna Large Igneous Province consists of layered mafic-ultramafic intrusions, mafic to felsic volcanic rocks and dykes, extensive mafic sills and swarms of mafic dykes (Wingate *et al.*, 2004). The Warakurna Large Igneous Province consists of coeval mafic igneous rocks. The bulk of the magmatic products emplaced between 1,078 and 1,070 million years ago, along an east-west swath approximately 800 km wide and 2,400 km long (Wingate *et al.*, 2004).

At a finer scale (1:500,00) the Study Area (GSWA, 2016) is mapped (Figure 2.3) as:

- Fortescue Group (A-FO-od): Dolerite dyke or sill. Occurs in the southeast across 28% (or 332 ha) of the Study Area.
- Jeerinah Formation (A-FOj-xs-b): Siliciclastic sedimentary rocks, mafic volcanic rocks and minor felsic volcanic rocks; local carbonate rocks, chert, and dolerite sills. Occurs across 72% (or 870 ha) of the Study Area.
- Marra Mamba Iron Formation (A-HAm-cib): Chert, banded iron-formation, mudstone, and siltstone; minor carbonate; metamorphosed. Occurs as a minor slither in the north across less than 1% (or 2 ha) of the Study Area.

## 2.6 Land Systems

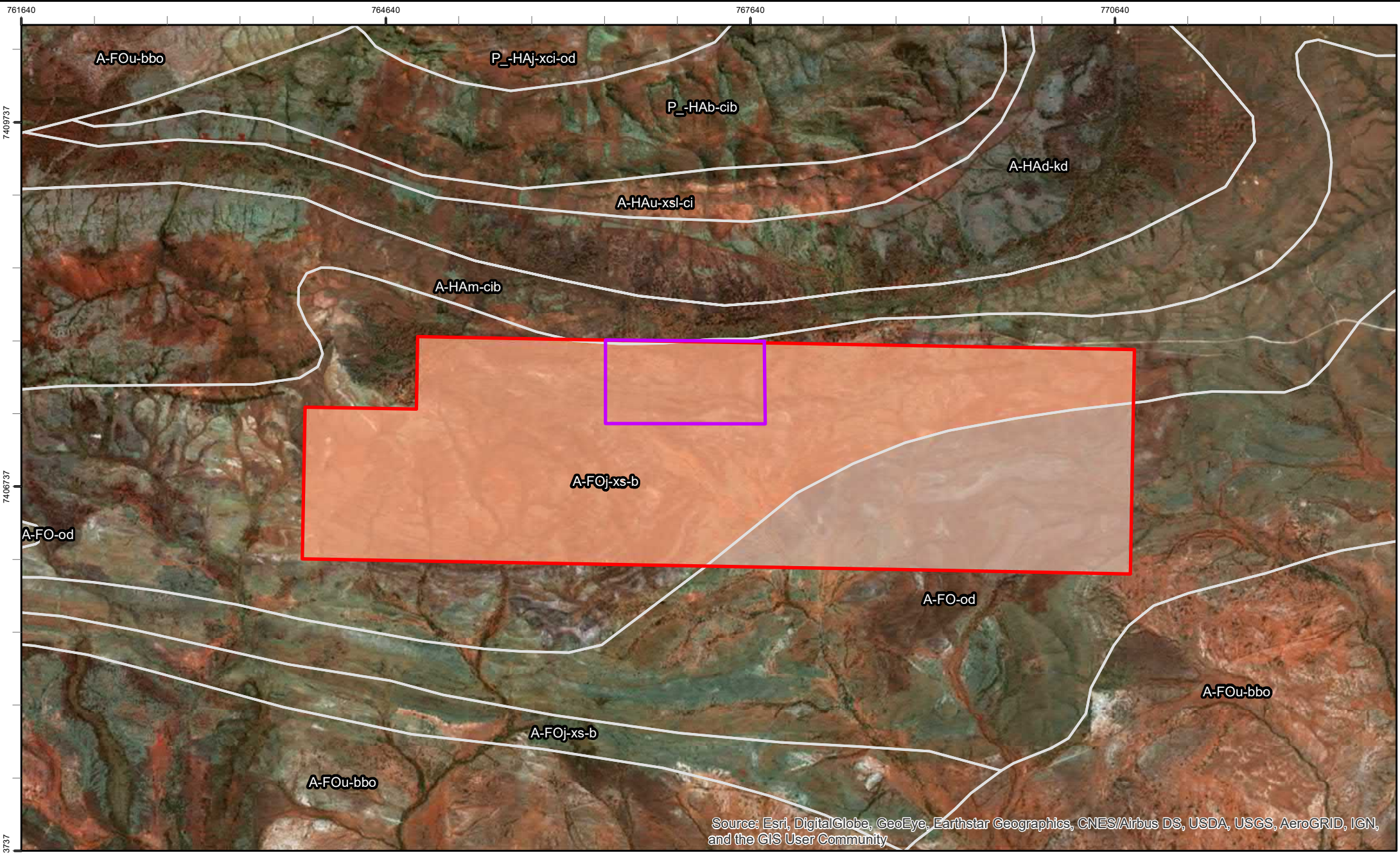
Work undertaken by a joint team from the (former) Department of Agriculture (now Department of Primary Industries and Regional Development) and the (former) Department of Lands Administration (now Department of Planning, Lands and Heritage) classified the pastoral areas of Western Australia (van Vreeswyk *et al.*, 2004). The purpose of the surveys were to provide a comprehensive description and mapping of the biophysical resources of the pastoral areas, together with an evaluation of the pastoral potential and the condition of the soils and vegetation (van Vreeswyk *et al.*, 2004).

Four land systems have been mapped as occurring across the Study Area, Boolgeeda, Elimunna, Newman and Rocklea (van Vreeswyk *et al.*, 2004) (Table 2.2 and Figure 2.4). The dominant land system is the Rocklea land system, which covered approximately 93% of the Study Area (Table 2.2). The land type for the Rocklea land system is described as basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex and occasionally soft spinifex grasslands with scattered shrubs (Table 2.2).

**Table 2.2 Land Systems of the Study Area**

Land System	Land Type	Description	Extent in Study Area	
			Ha	%
Boolgeeda	Stony plains with spinifex grasslands	Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands and mulga shrublands	73	6%
Elimunna	Hills and ranges with acacia shrublands	Gently undulating stony plains and granite hills supporting <i>Acacia-Eremophila-Senna</i> shrublands and minor soft spinifex grasslands.	2	<1%
Newman	Hills and ranges with spinifex grasslands	Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands	14	1%
Rocklea	Hills, ridges, upper and lower slopes with spinifex grasslands	Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands with <i>Acacia</i> and <i>Senna</i> shrubs.	1,116	93%
<b>Total</b>			1,204	100

NB: hectare values have been rounded to the nearest whole number.



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

**Legend**

- Study Area
  - Targeted Diversion Area
- Geological Unit**
- Fortescue Group (A-FO-od)
  - Jeerinah Formation (A-FOj-xs-b)
  - Marra Mamba Iron Formation (A-HAm-cib)

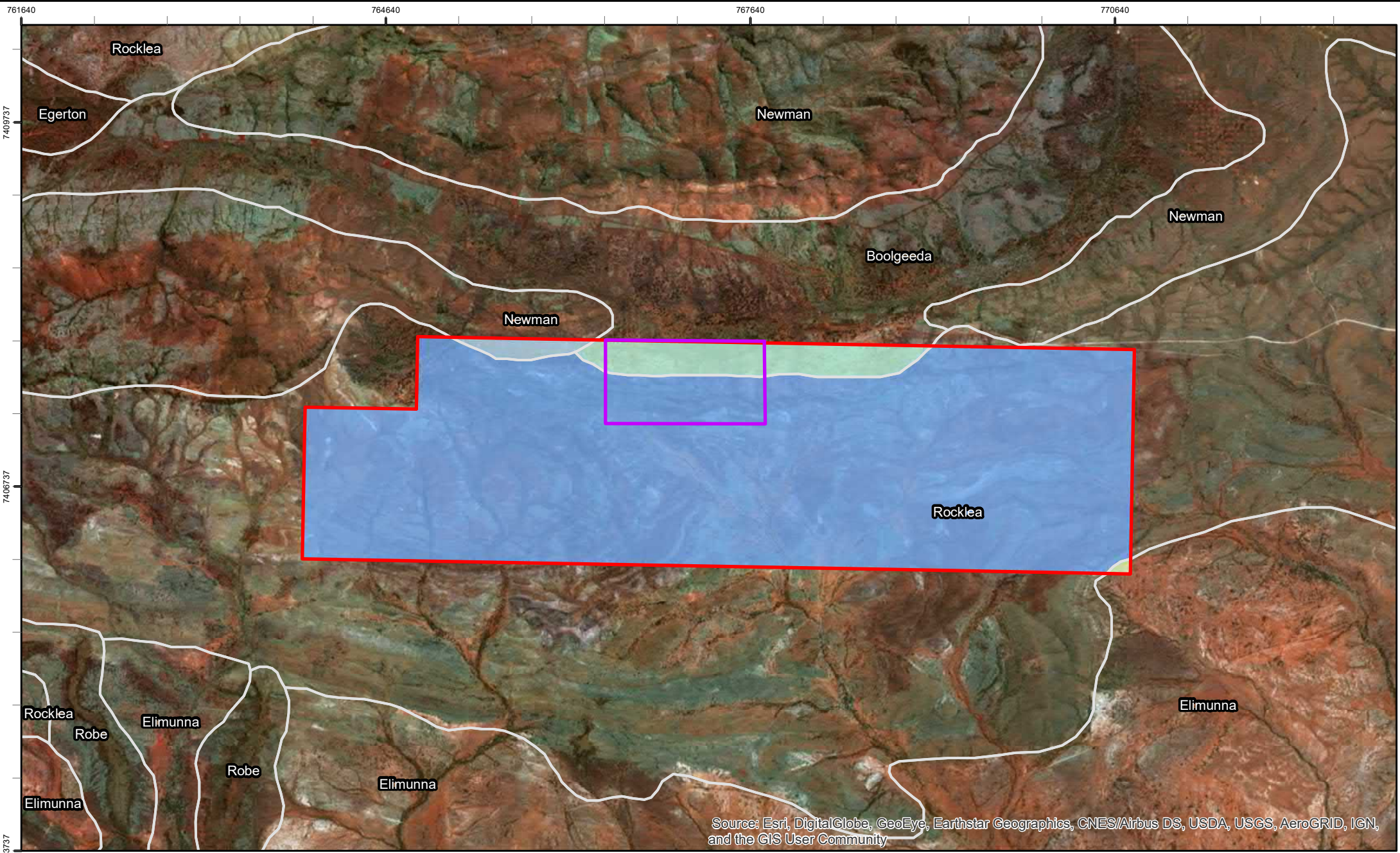
1:40,000

0 0.45 0.9 1.8 km

**BHP Western Australian Iron Ore**  
**Western Ridge Detailed Flora and Vegetation Survey**  
**Figure 2.3: Broad Geology of the Study Area**

Coordinate System: GDA 1994 MGA Zone 50  
 Projection: Transverse Mercator  
 Datum: GDA 1994

Size A4. Created 13/03/2019



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

**Legend**

- Targeted Diversion Area
  - Study Area
- |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Land System</b> | <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #ADD8E6; border: 1px solid black; margin-right: 5px;"></span> Newman</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #6495ED; border: 1px solid black; margin-right: 5px;"></span> Rocklea</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #90EE90; border: 1px solid black; margin-right: 5px;"></span> Boolgeeda</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #FFFF00; border: 1px solid black; margin-right: 5px;"></span> Elimunna</li> </ul> |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Scale bar: 0, 0.45, 0.9, 1.8 km

North arrow pointing up.

**BHP Western Australian Iron Ore  
Western Ridge Detailed Flora and  
Vegetation Survey**

**Figure 2.4: Land systems of the Study Area**

Coordinate System: GDA 1994 MGA Zone 50  
 Projection: Transverse Mercator  
 Datum: GDA 1994

Size A4. Created 13/03/2019

## 2.7 Hydrology

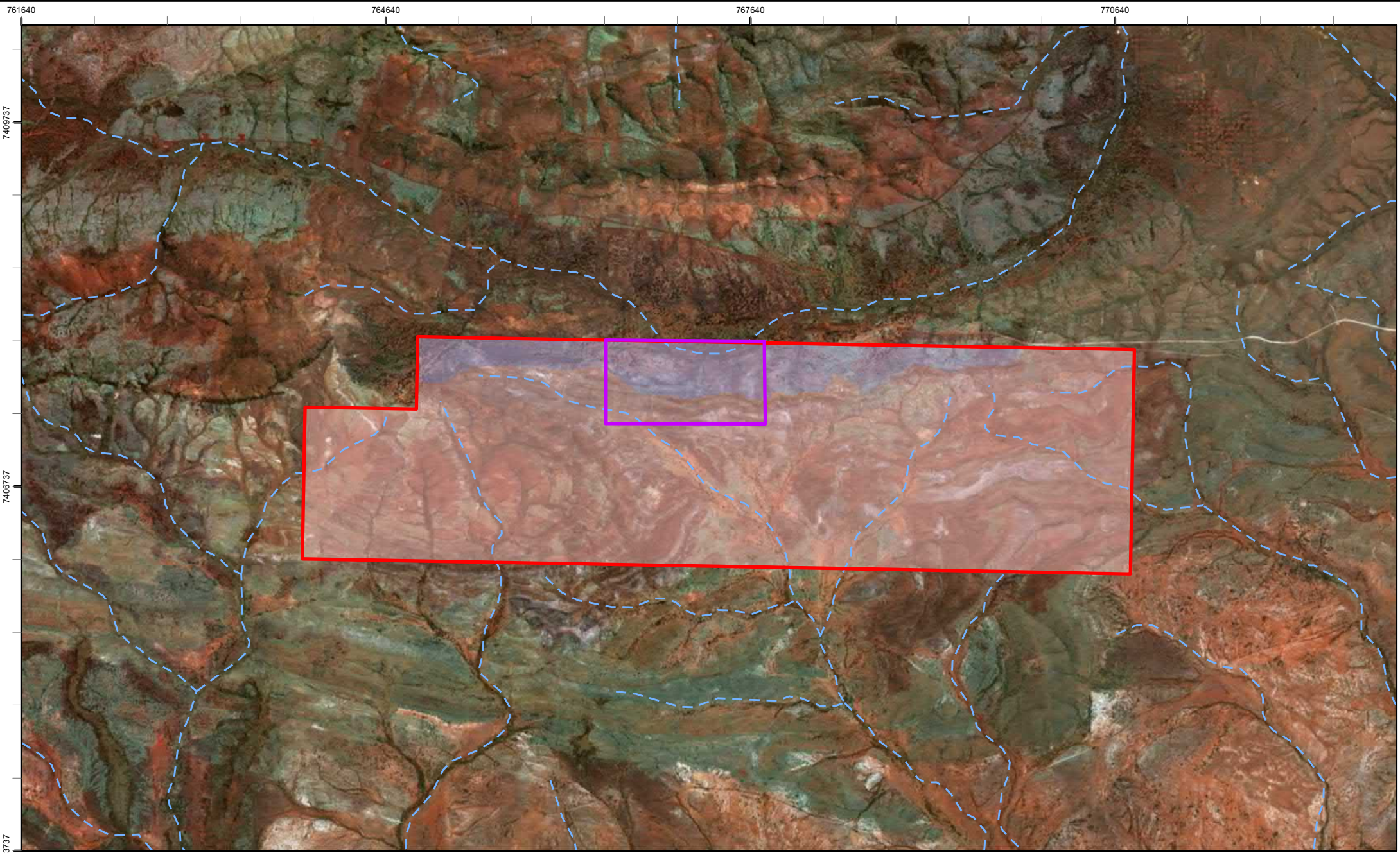
The hydrology, both surface and groundwater, of the Pilbara is highly variable as a result of a dynamic climate with severe droughts followed by major flooding (DoW, 2010). Streamflows are mostly a direct response to rainfall and are highly seasonal and variable. Most runoff occurs from January to March as a result of episodic cyclonic activities (DoW, 2010).

The Study Area is located within the Fortescue River basin, which extends from the Upper Fortescue River, along the Fortescue Marsh and through the Lower Fortescue River. At a finer scale, the Study Area is located within the Upper Fortescue River Catchment and at the juncture of the Ophthalmia Dam and Newman sub-catchments (Figure 2.5). The Study Area is located approximately 10 km north-west of the Fortescue River, at its closest point. Several unnamed drainage lines are located to the north and west of the Study Area.

Surface water hydrology within the Study Area is regulated by minor drainage lines that flow from the north or north-west to the south and south-east (Figure 2.5). These minor drainage lines end up discharging into the Fortescue River, south-west of the Great Northern Highway. Three minor drainage lines are located within the Study Area.

Groundwater originates from direct infiltration by rainfall and from surface water flows. Groundwater occurs throughout the Pilbara but is most easily located and accessed in close proximity to surface water drainage lines (alluvial channels). The most significant aquifers can be grouped into three types: alluvial aquifers that are either unconsolidated sedimentary aquifers or chemically deposited aquifers, consolidated sedimentary (or sedimentary rock) aquifers and fractured rock aquifers. Broadly, the groundwater in association with the Study Area is located within fractured and weathered rock aquifers.






Groundwater is stored in fractures and voids in the rocks and therefore tends to be localised. Groundwater recharge is also episodic and affected by direct infiltration of rainfall over areas where the rocks are fractured.




7408737  
7408737  
7408737

761640 764640 767640 770640

**Legend**

 Study Area	<b>Sub-catchment</b>
 Targeted Diversion Area	 Newman
 Minor watercourse	 Ophthalmia Dam



Scale: 1:40,000  
0 0.45 0.9 1.8 km

**BHP Western Australian Iron Ore  
Western Ridge Detailed Flora and  
Vegetation Survey**

**Figure 2.5: Hydrology of the Study Area**

Coordinate System: GDA 1994 MGA Zone 50  
Projection: Transverse Mercator  
Datum: GDA 1994

Size A4. Created 09/12/2019

## 2.8 Vegetation Associations

The Study Area is located in the Fortescue Botanical District, which is a part of the Eremaean Province (Beard, 1990). It is essentially a tree- and shrub-steppe with *Eucalyptus* spp. trees, *Acacia* shrubs, *Triodia pungens* and *Triodia wiseana* (Beard, 1990). Some mulga (*Acacia aneura* and close relatives) occurs in valleys and there are short-grass plains on alluvia (Beard, 1990). The vegetation associations of the Study Area were mapped by Beard (1975), in which he classified the following two vegetation associations (Figure 2.6):

- 18: Low woodland; mulga (*Acacia aneura* and close relatives) (with spinifex) low woodland on the Hamersley Plateau; and
- 82: Hummock grasslands, low tree steppe; snappy gum (*Eucalyptus leucophloia*) over *Triodia wiseana* on ranges and summits.

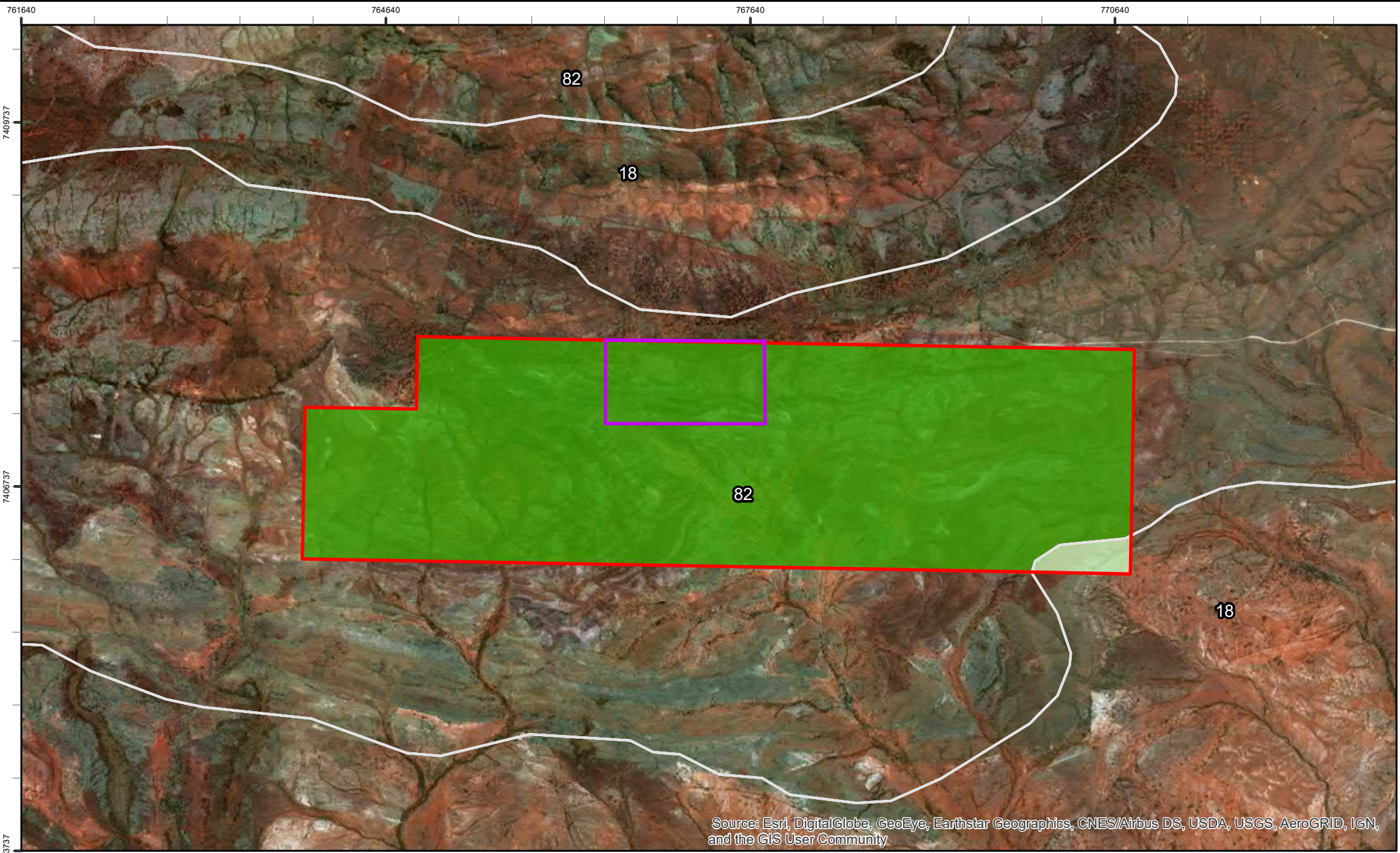
The majority of the Study Area was mapped as vegetation association 82, while a minor portion in the southeast was mapped as vegetation association 18 (Figure 2.6 and Table 2.3).

Shepherd *et al.* (2002) reinterpreted and updated the vegetation association mapping to reflect the National Vegetation Information System (NVIS Technical Working Group) standards (ESCAVI, 2003). The update also accounts for extensive clearing since Beard (1975) mapping. Shepherd *et al.* (2002) created a series of 'systems' to assist in removing mosaic vegetation associations originally mapped by Beard (1975); however, some mosaics still occur. The Study Area is located within the Kumarina Hills System, and under Shepherd *et al.* (2002) comprises:

- 18.11: *Acacia* open shrubland / *Ptilotus* mixed open forbland; and
- 82.3: *Eucalyptus* sparse mallee shrubland / *Senna* mixed sparse shrubland / *Triodia* open hummock grassland (Table 2.3).

The current extent of the vegetation system associations remaining exceeds 98% across the four regional scales: State, bioregion (Pilbara), subregion (Hamersley Iron) and Local Government Authority (Shire of East Pilbara) (Government of Western Australia, 2018) (Table 2.3). Currently both vegetation system associations (18 and 82) are represented within the National Reserve System having greater than 19% and 12% of their current bioregional and subregional extent within reserves, respectively (Government of Western Australia, 2018) (Table 2.3).





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

**Legend**

- Study Area
  - Targeted Diversion Area
- System Association**
- Hammersley (18)
  - Hammersley (82)

N  
1:40,000  
0 0.45 0.9 1.8 km

**BHP Western Australian Iron Ore  
Western Ridge Detailed Flora and  
Vegetation Survey**  
**Figure 2.6: Pre-European vegetation associations  
of the Study Area**

Coordinate System: GDA 1994 MGA Zone 50  
 Projection: Transverse Mercator  
 Datum: GDA 1994

Size A4. Created 13/03/2019

**Table 2.3: Regional and local extent of the Hamersley System Associations within the Study Area**

Code	Study Area (ha / %)	Scale	Pre-European extent (ha)	Current extent remaining (ha / %)	Current extent remaining within reserves (ha / %)
18.11	19 / 2%	State	580,556	576,433 / 99.29	113,404 / 19.67
		Pilbara	580,512	576,389 / 99.29	113,404 / 19.54
		Hamersley	580,512	576,389 / 99.29	113,404 / 19.54
		LGA	224,292	220,375 / 98.25	44 / 0.02
82.3	1,185 / 98%	State	2,169,997	2,157,852 / 99.44	262,983 / 12.19
		Pilbara	2,168,702	2,156,558 / 99.44	262,983 / 12.13
		Hamersley	2,158,862	2,146,719 / 99.44	262,244 / 12.15
		LGA	573,313	565,215 / 98.59	0 / 0

NB: LGA (Local Government Authority): Shire of East Pilbara

Reserves – International Union of Nature Conservation (IUCN) Class I-IV reserves (i.e. National Parks, Strict Nature Reserves)

Source: Government of Western Australia (2018); NB: area values have been rounded to the nearest whole number.

## 2.9 Flora and Vegetation Background

### 2.9.1 Introduced Taxa

The Commonwealth of Australia, in collaboration with the states and territories, has identified 32 WoNS based on an assessment process that prioritises these weeds according to their invasiveness, potential for spread and environmental, social and economic impacts. A list of 20 WoNS was endorsed in 1999 and a further 12 were added in 2012.

Landowners and land managers at all levels are responsible for managing WoNS. State and territory governments are responsible for legislation, regulation and administration of weeds. The WoNS were selected as they require coordination among all levels of government, organisations and individuals with weed management responsibilities.

### 2.9.2 Groundwater Dependent Ecosystems

Groundwater Dependent Ecosystems (GDEs) and their associated vegetation is dependent on the presence of groundwater to meet some, or all, of their water requirements, either through surface expression or subsurface presence of groundwater (Hatton & Evans, 1998). Groundwater dependent species that utilise groundwater are referred to as phreatophytes, and they may be classified as either obligate or facultative phreatophytes depending on their level of dependence on groundwater (Eamus *et al.*, 2006).

Obligate phreatophytes are plants that are highly dependent on groundwater. This dependence can be continual, seasonal or episodic. Obligate phreatophytes tend to be associated with surface expressions of groundwater rather than the subsurface presence of groundwater (i.e. *Melaleuca argentea*) (adapted from Astron, 2015).

Facultative phreatophytes are plants that can access groundwater but are not totally reliant on groundwater to sustain their water requirement. Rather, they utilise groundwater opportunistically, particularly during times of drought when moisture reserves in the vadose (unsaturated) zone of the soil profile become depleted. Facultative phreatophytes are generally associated with the subsurface presence of groundwater rather than surface water. Most facultative phreatophytes are large woody trees and shrubs with deep root systems capable of accessing the capillary fringe of the water table, which may occur at considerable depth within the profile (i.e. *Eucalyptus camaldulensis*) (adapted from Astron, 2015; Kath *et al.*, 2014; Thomas, 2014).

Review of the GDE Atlas (BoM, 2012) indicates that the Study Area has a low potential for GDE. Review of the vegetation associations and floristic assemblages indicates that the drainage lines are not considered to be a GDE due to the lack of phreatophytic flora taxa. *Eucalyptus xerothermica* is considered to be a vadophyte or very mildly facultative phreatophytic (Rio Tinto, 2018) and was present within the drainage lines and floodplains. However, it is known to mostly access water in the vadose (unsaturated) zone and is unlikely to rely on groundwater for survival.

### **2.9.3 Sheet Flow Dependent Ecosystems**

Mulga is a large, variable and taxonomically complex group of plants allied to *Acacia aneura* that dominate significant areas of the vast Australian arid zone (Maslin *et al.*, 2012). The term Mulga is also used to describe vegetation communities in which these species predominate (Maslin *et al.*, 2012). A recent revision of the Mulga group (*Acacia aneura* and its close relatives) classified 12 separate entities, excluding informal variants, putative hybrids and intergrades (Maslin & Reid, 2012). The structure and patterning of mulga communities varies from strongly banded (groved) through to open shrublands and woodlands across the landscape (Page & Grierson, 2012). The bandings act as a sink for nutrients and water to infiltrate the soil and are readily available for uptake by the flora located within the banding. This banding and overland sheet flow supports a diverse biota within the Mulga bands and plays an important ecological function which is well documented (Dawson & Ahern, 1973; Saco *et al.*, 2007; Winkworth, 1973).

### **2.9.4 Bioregional Significance**

Under the Convention of Biological Diversity, Australia has worked towards a target of 17% of the continent to be protected as part of the National Reserve System (NRSTG). In building the NRS, priority is given to under-represented bioregions that have less than 10% of their remaining area protected in reserves (NRSTG, 2009). The Pilbara bioregion is an underrepresented bioregion, with less than 10% of its total area protected in reserves. The Hamersley subregion is adequately represented, with more than 13% of the subregional area protected in reserves.

Despite the Pilbara bioregion being underrepresented within the NRS, greater than 99% of the bioregional and the Hamersley subregional area remains intact (Government of Western Australia, 2018). As such, it has been determined that any potential vegetation clearing within the Study Area would not substantially impact the biological values of the bioregion (and subregion) as the region will remain intact, and therefore the State retains the ability to adequately reserve vegetation within the Pilbara bioregion (and the Hamersley subregion).

### 3 METHODOLOGY

#### 3.1 Compliance

The survey was carried out in a manner consistent with the Western Australian EPA, DBCA and BHP WAIO guidelines for the environmental surveying and reporting of flora and vegetation. The following guidelines, procedures and documents were utilised prior to, during and after completion of the field survey:

- EPA (2018) Statement of Environmental Principles, Factors and Objectives;
- EPA (2016b) Environmental Factor Guideline: Flora and Vegetation;
- EPA (2016c) Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment;
- Latest version of BHP WAIO's Vegetation and Flora Survey Procedure (0124627) (BHP, 2018); and
- Latest version of BHP WAIO's Biological Survey Spatial Data Requirements (SPR-IEN-EMS-015) (BHP, 2019).

#### 3.2 Desktop Assessment

##### 3.2.1 Literature Review

Background information on the Study Area and surrounds was compiled prior to, during and after the field survey. Historic vegetation mapping conducted by Beard (1975) and Shepherd *et al.* (2002), land systems mapping (van Vreeswyk *et al.*, 2004), and the IBRA classification system (Desmond *et al.*, 2001) were consulted to provide broad contextual knowledge of the vegetation types likely to be encountered within the Study Area. The literature review also considered 26 previous field surveys and four desktop reviews of relevance to the Study Area (Table 3.1). The previous field surveys that were considered were provided by BHP WAIO and are located within a radius of 20 km from the Study Area. The Index of Biological Surveys for Assessments (IBSA) online portal was reviewed to identify additional projects that have been conducted in close proximity to the Study Area. No additional surveys were identified from IBSA.

**Table 3.1: Literature sources used for the review**

Survey Title	Reference	Survey Type	Distance from Study Area (km)
Mt. Whaleback <i>Lepidium catapycnon</i> Survey	HGM (1997)	Targeted Searching Survey	Adjacent (north)
Field Search and Observations of <i>Lepidium catapycnon</i> Populations, Mt. Whaleback, Newman	ENV (1999a)	Targeted Searching Survey	Adjacent (north)
Regional Search for <i>Lepidium catapycnon</i> in the Greater Newman Area (Pilbara), Western Australia	ENV (1999b)	Targeted Regional Searching Survey	Adjacent and surrounding
Follow-up Survey of Mt. Whale back <i>Lepidium catapycnon</i> Population	HGM (1999a)	Targeted Searching Survey	Adjacent (north)

Survey Title	Reference	Survey Type	Distance from Study Area (km)
Mt Whaleback OB30 and OB35 Soil and Biological Survey	HGM (1999b)	Reconnaissance Flora and Vegetation Survey, Fauna Survey, Soil Assessment, Desktop Assessment	Adjacent (north)
Baseline Biological & Soil Surveys and Mapping for ML244SA West of the Fortescue River	Biota (2001)	Baseline Flora, Fauna and Soils Survey	Adjacent (north)
Newman Hub: Priority Flora and Weed Survey	ecologia (2004)	Targeted Searching Survey, Weed Survey	Adjacent (north)
Western Ridge Exploration Project - Biological Survey	Ecologia (2005)	Detailed Flora and Vegetation Survey, Level One Fauna Assessment, Desktop Review	Adjacent (north)
Newman Ammonium Nitrate Storage Facility - Phase 2 Conservation Significant Flora Survey	Ecologia (2006a)	Targeted Searching Survey	10 km northeast
Newman Ammonium Nitrate Storage Facility Conservation Significant Flora Survey	Ecologia (2006b)	Targeted Searching Survey	10 km northeast
Western Ridge Exploration Project Biological Survey	Ecologia (2006c)	Detailed Flora and Vegetation Survey, a Level One Fauna Assessment, Desktop Review	Adjacent (north)
Mount Whaleback Flora & Vegetation Assessment – Phase III	ENV (2006d)	Detailed Flora and Vegetation Survey	Adjacent (north)
Proposed Kurra Village Extension Area Flora and Vegetation Assessment	ENV (2006a)	Reconnaissance Flora and Vegetation Survey	11.5 km northeast
RGP4 Newman Hub Infrastructure Area Flora and Vegetation Assessment	ENV (2006b)	Reconnaissance Flora and Vegetation Survey	Adjacent (north)
RRG4 Newman Hub Topsoil Stockpile and Borrow Areas for Construction Flora and Vegetation Assessment	ENV (2006c)	Reconnaissance Flora and Vegetation Survey	Adjacent (north)
Myopic Project Area Flora and Fauna Assessment	GHD (2008)	Detailed Flora and Vegetation Survey, a Level One Fauna Assessment	16 km northeast
Newman Power Network Flora and Fauna Survey	Biologic (2009)	Detailed Flora and Vegetation Survey, a Level One Fauna Assessment	Adjacent (north)
Newman to Yandi Transmission Line Flora and Vegetation Assessment	ENV (2009a)	Detailed Flora and Vegetation Survey	8 km northeast
Whaleback Power Station Flora and Vegetation Assessment	ENV (2009b)	Detailed Flora and Vegetation Survey	Adjacent (north)
Whaleback Flora & Vegetation Survey and Fauna Assessment	Onshore (2009)	Detailed Flora and Vegetation Survey, Level One Fauna assessment	Adjacent (north)
Whaleback TSF Flora and Vegetation and Fauna Survey	Astron (2010)	Detailed Flora and Vegetation Survey, a Level One Fauna Assessment	Adjacent (north)

Survey Title	Reference	Survey Type	Distance from Study Area (km)
Orebody 35 Vegetation Clearing Permit Area Flora and Fauna Assessment	ENV (2010)	Detailed Flora and Vegetation Survey, Level One Fauna Assessment	Adjacent (north)
Whaleback East Flora, Vegetation and Fauna Report and NVCP Letter	ENV (2011)	Detailed Flora and Vegetation Survey, a Level One Fauna Assessment and the NVCP Letter	Adjacent (north)
Orebody 35 and Surrounds Flora and Vegetation Survey	GHD (2011)	Detailed Flora and Vegetation Survey	Adjacent (north)
Eastern Ridge (OB23/24/25) Flora and Vegetation Assessment	ENV (2012)	Detailed Flora and Vegetation Survey	18 km northeast
Whaleback AML 7/244 Flora and Vegetation and Vertebrate Fauna Review	Onshore (2013)	Desktop Assessment	Adjacent (north)
Consolidation of Regional Vegetation Mapping BHP Billiton Iron Ore Pilbara Tenure	Onshore (2014a)	Review	Adjacent and surrounding
Western Ridge Biological Survey	Onshore (2014b)	Detailed Flora and Vegetation Survey (Formerly known as a Level 2 Flora and Vegetation Survey), Level One Fauna assessment	Adjacent (North)
Western Ridge Southern Tenements (E52/3360 and E52/3361) Flora and Vegetation Desktop Assessment Biological Survey	Onshore (2016)	Desktop Assessment	Adjacent (east and west)
Western Ridge E52/3448 Desktop Flora and Fauna Assessment	Onshore (2018)	Desktop Assessment	Adjacent (north)

### 3.2.2 Database Searches

Database searches were undertaken to generate a list of vascular flora taxa previously recorded within, and near, the Study Area, including introduced species and taxa of conservation significance. The database searches also identified ecological communities/ vegetation types of conservation significance that occur, or may occur, within, and near, the Study Area. Conservation codes for flora and vegetation of conservation significance are provided in Appendix A. Six database searches were conducted around a central coordinate (23°25'39.684"S; 119°36'53.46"E), with varying buffers as deemed appropriate (Table 3.2).

**Table 3.2: Details of database searches conducted**

Provider	Reference	Database	Parameters
Department of Biodiversity, Conservation and Attractions	DBCA (2018b)	Threatened and Priority Ecological Communities	Circle of radius 40 km centred on the coordinates: 23°25'39.684"S; 119°36'53.46"E
Department of Biodiversity, Conservation and Attractions	DBCA (2018c)	Threatened and Priority Flora	Circle of radius 40 km centred on the coordinates: 23°25'39.684"S; 119°36'53.46"E

Provider	Reference	Database	Parameters
Department of Biodiversity, Conservation and Attractions	DBCA (2018a)	NatureMap	Circle of radius 40 km centred on the coordinates: 23°25'39.684"S; 119°36'53.46"E
Department of the Environment and Energy	DoEE (2018)	Protected Matters Search (MNES)	Circle of radius 40 km centred on the coordinates: 23°25'39.684"S; 119°36'53.46"E
Atlas of Living Australia	ALA (2018a)	Occurrence search	Circle of radius 40 km centred on the coordinates: 23°25'39.684"S; 119°36'53.46"E
Department of Primary Industry and Regional Development (DPIRD)	DPIRD (2018)	Declared Plants Database (WAOL) <sup>1</sup>	Search of the Shire of East Pilbara local government area.

NB: MNES – Matters of National Environmental Significance; WAOL – Western Australian Organism List

The conservation significant flora species identified from the database searches were assessed and ranked on the likelihood of occurring within the Study Area (see Section 4.2). The rankings were assigned using the following definitions:

1. **Confirmed:** the presence of the species in the Study Area has been recorded unambiguously during the last 15 years.
2. **Highly Likely:** the Study Area lies within the known distribution of the species, the species has been recorded from within 10 km and within the last 15 years, and suitable habitat exists within the study area.
3. **Likely:** the Study Area lies within the known distribution of the species and the species has been recorded within 20 km in the last 20 years; however, either:
  - a. the Study Area is likely to contain only a small area of suitable habitat, or habitat that is only marginally suitable; or
  - b. the species is generally rare and patchily distributed in suitable habitat.
4. **Possible:** there is an outside chance of occurrence, because:
  - a. the Study Area is just outside the known distribution of the species, but is likely to contain suitable and sufficient habitat (the species may be common, rare, or patchily distributed); or
  - b. the Study Area lies within the known distribution of the species, but the species is very rare and/or patchily distributed; or
  - c. the Study Area lies on the edge of, or within, the known distribution and is likely to contain suitable habitat, but the species has not been recorded in the area for over 20 years.
5. **Unlikely:** the Study Area lies outside the known distribution of the species, the Study Area is unlikely to contain suitable habitat, and the species has not been recorded in the area for over 20 years.
6. **Highly Unlikely:** the Study Area lies a significant distance outside of the known distribution, for example, greater than 150 km to the nearest record, and has never been recorded from the area.

<sup>1</sup> Filtered to only include declared plant pests listed under Section 22 of the *Biosecurity and Agricultural Management Act 2007*.



### 3.3 Field Survey

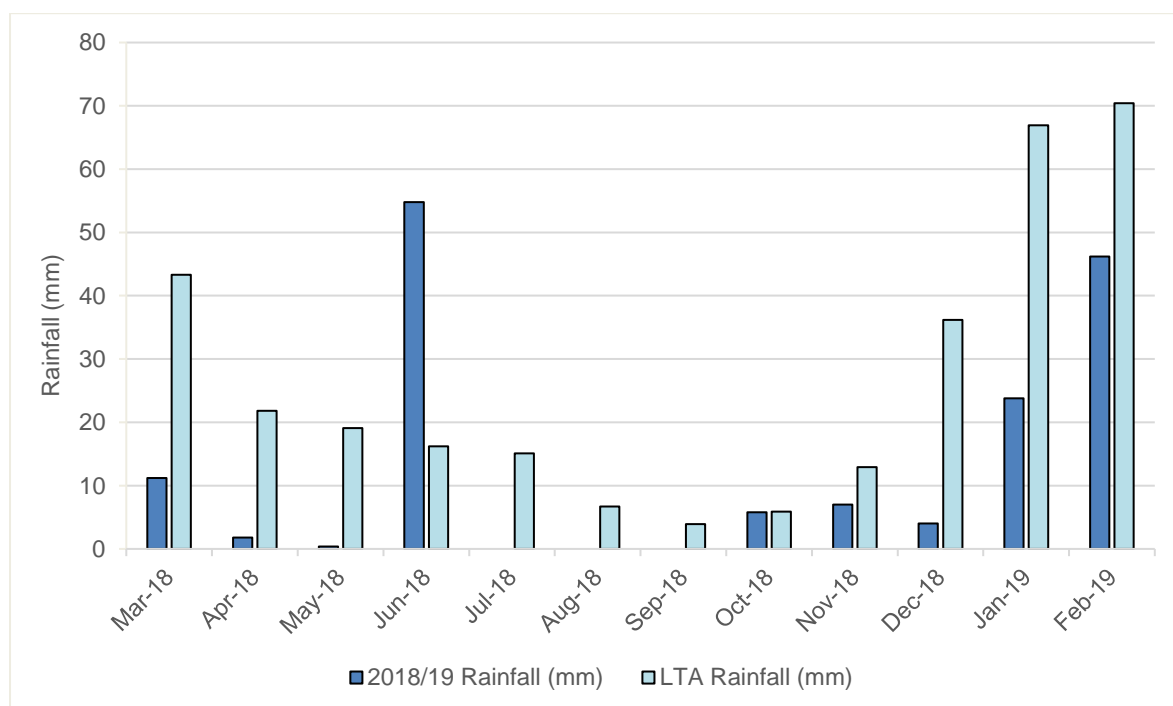
#### 3.3.1 Survey Type, Timing and Weather

The field survey was undertaken with due consideration given to:

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

A single season Detailed Flora and Vegetation Survey was requested by BHP. The field survey was undertaken over eight days, equivalent to 160-person hours, between 11 and 18 March 2019. The day time climatic conditions during the field survey (hot temperatures and clear skies; BoM, 2019) were adequate to complete the survey on foot.

The field survey was undertaken following a winter, spring and summer season of large fluctuations. The months of September to November 2018 received below average rainfall (12.8 mm compared to 22.5 mm; Figure 3.1). The three months preceding the field survey (December 2018 and January to February 2019) received well below average rainfall (74 mm compared to 173.5 mm; Figure 3.1) (BoM, 2019). No rain was received in the week prior to the commencement of the survey and a total of 3.6 mm was received during the eight-day survey which did not impact on soil moisture. Although the Newman weather station received some rainfall for January and February, the four dry months preceding this below average rain ensured that there was little soil moisture, which was evident by the lack of annuals and ephemerals, while a number of perennial grasses had only vegetative material present.



**Figure 3.1: 2018/19 monthly rainfall and long-term average (LTA) rainfall for Newman Airport. Survey completed in mid March 2019 (BoM, 2019)**

### 3.3.2 Survey Team and Licensing

The field survey was led by Mr Clinton van den Bergh, a Senior Botanist with over 13 years' experience. Clinton was assisted by Mr Sam Coultas during the field survey, a Botanist with over 4 years' experience. Clinton meets the minimum requirements (5+ years' experience in the bioregion) to lead and manage a flora survey in the Pilbara, as prescribed by the EPA (2016c). The collection of flora specimens was taken under flora collecting permits (SL012369; FB62000017) pursuant to the *Wildlife Conservation Act 1950* (WC Act; Section 23C and 23F) and the BC Act (Regulation 62). Clinton also holds a *Permit to Take Declared Rare Flora* for identification purposes (167-1718), issued under the WC Act, Section 23F.

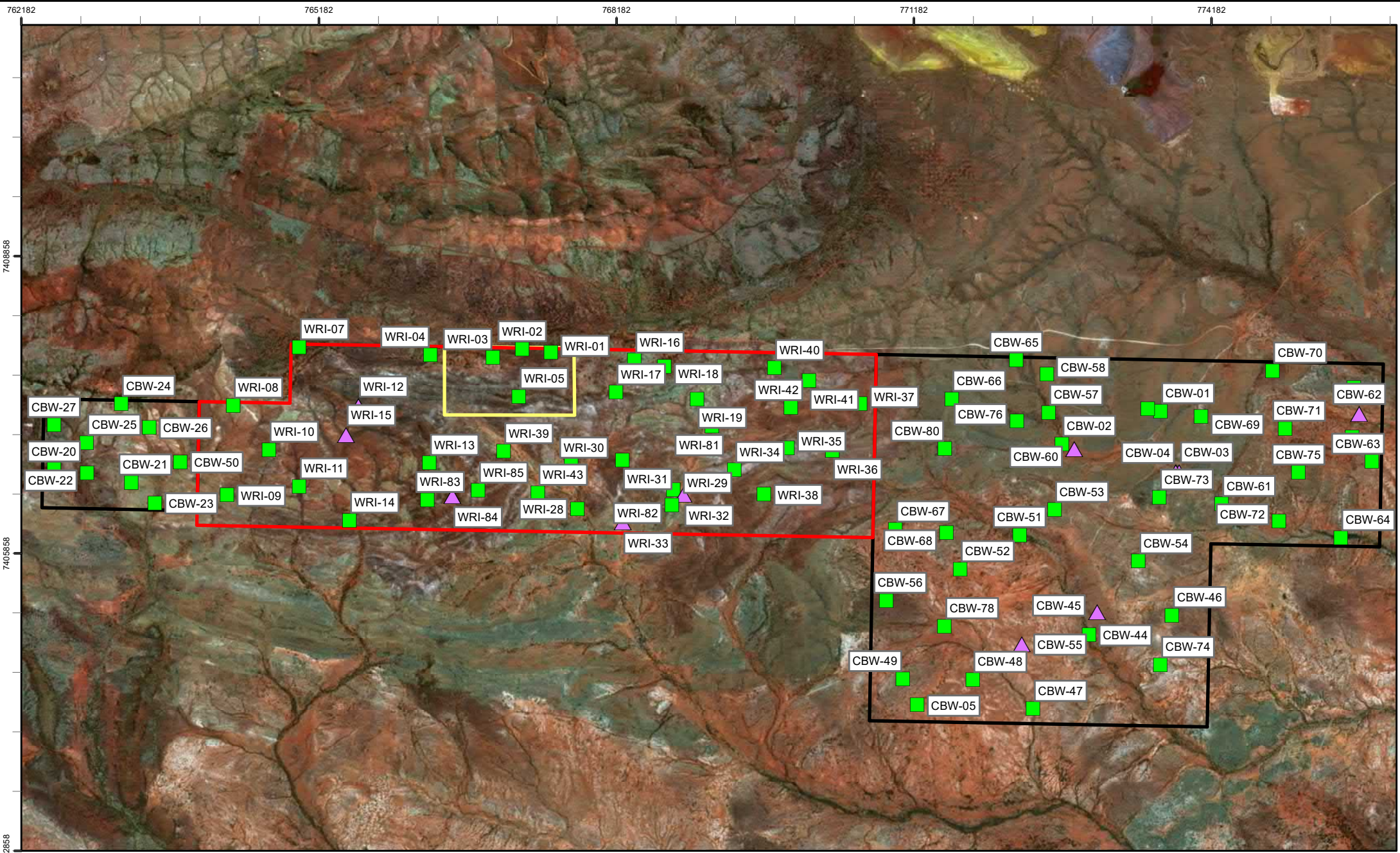
### 3.3.3 Flora and Vegetation Survey Design

Prior to the field survey, aerial photography (Scale 1:30,000) of the Study Area and Google Earth Pro®, were reviewed, along with previous vegetation mapping (Beard, 1976; Biologic, 2015; Onshore, 2014a, 2014b, 2016, 2017, 2018; Shepherd *et al.*, 2002), land systems mapping (van Vreeswyk *et al.*, 2004) and soil landscape mapping (Northcote *et al.*, 1960-1968), to determine broad preliminary vegetation unit boundaries. Following the review of the aerial imagery and broad contextual information, survey plans were designed to ensure the Study Area was appropriately traversed, sampled and targeted to capture the data required for a single season Detailed Flora and Vegetation Survey.

The entirety of the Study Area overlaps a previous desktop flora and vegetation survey completed by Onshore Environmental (Onshore, 2018), on behalf of BHP WAIO. The vegetation unit mapping detailed within Onshore (2018) was reviewed to provide guidance to the survey plan.

### 3.3.4 Detailed Survey

In addition to this project, Biologic were commissioned to complete a single season Detailed Flora and Vegetation Survey of the Coombanbunna Well exploration tenements (E52/3361 and E52/3360) (Figure 3.2). As the three tenements occurred adjacent to each other, and the landforms extended across the three tenements, the single season Detailed Flora and Vegetation Survey for both Surveys was undertaken concurrently. The three tenements were considered one "Survey Area" for the purposes of establishing and sampling quadrats within the representative vegetation units. As such, there is the situation where some of the vegetation associations in the Study Area are only represented by one quadrat, however, additional quadrats are located within the Coombanbunna Well Study Area.



7403858  
7403858  
7402858

762182 765182 768182 771182 774182

**Legend**

**Sampling**

- Quadrat
- ▲ Releve

- Western Ridge
- Coombanbunna
- Targeted Diversion Area

biologic  
Environmental Survey

N  
1:49,000  
0 0.5 1 2 km

**BHP Western Australian Iron Ore  
Western Ridge Detailed Flora and  
Vegetation Survey  
Figure 3.2: Sampling Methods**

Coordinate System: GDA 1994 MGA Zone 50  
Projection: Transverse Mercator  
Datum: GDA 1994

The Survey established and sampled 34 quadrats (50 m x 50 m) and five relevés across the Study Area (Figure 3.2; Appendix B), while an additional 45 quadrats and five relevés were established and sampled within the Coomabanbunna Well Study Area. The 79 quadrats (34 quadrats in the Study Area and 45 quadrats from Coomabanbunna Well) were not permanently marked (i.e. posts) in the field, so they were orientated north west, north east, south west and south east (any deviation from this was recorded in the site data) to assist with any future re-sampling. At least three quadrats were established in each of the preliminary vegetation type areas, to ensure that each vegetation type occurring within the Study Area was captured by the survey and described appropriately and in accordance with EPA (2016c). The only exceptions to this were three vegetation types which covered areas too small to warrant additional survey effort. Relevés were sampled in vegetation that was already sampled sufficiently or showed signs of disturbance (i.e. heavy cattle grazing) that hindered an accurate determination of the typical vegetation structure and diversity. The relevés ensured adequate spatial coverage across the Survey Area and to assist with delineation of vegetation boundaries when the vegetation type had already been sufficiently sampled. Information recorded for the relevés was from a central coordinate to an approximate radius of 50 m, depending on the condition and structure of the vegetation.

All vascular flora taxa within each quadrat and relevé (including overhang from plants rooted outside the boundary of quadrats) were recorded, with their corresponding height and cover class (excluding relevés). A brief summary of the vegetation assemblage at each site was also recorded to aid in producing vegetation type descriptions (NVIS Technical Working Group, 2017) (Appendix C). In addition, the following information was recorded at each quadrat (and relevé):

- quadrat (or relevé) number;
- date of survey;
- personnel;
- GPS coordinates of each corner (GDA 94) (only a central coordinate was taken for relevés);
- site photograph – taken from the north-west corner, facing south-east;
- soil characteristics (texture and colour);
- geology (type, size and nature of any rocks, stones, gravel, or outcropping);
- topography (landform type and aspect);
- vegetation condition (based on Trudgen, 1988) (Appendix D);
- disturbance (if present); and
- approximate time since last fire.

Any flora taxa not recorded in quadrats, or considered to be of conservation significance, that were observed opportunistically in the vicinity of quadrats, or while traversing the Survey Area, were also recorded. For any populations of taxa known to be of conservation significant or introduced flora observed, a GPS location and a count of the individuals present, or percentage foliage cover for a given area, were recorded.

### 3.3.5 Targeted Searches

Prior to the survey, a list of conservation significant flora known to, with the likelihood to, or potential to occur within the Study Area was compiled. Field personnel familiarised themselves with photographs, reference samples and descriptions of these taxa before conducting the survey. Once on the ground, personnel actively searched while traversing the Study Area and in known locations or preferred habitat encountered in the field.

Targeted searching was undertaken for flora of conservation significance, as identified during the desktop assessment. Taxa that were confirmed or considered very likely, likely or possible to occur within the Study Area were targeted. Intensive targeted searches were conducted within the Targeted Diversion Area and more broadly over the remainder of the Study Area. The meandering targeted searches while traversing the Study Area focussed on habitat considered likely to support conservation significant flora (i.e. ironstone ridgeline, drainage lines, basalt outcrops).

The Study Area included a Targeted Diversion Area (approximately 73 ha in size) which may need to be impacted to allow for the future potential deviation of an unnamed creek. The field survey team completed intensive targeted grid searching at a distance of 50 to 100 m apart (Figure 3.3), deviating where necessary to explore habitat considered likely to support conservation significant flora.

In addition to targeted searching for specific Priority Listed flora taxa in particular habitats, personnel actively searched for all Priority Listed flora taxa and opportunistic flora taxa while completing quadrats and traversing the Study Area. Personnel also identified suitable habitat for targeted searches while travelling within the Study Area.




If a conservation significant taxon was identified, a GPS coordinate of the individual was taken when occurring in isolation, or a central GPS coordinate was taken for a small population (central coordinate with an approximate 20 m radius). Information collected at each location comprised:

- Number of individuals, for a small population;
- Condition and reproductive status of the plants in each population;
- Photographs and description of vegetation habitat; and
- Broad information on vegetation type and condition.


*Threatened and Priority Flora Report Forms* will be provided to the Parks and Wildlife Division (Parks and Wildlife) of DBCA, as required under the flora collecting permits. Conservation significant flora specimens will be vouchered with the Western Australian Herbarium (WAH), where required and appropriate.



**Legend**

-  Study Area
-  Targeted Diversion Area
-  Track data

**biologic**  
Environmental Survey



N  
1:25,000  
0 0.275 0.55 1.1 km

**BHP Western Australian Iron Ore  
Western Ridge Detailed Flora and  
Vegetation Survey**  
**Figure 3.3: Sampling intensity with track data**

Coordinate System: GDA 1994 MGA Zone 50  
Projection: Transverse Mercator  
Datum: GDA 1994  
Size A4. Created 13/05/2019

### 3.3.6 Introduced Taxa

#### Weeds of National Significance

Where significant environmental weeds (weeds of national significance and Declared Plant Pests listed under Section 22 of the *Biosecurity and Agriculture Management Act 2007*) are identified in the field, searches were conducted within a minimum radius of 20 m from the given specimen, to document the number of individual plants and map the spatial extent of the infestation. The methodology and information collected for significant environmental weeds was consistent with the methodology and information collected for the conservation significant flora.

#### Declared Plant Pests

To protect Western Australian agriculture the Department of Primary Industries and Regional Development (DPIRD) (formerly the Department of Agriculture and Food Western Australia, DAFWA) regulates harmful plants under the *Biosecurity and Agriculture Management Act 2007* (BAM Act). Plants that are prevented entry into the state or have control or keeping requirements within the state are known as declared pests. The main purposes of the BAM Act and its regulations related to DPP are to prevent new plant pests from entering Western Australia, manage the impact and spread of those pests already present in the state and safely manage the use of agricultural chemicals.

The BAM Act has categorised the weeds of Western Australia into four main classifications:

- Declared Pests (under Section 22 of the Act);
- Permitted (under Section 11 of the Act);
- Prohibited (under Section 12 of the Act); and
- Permitted requiring a permit (Section 73, BAM Regulations 2013).

Under the BAM Act all declared plant pests are placed in one of three categories:

- C1 (Exclusion) — Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State;
- C2 (Eradication) — Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still feasible; and
- C3 (Management) — Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

#### Weed Prioritisation

In 2008 Parks and Wildlife developed and implemented an integrated approach to weed management on Parks and Wildlife-managed lands in WA, the Weed Prioritisation Process. It was updated in 2013 and further revised in 2016. Parks and Wildlife prioritised weeds in each region, based on their:

- invasiveness;
- ecological impact;
- potential and current distribution; and
- feasibility of control.

The resulting priorities focus on weeds considered to be high impact, rapidly invasive and still at a population size that can feasibly be eradicated or contained to a manageable size. This means that weed species that are already widespread may not be ranked as a high priority. The weed prioritisation for the Pilbara bioregion has recently been revised by Parks and Wildlife. The key priorities are now centred on 'Priority Alert' weeds and weeds that receive a rating for 'Ecological Impact' and 'Invasiveness'.

### **3.3.7 Groundwater Dependent and Sheet Flow Dependent Vegetation**

The Survey included an assessment of vegetation that may be reliant on groundwater for part or all of their lifecycle. Preliminary review of aerial imagery available for the Study Area suggests that minor to medium drainage lines occur throughout the Study Area. These drainage lines may support groundwater dependent vegetation (GDV) and/ or groundwater dependent ecosystems (GDE). The determination of groundwater dependency was undertaken with a review of the flora assemblage present within the Study Area and a review of the literature.

The structure and patterning of Mulga (*Acacia aneura* and its close relatives) communities varies from strongly banded (groved) through to open shrublands and woodlands across the landscape (Page & Grierson, 2012). Banded communities and overland sheet flow supports a diverse biota within the Mulga bands and plays and important ecological function which is well documented (Dawson & Ahern, 1973; Saco *et al.*, 2007; Winkworth, 1973). The Survey delineated and describe communities that are or could potentially be sheet flow dependent (determined through landform position, vegetation patterning and species composition).

### **3.3.8 Identification of Flora Specimens**

Plant taxa that could not be identified during the field survey were collected, assigned a unique number for tracking purposes, and pressed for subsequent identification. Identifications were carried out by Biologic's principal taxonomist, Mrs Sharnya Yates, utilising her personal reference collections, Western Australian Herbarium's (WAH) reference collection, taxonomic keys and reference material. All taxa were checked against Florabase® (version 2.9.31; WAH, 1998-) to ensure their currency and validity. Any conservation significant flora taxa, including potential threatened and priority species, range extensions and potential new taxa have been verified and vouchered (if appropriate) at the WAH.

## **3.4 Statistical Analysis**

### **3.4.1 Floristic Community Types**

#### **Data Transformation and Reconciliation**

The floristics of the Study Area quadrats were recorded on a cover abundance basis, with an estimate of the foliage cover of each species made at each site. The hummock grassland layer of the Pilbara



can exceed 50% cover within a quadrat, while most other taxa cover less than 1% of a quadrat. To allow for this large disparity in cover and the potential for ambiguities in determining cover between observers, the cover values were reduced to cover codes, based on an adapted Braun-Blanquet method (1 = <1%; 2 = 1-5%; 3 = 6-25%; 4 = 26-50%; 5 = 51-75%; and 6 = >75%). The flora species list was then reconciled to amalgamate a portion of the taxa (Appendix E). Following the reconciliation of the dataset several taxa were removed from the analysis, including tentative identifications (i.e. ? *Pluchea rubelliflora*) and weed species (i.e. \**Cenchrus ciliaris*). Once the floristic dataset was reconciled three sample sites (CBW-62, WRI-32 and WRI-33) were removed from the dataset due to low species diversity. The three sites were only represented by one or two taxa and would not have adequately linked within the analysis. The final dataset utilised in the analysis included 185 flora taxa from 80 sample sites.

### Hierarchical clustering

The cover code values for the floristic data recorded for each sample site (quadrat and relevé) was transformed using the Log transformation in Primer v7 before a resemblance matrix and dendrogram were created. The similarity testing was undertaken using the BrayCurtis coefficient. Vegetation units were defined based on 40-80% similarity and distinguished visually in a dendrogram based on a Similarity Profile Test (SIMPROF) Cluster analysis.

The presence of ephemeral taxa is strongly influenced by seasonal rainfall, and can be highly variable in the Pilbara (van Etten & Fox, 2004). Ephemeral taxa were included in the analysis as the season in which the survey was undertaken followed well below average rainfall. Ephemeral taxa were limited, and can also be considered to be short-lived perennials and have unlikely been influenced by any seasonal rainfall.

#### 3.4.2 Species Accumulation Curve

Species accumulation curves were plotted using Sobs, Chao 1, Jackknife 1, Bootstrap and Michealis-Menton in Primer v7 to determine the adequacy of the survey. The species accumulation curves were plotted for the Study Area with all native flora taxa, both annual and perennial, within each flora site used in generating the species accumulation curve.

Species accumulation curves including Sobs (S), to reflect the number of species observed (based on a given total of species recorded), and richness estimators Chao 1, Jackknife 1, Bootstrap and Michealis-Menton to predict the total number of flora taxa that could potentially be recorded were applied.

When a curve approaches an asymptote it suggests that sampling effort has been sufficient to adequately collect the species comprising the floral assemblage at the locations sampled (Thompson & Withers, 2003). The value at which the curve asymptotes can also be used as an approximate measure of the total size of the species complement at that location (Thompson *et al.*, 2003).

### 3.5 Vegetation Unit Mapping

Broad vegetation mapping was conducted in the field, with vegetation boundaries delineated over aerial photography. Following the completion of the quadrat sampling and taxonomic identifications, the broad vegetation units were refined based on the review of the floristic data collected from the quadrats and

relevés and the results of the statistical analysis and outputs (i.e. hierarchical classification). The vegetation type mapping was then digitised using geographic information systems (GIS) software.

Vegetation associations were delineated and described from aerial imagery utilising the flora sampling site data. The vegetation structure information collected from the quadrats, relevés and mapping points was reviewed to describe the vegetation associations based on the dominant taxa, foliar cover and height of the three traditional strata (upper, mid and lower/ground). This method of vegetation type determination is consistent with EPA (2016c) and BHP (2018).

The vegetation types have been described to Level 5 (Vegetation Association) in the NVIS hierarchical structure (NVIS Technical Working Group, 2017) and have been coded in accordance with BHP (2018) standards. The mapping reliability is considered to be high across the Study Area, with the majority of the Study Area traversed.

### **3.6 Vegetation Condition Mapping**

Vegetation condition was defined within the Study Area using the BHP (2018) vegetation condition scale which has been adapted from Keighery (1994) and Trudgen (1988) (Appendix D), based on the level of disturbance observed in an area. Condition was recorded at each sampling site, while additional notes were taken while traversing the Study Area and used to broadly map vegetation condition boundaries. The vegetation condition mapping was then digitised using GIS software.

### **3.7 Potential Limitation and Constraints**

There are a number of possible limitations and constraints that can affect the adequacy of vegetation and flora surveys (EPA, 2016c). The limitations of the current assessment are presented in accordance with the Technical Guidance (EPA, 2016c) (Table 3.3).

Although the Newman weather station received some rainfall for January and February, the four dry months preceding this below average rain ensured that there was little soil moisture, which was evident by the lack of annuals and ephemerals, while a number of perennial grasses had only vegetative material present.

The survey was undertaken during a time considered to be optimal for the Pilbara bioregion (optimal timing is considered to be between March and June, EPA, 2016c). However, the three months preceding the field survey (December 2018 and January to February 2019) received well below average rainfall (74 mm compared to 173.5 mm; Figure 3.1) (BoM, 2019). This was further emphasised by the dry conditions observed in the field. The daytime temperatures were also above average (by 2-4°C than the monthly mean, BoM, 2019) with a substantial number of days over 40°C (76 of a possible 100 days between 1 December 2018 and 10 March 2019, BoM, 2019), resulting in the evaporation of the limited rainfall that was received in the area. There were limited annual and ephemeral taxa present, while the perennial species were generally lacking flowering and fruiting material.

**Table 3.3: Botanical survey limitations and constraints**

Limitation	Constraint	Comment
Availability of contextual information at a regional and local scale	No	Sufficient contextual information was available for the Study Area, including broad information on land systems and vegetation associations. The Study Area is located immediately south of the Mt Whaleback mine operated by BHP. An extensive amount of biological survey work has occurred across Mt Whaleback, the data and reports of which were all available for this assessment.
Competency/experience of the team carrying out the survey, including experience in the bioregion surveyed	No	The survey was led by a Senior Botanist with over 13 years' experience. The lead botanist met the minimum requirements to manage a flora and vegetation field survey in the Pilbara bioregion (EPA, 2016c).
Proportion of flora recorded and/or collected, any identification issues	Yes Moderate	The survey intensity (Detailed) is designed to capture all flora within the Study Area. However, the seasonal conditions prior to the survey was considered below optimal (i.e. below average rainfall preceding the survey) to capture all flora within the Study Area. The key flora groups that have been under sampled include annuals and ephemerals. Perennial flora may also have been missed due to the large Study Area, limited accessibility and lack of flowers and/ or fruits.
Was the appropriate area fully surveyed (effort and extent)	No	The Study Area was traversed and surveyed on foot with all major vegetation units visited. The Study Area is more than 1,204 ha in size and it was not feasible to traverse the entire Study Area. However, the survey intensity and coverage match that of which is required for a Detailed survey and is not considered to be a constraint.
Access restrictions within the survey area	No	The Study Area was accessed via mining, exploration and pastoral tracks to the boundaries. No useable access tracks occurred in the Study Area, therefore, the survey was completed on foot with traverses limited to a maximum distance of 2 km from the vehicle. However, access was sufficient from outside of the Study Area. As such, the majority of the Study Area was traversed.

Limitation	Constraint	Comment
Survey timing, rainfall, season of survey	Yes Minor	<p>The survey was undertaken during a period which is considered to be optimal, between March and June for the Eremaean region (EPA, 2016c). Rainfall preceding the survey was well below average, with only the months of June and October 2018 recording average rainfall or above. Rainfall was recorded during the months of January and February 2019, however daytime temperatures were very hot. This may have limited the capacity of the rainfall to infiltrate the soil, and where soil moisture was present, it was most likely quickly lost to the environment.</p> <p>The dry conditions of the field survey were evident by a lack of annual and ephemeral taxa, while many of the perennial species, especially the grasses, lacked sufficient material for confident taxonomic identifications.</p> <p>The survey was undertaken during below optimal conditions and therefore the intensity and scope of the survey (detailed survey) is potentially hampered by the season (EPA, 2016c). However, due to the extensive knowledge and contextual information for the Study Area and surrounds the survey can be supplemented with this information.</p> <p>There still is a minor constraint due to the season of the survey. This would have limited the ability to identify priority taxa, if present. Following the field survey, it is likely that only <i>Goodenia nuda</i> (P4) is present in the Study Area.</p>
Disturbance that may have affected the results of survey such as fire, flood or clearing	No	<p>The Study Area is located within an active pastoral lease and current mining exploration tenement. The vegetation was noted as being altered, however not to a point that limited the results of the flora and vegetation survey. Disturbances recorded during the Survey included fire, grazing and weeds. Grazing and weed impacts were magnified along the northern and southern creeklines.</p>

## 4 RESULTS AND DISCUSSION

### 4.1 Literature Review

The results and outcomes of the review of 30 flora and vegetation reports identified from the literature review are presented in Table 4.1. The literature review identified 10 conservation significant flora species (Threatened, Priority 1, Priority 2, Priority 3 and Priority 4 taxa) previously recorded in close proximity to the Study Area; however, none have been recorded within the Study Area. The 30 reports, excluding Onshore (2014a) which includes all of BHP WAIO Pilbara tenure, did not identify any conservation significant vegetation associations (Table 4.1).

### 4.2 Database Search Results

#### 4.2.1 Flora of Conservation Significance

A total of 75 conservation significant flora taxa (those listed under the EPBC Act, WC Act, or DBCA's Priority List) were identified from the database searches (Appendix F). None of the 75 taxa are listed as Threatened under the EPBC Act or the BC Act. There are three threatened flora taxa, *Aluta quadrata*, *Pityrodia* sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4) and *Thryptomene wittweri*, known to occur within the Pilbara bioregion (WAH, 1998-). Each of the three threatened flora are considered highly unlikely to occur in the Study Area, as they are known from summits of ranges (*Aluta quadrata* and *Thryptomene wittweri*) or isolated in the central Pilbara on steep slopes (*Pityrodia* sp. Marble Bar [G. Woodman & D. Coultas GWDC Opp 4]).

Of the 75 priority listed taxa, 29 are listed as Priority 1, seven are listed as Priority 2, 31 are listed as Priority 3, and the remaining eight taxa are listed as Priority 4. Based on the results of the database searches, no priority listed taxa have previously been recorded from the Study Area (Figure 4.1). Flora taxa of conservation significance identified by the desktop assessment were assessed and ranked on the likelihood of occurring within the Study Area (Appendix G).

One priority taxon was considered highly likely to occur, five were considered likely to occur and seven were considered to possibly occur within the Study Area (Table 4.2). The remaining 62 taxa were considered unlikely or highly unlikely to occur within the Study Area (Appendix G). A disjunct unconfirmed population of *Hibiscus campanulatus* (P1) has previously been recorded in close proximity to the study area (15 km north). This taxon has affinities with *Hibiscus campanulatus* but is potentially of interest as a separate taxon. It has tentatively been named *Hibiscus* aff. *campanulatus*.

**Table 4.1: Key findings from the literature review**

Study details	Methods	Results	Significant findings	Limitations
<p>(HGM, 1997)</p> <p><b>Client:</b> BHP Billiton Iron Ore</p> <p><b>Type:</b> Targeted Searching Survey</p> <p><b>Location:</b> Ore Body 29, Mt Whaleback Mining Tenement</p> <p><b>Timing:</b> November 1996 and January 1997</p>	<ul style="list-style-type: none"> <li>Targeted Searching Survey</li> </ul>	<ul style="list-style-type: none"> <li>No introduced taxa</li> </ul>	<ul style="list-style-type: none"> <li>One Priority 4 flora taxon: <i>Lepidium catapycnon</i><sup>2</sup></li> <li>3,184 live and 1,048 dead individuals of the Priority 4 flora taxon <i>Lepidium catapycnon</i></li> <li>No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>Poor season</li> </ul>
<p>(ENV, 1999a)</p> <p><b>Client:</b> BHP Billiton Iron Ore</p> <p><b>Type:</b> Targeted Searching Survey</p> <p><b>Location:</b> Ore Body 29, Mt Whaleback Mining Tenement and Ophthalmia Dam</p> <p><b>Timing:</b> June to August 1999</p>	<ul style="list-style-type: none"> <li>Targeted Searching Survey</li> </ul>	<ul style="list-style-type: none"> <li>No introduced taxa</li> </ul>	<ul style="list-style-type: none"> <li>One Priority 4 flora taxon: <i>Lepidium catapycnon</i></li> <li>36 sub-populations of <i>Lepidium catapycnon</i> (P4)</li> <li>Estimated count of 6,011 individuals of <i>Lepidium catapycnon</i> (P4)</li> <li>No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>No significant limitations</li> </ul>
<p>(ENV, 1999b)</p> <p><b>Client:</b> BHP Billiton Iron Ore</p> <p><b>Type:</b> Targeted Searching Survey</p> <p><b>Location:</b> Regional Searching</p> <p><b>Timing:</b> June to November 1999</p>	<ul style="list-style-type: none"> <li>Targeted Searching Survey</li> </ul>	<ul style="list-style-type: none"> <li>No introduced taxa</li> </ul>	<ul style="list-style-type: none"> <li>One Priority 4 flora taxon: <i>Lepidium catapycnon</i></li> <li>8 new populations of <i>Lepidium catapycnon</i> (P4)</li> <li>Estimated count of 7,493 individuals of <i>Lepidium catapycnon</i> (P4)</li> <li>No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>No significant limitations</li> </ul>

<sup>2</sup> *Lepidium catapycnon* was previously listed as a Threatened flora species. It is now listed as Priority 4.

Study details	Methods	Results	Significant findings	Limitations
<p>(HGM, 1999a)</p> <p><b>Client:</b> BHP Billiton Iron Ore</p> <p><b>Type:</b> Detailed Flora and Vegetation Survey</p> <p><b>Location:</b> Mt Whaleback Mining Tenement and surrounds</p> <p><b>Timing:</b> May 1999</p>	<ul style="list-style-type: none"> <li>Targeted Searching Survey</li> </ul>	<ul style="list-style-type: none"> <li>No introduced taxa</li> </ul>	<ul style="list-style-type: none"> <li>One Priority 4 flora taxon: <i>Lepidium catapycnon</i><sup>3</sup></li> <li>Estimated count of 9523 individuals of <i>Lepidium catapycnon</i> (P4) at Mt Whaleback and 920 individuals at Weeli Wolli</li> <li>No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>No significant limitations</li> </ul>
<p>(HGM, 1999b)</p> <p><b>Client:</b> BHP Billiton Iron Ore</p> <p><b>Type:</b> Detailed Flora and Vegetation Survey</p> <p><b>Location:</b> Orebody 30 and Orebody 35 Mining Tenement</p> <p><b>Timing:</b> August 1999</p>	<ul style="list-style-type: none"> <li>10 detailed floristic sites (quadrats)</li> <li>Opportunistic collections</li> </ul>	<ul style="list-style-type: none"> <li>206 plant taxa</li> <li>44 families</li> <li>101 genera</li> <li>Four introduced taxa</li> <li>Five vegetation associations</li> </ul>	<ul style="list-style-type: none"> <li>No threatened flora</li> <li>One priority listed flora taxon: <i>Triumfetta leptacantha</i> (P3)<sup>4</sup></li> <li>No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>Poor Season</li> </ul>
<p>(Biota, 2001)</p> <p><b>Client:</b> BHP Billiton Iron Ore</p> <p><b>Type:</b> Detailed Flora and Vegetation Survey</p> <p><b>Location:</b> ML244SA</p> <p><b>Timing:</b> September 2000</p>	<ul style="list-style-type: none"> <li>60 detailed floristic sites (quadrats)</li> <li>Targeted Searching</li> </ul>	<ul style="list-style-type: none"> <li>380 plant taxa</li> <li>98 families</li> <li>168 genera</li> <li>14 introduced taxa</li> <li>27 vegetation associations</li> <li>4 broad landform formations</li> </ul>	<ul style="list-style-type: none"> <li>No conservation significant flora</li> <li>No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>Poor Season</li> <li>Recent Burn</li> <li>Lack of Aerial Photography for a portion of the Study Area</li> </ul>

<sup>3</sup> *Lepidium catapycnon* is no longer listed as a Threatened flora species. It is now listed as Priority 4.

<sup>4</sup> *Triumfetta leptacantha* is no longer listed as a Priority flora species.

Study details	Methods	Results	Significant findings	Limitations
(ecologia, 2004) <b>Client:</b> BHP Billiton Iron Ore <b>Type:</b> Targeted Survey <b>Location:</b> Mt Whaleback Mining Tenement <b>Timing:</b> June 2004	<ul style="list-style-type: none"> <li>Targeted Searching Survey</li> </ul>	<ul style="list-style-type: none"> <li>Four introduced taxa</li> </ul>	<ul style="list-style-type: none"> <li>No conservation significant flora</li> <li>No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>Poor Season</li> </ul>
(Ecologia, 2005) <b>Client:</b> BHP Billiton Iron Ore <b>Type:</b> Detailed Flora and Vegetation Survey <b>Location:</b> Mt Whaleback Mining Tenement <b>Timing:</b> May 2005	<ul style="list-style-type: none"> <li>7 detailed floristic sites (quadrats)</li> <li>Targeted Searching Survey</li> </ul>	<ul style="list-style-type: none"> <li>91 plant taxa</li> <li>No introduced taxa</li> </ul>	<ul style="list-style-type: none"> <li>No conservation significant flora</li> <li>No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>No significant limitations</li> </ul>
(Ecologia, 2006c) <b>Client:</b> BHP Billiton Iron Ore <b>Type:</b> Detailed Flora and Vegetation Survey <b>Location:</b> Mt Whaleback Mining Tenement <b>Timing:</b> May to June 2006	<ul style="list-style-type: none"> <li>36 detailed floristic sites (quadrats)</li> </ul>	<ul style="list-style-type: none"> <li>152 plant taxa</li> <li>Three introduced taxa</li> <li>Five broad floristic formations</li> </ul>	<ul style="list-style-type: none"> <li>No threatened flora</li> <li>One priority listed flora taxon: <i>Calotis latiuscula</i> (P3)<sup>5</sup></li> <li>No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>No significant limitations</li> </ul>

<sup>5</sup> *Calotis latiuscula* is no longer listed as a Priority flora species.



Study details	Methods	Results	Significant findings	Limitations
(Ecologia, 2006b) <b>Client:</b> BHP Billiton Iron Ore <b>Type:</b> Targeted Survey <b>Location:</b> Mt Whaleback Mining Tenement <b>Timing:</b> January 2006	<ul style="list-style-type: none"> <li>Targeted Searching Survey</li> </ul>	<ul style="list-style-type: none"> <li>64 plant taxa</li> <li>One introduced taxon</li> </ul>	<ul style="list-style-type: none"> <li>No conservation significant flora</li> <li>No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>No significant limitations</li> </ul>
(Ecologia, 2006a) <b>Client:</b> BHP Billiton Iron Ore <b>Type:</b> Targeted Survey <b>Location:</b> Mt Whaleback Mining Tenement <b>Timing:</b> April 2006	<ul style="list-style-type: none"> <li>Targeted Searching Survey</li> </ul>	<ul style="list-style-type: none"> <li>122 plant taxa</li> <li>Three introduced taxa</li> </ul>	<ul style="list-style-type: none"> <li>No conservation significant flora</li> <li>No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>No significant limitations</li> </ul>
(ENV, 2006d) <b>Client:</b> BHP Billiton Iron Ore <b>Type:</b> Detailed Flora and Vegetation Survey <b>Location:</b> Mt Whaleback Mining Tenement <b>Timing:</b> August 2006	<ul style="list-style-type: none"> <li>81 detailed floristic sites (quadrats) and relevé plots</li> <li>Targeted Searching</li> </ul>	<ul style="list-style-type: none"> <li>243 plant taxa</li> <li>42 families</li> <li>117 genera</li> <li>Seven introduced taxa</li> <li>9 broad floristic formations</li> </ul>	<ul style="list-style-type: none"> <li>No threatened flora</li> <li>One priority listed flora taxon: <i>Lepidium catapycnon</i> (P4)<sup>6</sup></li> <li>No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>No significant limitations</li> </ul>

<sup>6</sup> *Lepidium catapycnon* was previously listed as a Threatened flora species. It is now listed as Priority 4.

Study details	Methods	Results	Significant findings	Limitations
(ENV, 2006b) <b>Client:</b> BHP Billiton Iron Ore <b>Type:</b> Detailed Flora and Vegetation Survey <b>Location:</b> Mt Whaleback Mining Tenement <b>Timing:</b> September 2006	<ul style="list-style-type: none"> <li>10 detailed floristic sites (quadrats) and relevé plots</li> </ul>	<ul style="list-style-type: none"> <li>168 plant taxa</li> <li>39 families</li> <li>99 genera</li> <li>Eight introduced taxa</li> <li>11 vegetation associations</li> <li>6 broad floristic formations</li> </ul>	<ul style="list-style-type: none"> <li>No conservation significant flora</li> <li>No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>No significant limitations</li> </ul>
(ENV, 2006a) <b>Client:</b> BHP Billiton Iron Ore <b>Type:</b> Detailed Flora and Vegetation Survey <b>Location:</b> Newman Townsite, Kurra Village <b>Timing:</b> September 2006	<ul style="list-style-type: none"> <li>9 detailed floristic sites (quadrats) and relevé plots</li> </ul>	<ul style="list-style-type: none"> <li>117 plant taxa</li> <li>25 families</li> <li>59 genera</li> <li>Seven introduced taxa</li> <li>9 vegetation associations</li> <li>2 broad floristic formations</li> </ul>	<ul style="list-style-type: none"> <li>No conservation significant flora</li> <li>No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>No significant limitations</li> </ul>
(ENV, 2006c) <b>Client:</b> BHP Billiton Iron Ore <b>Type:</b> Detailed Flora and Vegetation Survey <b>Location:</b> Mt Whaleback Mining Tenement <b>Timing:</b> October 2006	<ul style="list-style-type: none"> <li>41 detailed floristic sites (quadrats)</li> <li>Four relevé plots</li> </ul>	<ul style="list-style-type: none"> <li>285 plant taxa</li> <li>47 families</li> <li>115 genera</li> <li>13 introduced taxa</li> <li>20 broad floristic formations</li> </ul>	<ul style="list-style-type: none"> <li>No threatened flora</li> <li>One priority listed flora taxon: <i>Acacia kenneallyi</i> (P3)<sup>7</sup></li> <li>No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>No significant limitations</li> <li>Misidentification on flora taxa</li> </ul>

<sup>7</sup> *Acacia kenneallyi* is restricted to the northern Kimberley region of Western Australia and the Whaleback record was a misidentification.

Study details	Methods	Results	Significant findings	Limitations
(GHD, 2008) <b>Client:</b> BHP Billiton Iron Ore <b>Type:</b> Detailed Flora and Vegetation Survey <b>Location:</b> Myopic Project Area <b>Timing:</b> November 2008	<ul style="list-style-type: none"> <li>• 119 detailed floristic sites (quadrats)</li> <li>• 22 relevé plots</li> </ul>	<ul style="list-style-type: none"> <li>• 321 plant taxa</li> <li>• 52 families</li> <li>• 14 introduced taxa</li> <li>• Nine vegetation associations</li> </ul>	<ul style="list-style-type: none"> <li>• No threatened flora</li> <li>• Two priority listed flora taxa: <i>Brunonia</i> sp. Long hairs (D.E. Symon 2440) (P1)<sup>8</sup> and <i>Triumfetta leptacantha</i> (P3)<sup>9</sup></li> <li>• No TECs and PECs</li> <li>• Four range extensions</li> </ul>	<ul style="list-style-type: none"> <li>• No significant limitations</li> </ul>
(Biologic, 2009) <b>Client:</b> BHP Billiton Iron Ore <b>Type:</b> Detailed Flora and Vegetation Survey <b>Location:</b> Mt Whaleback Mining Tenement, Orebody 25 and Newman Townsite <b>Timing:</b> July 2009	<ul style="list-style-type: none"> <li>• Detailed floristic sites (quadrats)</li> </ul>	<ul style="list-style-type: none"> <li>• 319 plant taxa</li> <li>• 54 families</li> <li>• 14 introduced taxa</li> <li>• 10 vegetation associations</li> </ul>	<ul style="list-style-type: none"> <li>• No threatened flora</li> <li>• One priority listed flora taxon: <i>Goodenia nuda</i> (P4)</li> <li>• No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>• Vegetation condition due to Mining activities</li> </ul>

<sup>8</sup> *Brunonia* sp. Long hairs (D.E. Symon 2440) is no longer listed as a Priority flora species.

<sup>9</sup> *Triumfetta leptacantha* is no longer listed as a Priority flora species.

Study details	Methods	Results	Significant findings	Limitations
<p>(ENV, 2009a)</p> <p><b>Client:</b> BHP Billiton Iron Ore</p> <p><b>Type:</b> Detailed Flora and Vegetation Survey</p> <p><b>Location:</b> Mt Whaleback Mining Tenement, Newman Townsite and MAC</p> <p><b>Timing:</b> May 2009</p>	<ul style="list-style-type: none"> <li>• 151 detailed floristic sites (quadrats)</li> <li>• 29 relevé plots</li> <li>• Targeted searching</li> </ul>	<ul style="list-style-type: none"> <li>• 501 plant taxa</li> <li>• 58 families</li> <li>• 172 genera</li> <li>• 14 introduced taxa</li> <li>• 30 vegetation associations</li> </ul>	<ul style="list-style-type: none"> <li>• No threatened flora</li> <li>• One priority listed flora taxon: <i>Goodenia nuda</i> (P4)</li> <li>• No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>• Poor Season</li> </ul>
<p>(ENV, 2009b)</p> <p><b>Client:</b> BHP Billiton Iron Ore</p> <p><b>Type:</b> Detailed Flora and Vegetation Survey</p> <p><b>Location:</b> Mt Whaleback Mining Tenement</p> <p><b>Timing:</b> April 2009</p>	<ul style="list-style-type: none"> <li>• Seven detailed floristic sites (quadrats)</li> <li>• Three relevé plots</li> </ul>	<ul style="list-style-type: none"> <li>• 124 plant taxa</li> <li>• 28 families</li> <li>• 65 genera</li> <li>• Five introduced taxa</li> <li>• 7 vegetation associations</li> </ul>	<ul style="list-style-type: none"> <li>• No conservation significant flora</li> <li>• No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>• No significant limitations</li> </ul>
<p>(Onshore, 2009)</p> <p><b>Client:</b> BHP Billiton Iron Ore</p> <p><b>Type:</b> Detailed Flora and Vegetation Survey</p> <p><b>Location:</b> Mt Whaleback Mining Tenement and surrounds</p> <p><b>Timing:</b> June 2009</p>	<ul style="list-style-type: none"> <li>• 30 detailed floristic sites (quadrats) and relevé plots</li> </ul>	<ul style="list-style-type: none"> <li>• 201 plant taxa</li> <li>• 40 families</li> <li>• 100 genera</li> <li>• 17 introduced taxa</li> <li>• 9 vegetation associations</li> <li>• 7 broad floristic formations</li> </ul>	<ul style="list-style-type: none"> <li>• No conservation significant flora</li> <li>• No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>• Poor Season</li> </ul>

Study details	Methods	Results	Significant findings	Limitations
(Astron, 2010) <b>Client:</b> BHP Billiton Iron Ore <b>Type:</b> Detailed Flora and Vegetation Survey <b>Location:</b> Mt Whaleback Mining Tenement <b>Timing:</b> March 2010	<ul style="list-style-type: none"> <li>Five detailed floristic sites (quadrats)</li> <li>Two relevé plots</li> </ul>	<ul style="list-style-type: none"> <li>71 plant taxa</li> <li>18 families</li> <li>38 genera</li> <li>Two introduced taxa</li> <li>Three vegetation associations</li> <li>One broad floristic formation</li> </ul>	<ul style="list-style-type: none"> <li>No conservation significant flora</li> <li>No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>Poor Season</li> </ul>
(ENV, 2010) <b>Client:</b> BHP Billiton Iron Ore <b>Type:</b> Detailed Flora and Vegetation Survey <b>Location:</b> Orebody 35 Mining Tenement <b>Timing:</b> December 2009	<ul style="list-style-type: none"> <li>28 detailed floristic sites (quadrats)</li> <li>One relevé plot</li> </ul>	<ul style="list-style-type: none"> <li>189 plant taxa</li> <li>37 families</li> <li>86 genera</li> <li>Three introduced taxa</li> <li>10 vegetation associations</li> </ul>	<ul style="list-style-type: none"> <li>No conservation significant flora</li> <li>One priority listed flora taxon: <i>Tephrosia</i> sp. Pilbara Ranges (S. van Leeuwen 4246) (P3)<sup>10</sup></li> <li>No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>Poor Season</li> </ul>
(ENV, 2011) <b>Client:</b> BHP Billiton Iron Ore <b>Type:</b> Detailed Flora and Vegetation Survey <b>Location:</b> Mt Whaleback Mining Tenement <b>Timing:</b> January 2011	<ul style="list-style-type: none"> <li>15 detailed floristic sites (quadrats)</li> </ul>	<ul style="list-style-type: none"> <li>127 plant taxa</li> <li>31 families</li> <li>64 genera</li> <li>Seven introduced taxa</li> <li>Eight vegetation associations</li> </ul>	<ul style="list-style-type: none"> <li>No conservation significant flora</li> <li>No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>Poor Season</li> </ul>

<sup>10</sup> *Tephrosia* sp. Pilbara Ranges (S. van Leeuwen 4246) is not current and is more recently known as *Tephrosia oxalidea* which is not listed as a Priority flora species.

Study details	Methods	Results	Significant findings	Limitations
(GHD, 2011) <b>Client:</b> BHP Billiton Iron Ore <b>Type:</b> Two Season Detailed Flora and Vegetation Survey <b>Location:</b> Orebody 35 Mining Tenement and Surrounds <b>Timing:</b> May and August 2010	<ul style="list-style-type: none"> <li>• 88 detailed floristic sites (quadrats)</li> <li>• 35 relevé plots</li> </ul>	<ul style="list-style-type: none"> <li>• 347 plant taxa</li> <li>• 48 families</li> <li>• 159 genera</li> <li>• 13 introduced taxa</li> <li>• 22 vegetation associations</li> <li>• 10 broad floristic formations</li> </ul>	<ul style="list-style-type: none"> <li>• No threatened flora</li> <li>• Three priority listed flora taxa: <i>Indigofera gilesii</i> (P3), <i>Gymnanthera cunninghamii</i> (P3), <i>Goodenia nuda</i> (P4)</li> <li>• No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>• Poor Season</li> </ul>
(ENV, 2012) <b>Client:</b> BHP Billiton Iron Ore <b>Type:</b> Detailed Flora and Vegetation Survey <b>Location:</b> Eastern Ridge Mining Tenement (OB23/24/25) <b>Timing:</b> March 2011	<ul style="list-style-type: none"> <li>• 51 detailed floristic sites (quadrats)</li> <li>• One relevé plots</li> </ul>	<ul style="list-style-type: none"> <li>• 455 plant taxa</li> <li>• 52 families</li> <li>• 170 genera</li> <li>• 19 introduced taxa</li> <li>• 13 vegetation associations</li> </ul>	<ul style="list-style-type: none"> <li>• No threatened flora</li> <li>• Five priority listed flora taxa: <i>Aristida jerichoensis</i> var. <i>subspinulifera</i> (P1)<sup>11</sup>, <i>Calotis latiuscula</i> (P3)<sup>12</sup>, <i>Goodenia nuda</i> (P4), <i>Eremophila magnifica</i> var. <i>velutina</i> (P3) and <i>Isotropis parviflora</i> (P2)</li> <li>• No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>• Access</li> </ul>

<sup>11</sup> *Aristida jerichoensis* var. *subspinulifera* is no longer listed as a Priority 1 flora species. It is now listed as a Priority 3 flora species.

<sup>12</sup> *Calotis latiuscula* is no longer listed as a Priority flora species.

Study details	Methods	Results	Significant findings	Limitations
<p>(Onshore, 2013)</p> <p><b>Client:</b> BHP Billiton Iron Ore</p> <p><b>Type:</b> Desktop Assessment</p> <p><b>Location:</b> Mt Whaleback Mining Tenement</p> <p><b>Timing:</b> April 2013</p>	<ul style="list-style-type: none"> <li>• Desktop Assessment</li> </ul>	<ul style="list-style-type: none"> <li>• 352 plant taxa</li> <li>• 48 families</li> <li>• 147 genera</li> <li>• 19 introduced taxa</li> <li>• 20 vegetation associations</li> <li>• Six broad floristic formations</li> </ul>	<ul style="list-style-type: none"> <li>• No threatened flora</li> <li>• Three priority listed flora taxa: <i>Calotis latiuscula</i> (P3)<sup>13</sup>, <i>Eremophila magnifica</i> subsp. <i>magnifica</i> (P4), <i>Lepidium catapycnon</i> (P4)<sup>14</sup></li> <li>• No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>• No significant limitations</li> </ul>

<sup>13</sup> *Calotis latiuscula* is no longer listed as a Priority flora species.

<sup>14</sup> *Lepidium catapycnon* is no longer listed as a Threatened flora species. It is now listed as Priority 4.

Study details	Methods	Results	Significant findings	Limitations
(Onshore, 2014a) <b>Client:</b> BHP Billiton Iron Ore <b>Type:</b> Mapping Consolidation <b>Location:</b> BHP Pilbara tenure <b>Timing:</b> Mapping consolidation completed in 2015. Additional field surveys completed in July and August 2013	A combination of: <ul style="list-style-type: none"> <li>Review of historical surveys;</li> <li>Field surveys to fill 'gaps';</li> <li>Consolidation of vegetation mapping;</li> <li>Review significant plant taxa;</li> <li>Review of introduced weed taxa;</li> <li>Consolidation of vegetation condition mapping; and</li> <li>Review and consolidation of raw and spatial data</li> </ul>	<ul style="list-style-type: none"> <li>15 landform types described and mapped.</li> <li>218 vegetation associations classified, under 53 broad floristic formations.</li> </ul>	<ul style="list-style-type: none"> <li>Themeda grasslands on cracking clay TEC present.</li> <li>Six PECs represented in the Study Area</li> <li>57 significant plant taxa including one threatened<sup>15</sup>, 14 P1, 11 P2, 26 P3, and four P4.</li> <li>56 introduced weed taxa, including seven recognised as Declared Plant Pests under the BAM Act.</li> <li>Three introduced weed taxa are listed as WoNS (*<i>Jatropha gossypifolia</i>, *<i>Parkinsonia aculeata</i> and *<i>Tamarix aphylla</i>).</li> </ul>	<ul style="list-style-type: none"> <li>Timing of historical field surveys.</li> <li>Detail in raw data lacking.</li> <li>Variability in scope and resources for previous baseline surveys.</li> <li>Variability in completeness of raw data.</li> <li>Vegetation classification variable.</li> <li>Vegetation mapping linework and overlapping datasets.</li> <li>Mis-identification of keystone plant taxa.</li> <li>Gaps in vegetation datasets.</li> </ul>
(Onshore, 2014b) <b>Client:</b> BHP Billiton Iron Ore <b>Type:</b> Detailed Flora and Vegetation Survey Level One Fauna assessment <b>Location:</b> Western Ridge (not same area as present report) <b>Timing:</b> June 2014	<ul style="list-style-type: none"> <li>12 detailed floristic sites (quadrats)</li> <li>116 relevé plots</li> </ul>	<ul style="list-style-type: none"> <li>199 plant taxa</li> <li>32 families</li> <li>93 genera</li> <li>Seven introduced taxa</li> <li>17 vegetation associations</li> <li>10 broad floristic formations</li> </ul>	<ul style="list-style-type: none"> <li>No threatened flora</li> <li>One priority listed flora taxon and one taxon of interest: <i>Calotis latiuscula</i> (P3)<sup>16</sup>, <i>Aristida</i> cf. <i>nitidula</i> (species of interest)</li> <li>No TECs and PECs</li> </ul>	<ul style="list-style-type: none"> <li>No significant limitations</li> </ul>

<sup>15</sup> *Lepidium catapycnon* is no longer listed as a Threatened flora species. It is now listed as Priority 4.

<sup>16</sup> *Calotis latiuscula* is no longer listed as a Priority flora species.



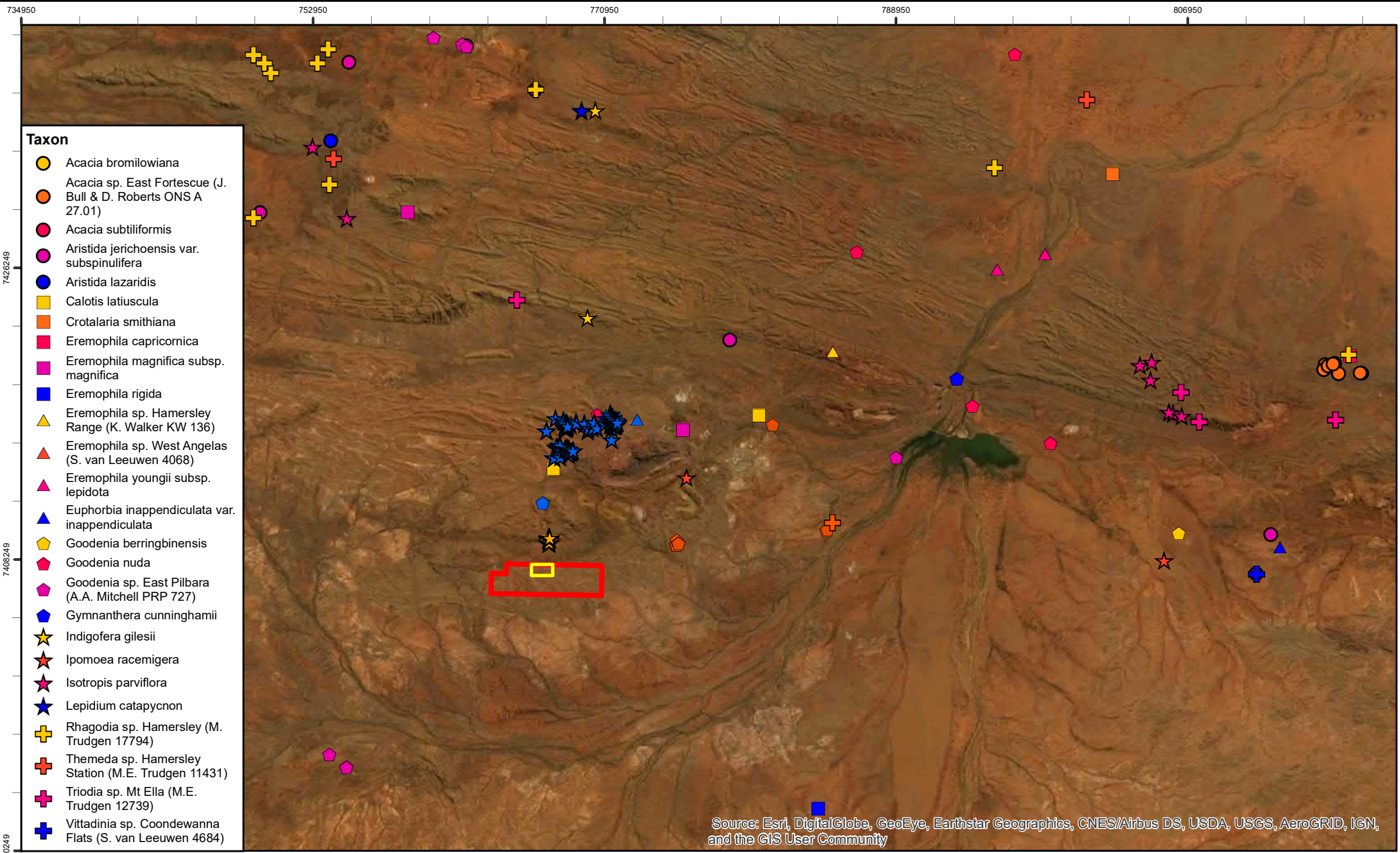
Study details	Methods	Results	Significant findings	Limitations
<p>(Onshore, 2016)</p> <p><b>Client:</b> BHP Billiton Iron Ore</p> <p><b>Type:</b> Desktop Assessment</p> <p><b>Location:</b> Western Ridge Southern Tenements (E52/3360 and E52/3361)</p> <p><b>Timing:</b> October 2016</p>	<ul style="list-style-type: none"> <li>• Desktop assessment</li> </ul>	<ul style="list-style-type: none"> <li>• 13 vegetation associations</li> <li>• Nine broad floristic formations</li> </ul>	<ul style="list-style-type: none"> <li>• No threatened flora</li> <li>• Identified as likely to occur in the study area: <i>Aristida lazaridis</i> (P2), <i>Calotis latiuscula</i> (P3)<sup>17</sup>, <i>Eremophila magnifica</i> subsp. <i>magnifica</i> (P4), <i>Eremophila magnifica</i> subsp. <i>velutina</i> (P3), <i>Goodenia nuda</i> (P4), <i>Gymnanthera cunninghamii</i> (P3), <i>Indigofera gilesii</i> (P3), <i>Ipomoea racemigera</i> (P2), <i>Isotropis parviflora</i> (P2), <i>Lepidium catapycnon</i> (P4)<sup>18</sup>, <i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739) (P3)</li> <li>• One vegetation association was closely affiliated to the West Angelas Cracking-Clays Priority Ecological Community (PEC) (Priority 1). A further three vegetation associations supporting Mulga Low Open Forest (to Low Woodland) were representative of 'Valley Floor Mulga' within the Hamersley subregion (considered to be an 'ecosystem at risk' by DPaW) (Kendrick 2001)</li> </ul>	<ul style="list-style-type: none"> <li>• Gaps in vegetation datasets</li> <li>• Timing of historical field surveys</li> <li>• Detail in raw data lacking</li> <li>• Variability in scope and resources for previous baseline surveys.</li> <li>• Variability in completeness of raw data</li> <li>• Vegetation classification variable</li> <li>• Vegetation mapping linework and overlapping datasets</li> <li>• Mis-identification of keystone plant taxa</li> </ul>

<sup>17</sup> *Calotis latiuscula* is no longer listed as a Priority flora species.

<sup>18</sup> *Lepidium catapycnon* is no longer listed as a Threatened flora species. It is now listed as Priority 4.

Study details	Methods	Results	Significant findings	Limitations
<p>(Onshore, 2018)</p> <p><b>Client:</b> BHP Billiton Iron Ore</p> <p><b>Type:</b> Desktop Assessment</p> <p><b>Location:</b> Western Ridge (E52/3448) Tenement (current Survey Study Area)</p> <p><b>Timing:</b> November 2018</p>	<ul style="list-style-type: none"> <li>• Desktop Assessment</li> </ul>	<ul style="list-style-type: none"> <li>• 13 vegetation associations</li> <li>• Nine broad floristic formations</li> </ul>	<ul style="list-style-type: none"> <li>• No threatened flora</li> <li>• Identified as likely to occur in the study area: <i>Calotis latiuscula</i> (P3)<sup>19</sup>, <i>Eremophila magnifica</i> subsp. <i>magnifica</i> (P4), <i>Goodenia nuda</i> (P4), <i>Ipomoea racemigera</i> (P2)</li> <li>• Two vegetation associations supporting Mulga Low Open Forest (to Low Woodland) were representative of 'Valley Floor Mulga' within the Hamersley subregion (considered to be an 'ecosystem at risk' by DBCA) (Kendrick 2001)</li> </ul>	<ul style="list-style-type: none"> <li>• Gaps in vegetation datasets</li> <li>• Timing of historical field surveys</li> <li>• Detail in raw data lacking</li> <li>• Variability in scope and resources for previous baseline surveys.</li> <li>• Variability in completeness of raw data</li> <li>• Vegetation classification variable</li> <li>• Vegetation mapping linework and overlapping datasets</li> <li>• Mis-identification of keystone plant taxa</li> </ul>

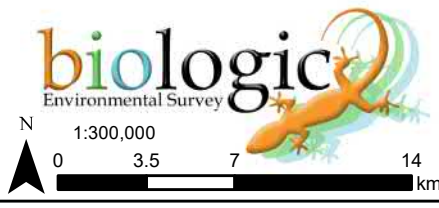
<sup>19</sup> *Calotis latiuscula* is no longer listed as a Priority flora species.



- Taxon**
- Acacia bromilowiana
  - Acacia sp. East Fortescue (J. Bull & D. Roberts ONS A 27.01)
  - Acacia subtiliformis
  - Aristida jerichoensis var. subspinulifera
  - Aristida lazaridis
  - Calotis latiuscula
  - Crotonia smithiana
  - Eremophila capricornica
  - Eremophila magnifica subsp. magnifica
  - Eremophila rigida
  - ▲ Eremophila sp. Hamersley Range (K. Walker KW 136)
  - ▲ Eremophila sp. West Angelas (S. van Leeuwen 4068)
  - ▲ Eremophila youngii subsp. lepidota
  - ▲ Euphorbia inappendiculata var. inappendiculata
  - Goodenia berringbinensis
  - Goodenia nuda
  - Goodenia sp. East Pilbara (A.A. Mitchell PRP 727)
  - Gymnanthera cunninghamii
  - ★ Indigofera gilesii
  - ★ Ipomoea racemigera
  - ★ Isotropis parviflora
  - ★ Lepidium catapycnon
  - ✚ Rhagodia sp. Hamersley (M. Trudgen 17794)
  - ✚ Themeda sp. Hamersley Station (M.E. Trudgen 11431)
  - ✚ Triodia sp. Mt Ella (M.E. Trudgen 12739)
  - ✚ Vittadinia sp. Coondewanna Flats (S. van Leeuwen 4684)

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

- Legend**
- ▭ Study Area
  - ▭ Targeted Diversion Area



**BHP Western Australian Iron Ore  
Western Ridge Detailed Flora and  
Vegetation Survey**  
**Figure 4.1 Database search results**

Coordinate System: GDA 1994 MGA Zone 50  
Projection: Transverse Mercator  
Datum: GDA 1994

Size A4. Created 20/03/2019

**Table 4.2: Conservation significant flora taxa known to occur near the Study Area based on the desktop assessment**

Taxon	Description (WAH, 1998-)	Location
<b>Highly Likely</b>		
<i>Goodenia nuda</i> (P4)	Erect to ascending herb, to 0.5 m high. Fl. yellow, Apr to Aug	1 km N
<b>Likely</b>		
<i>Ipomoea racemigera</i> (P2)	Creeping annual, herb or climber. Fl. white	5 km N
<i>Aristida jerichoensis</i> var. <i>subspinulifera</i> (P3)	Compactly tufted perennial, grass-like or herb, 0.3-0.8 m high, lemma groove muricate. Hardpan plains	>12 km N
<i>Indigofera gilesii</i> (P3)	Shrub, to 1.5 m high. Fl. purple-pink, May or Aug. Pebbly loam. Amongst boulders & outcrops, hills	1 km N
<i>Eremophila magnifica</i> subsp. <i>magnifica</i> (P4)	Shrub, 0.5-1.5 m high. Fl. blue-purple, Aug to Sep. Skeletal soils over ironstone. Summits and rocky scree slopes	7.5 km N
<i>Lepidium catapycnon</i> (P4)	Open, woody perennial, herb or shrub, 0.2-0.3 m high, stems zigzag. Fl. white, Oct. Skeletal soils. Hillsides	7 km N
<b>Possible</b>		
<i>Isotropis parviflora</i> (P2)	Shrub, 0.1 m high. Fl. white/pink, Mar. Valley slopes, slopes of ironstone plateau	>28 km E
<i>Eremophila magnifica</i> subsp. <i>velutina</i> (P3)	Shrub, 0.5-1.5 m high. Fl. blue-purple, Aug to Sep. Skeletal soils over ironstone. Summits and rocky scree slopes	>30 km S
<i>Eremophila</i> sp. Hamersley Range (K. Walker KW 136) (P3)	Erect shrub 1-3.5 m tall. Grows in open rocky slopes, gullies and rock faces associated with large hills and cliffs	>12 km N
<i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727) (P3)	Open, erect annual or biennial, herb, to 0.2 m high. Fl. yellow. Red-brown clay soil, calcrete pebbles. Low undulating plain, swampy plains	>15 km NE
<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431) (P3)	Tussocky perennial, grass-like or herb, 0.9-1.8 m high. Fl. Aug. Red clay. Clay pan, grass plain	10 km N
<i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739) (P3)	Perennial, grass-like or herb, 0.4 m high. Light orange-brown, pebbly loam. Amongst rocks & outcrops, gully slopes	>15 km N
<i>Acacia bromilowiana</i> (P4)	Tree or shrub, to 12 m high, bark dark grey, fibrous; phyllodes more or less glaucous & slightly pruinose; inflorescence in spikes. Fl. yellow/pink, Jul to Aug. Red skeletal stony loam, orange-brown pebbly, gravel loam, laterite, banded ironstone, basalt. Rocky hills, breakaways, scree slopes, gorges, creek beds	>32 km NW

#### 4.2.2 Vegetation of Conservation Significance

One Threatened Ecological Community (TEC) listed under the BC Act and relevant to vegetation, Themeda Grasslands on Cracking Clays, is recognised in the Pilbara region of Western Australia. The TEC is restricted to cracking clay alluvial soils near Tom Price. The cracking-clay alluvial soils do not occur in the Study Area. A further TEC, Ethel Gorge Aquifer Stygobiont Community was identified as occurring within 40 km of the Study Area (7.5 km east of the Study Area) during the database search

request (Figure 4.1). This TEC does not represent terrestrial vegetation and is not considered any further.

The Parks and Wildlife TEC and Priority Ecological Community (PEC) database search (DBCA, 2018b) identified one of the 42 Pilbara PECs as occurring within the 40 km database search buffer; the West Angelas Cracking Clays (P1) (Figure 4.1 and Table 4.3). This PEC occurs 38 km west northwest of the Study Area (Figure 4.1). This PEC represents cracking-clay loam depressions and flowlines associated with significant basalt hills and ranges of which do not occur in the Study Area due to the restrictions of this landform (DBCA, 2018b).

**Table 4.3: Priority Ecological Communities known to occur within, and surrounding, the Study Area**

Community ID	Community Name and Description	Location
West Angelas Cracking Clays	<p><b>West Angelas Cracking-Clays – Priority 1</b></p> <p>Open tussock grasslands of <i>Astrebla pectinata</i>, <i>A. elymoides</i>, <i>Aristida latifolia</i>, in combination with <i>Astrebla squarrosa</i> and low scattered shrubs of <i>Sida fibulifera</i>, on basalt derived cracking-clay loam depressions and flowlines.</p> <p>Threats: disturbance footprints increasing from mine, future infrastructure development, possible weed invasion and changes in fire regime.</p>	Approximately 38 km west northwest of the Study Area

#### 4.2.3 Introduced Taxa

The NatureMap (DBCA, 2018a), Protected Matters (DoEE, 2018), ALA (ALA, 2018a) and The Western Australian Organism List (WAOL) (DPIRD, 2018) database searches identified a list of 66 introduced taxa that may potentially occur within the Study Area. The list of introduced taxa known to occur or potentially occur within the Study Area (Appendix H) was reviewed to identify Weeds of National Significance (WoNS) and Declared Plant Pests (DPP).

#### Weeds of National Significance

Of the list of introduced taxa identified during the desktop assessment as occurring in or near the Study Area, 27 are listed as WoNS (Appendix H). The 27 WoNS were identified from the WAOL database search for the entire Shire of East Pilbara and occur or may potentially occur within the shire boundaries. No other database search or literature review identified any WoNS. The 27 taxa include numerous *Opuntia*, *Austrocylindropuntia* and *Cylindropuntia* species that are grouped together in the WoNS listing.

#### Declared Plant Pests

The desktop assessment identified 45 DPPs (including numerous cacti species that are all listed as DPPs, Appendix H), previously recorded or potentially located within the Shire of East Pilbara. The desktop assessment did not identify any DPPs as occurring within, or immediately adjacent to, the Study Area.

## Weed Prioritisation

Fifteen introduced taxa have been identified by Parks and Wildlife as 'Priority Alerts' for the Pilbara region, comprising *\*Azadirachta indica*, *\*Calotropis procera*, *\*Chloris gayana*, *\*Clitoria ternatea*, *\*Cryptostegia grandiflora*, *\*Cylindropuntia* spp., *\*Euphorbia tirucalli*, *\*Jatropha gossypifolia*, *\*Lantana camara*, *\*Moringa oleifera*, *\*Ricinus communis*, *\*Schinus molle* var. *areira*, *\*Vachellia nilotica*, *\*Washingtonia robusta* and *\*Xanthium strumarium*. None of these introduced 'Priority Alerts' taxa are expected to occur in the Study Area.

### 4.3 Flora Composition

A total of 152 vascular flora taxa from 29 families and 70 genera were recorded from the Study Area during the field survey (Appendix I). The total number of vascular flora taxa recorded comprised 149 native taxa and three introduced taxa (Appendix I). The total number of vascular flora taxa recorded from the Study Area increases to 218, comprising 209 native taxa and nine introduced taxa (Appendix I), when the taxa from Coombanbunna Well are included in the total.

The dominant families equate to 63% of the total taxa recorded and comprised Fabaceae (41 taxa), Poaceae (27 taxa), Malvaceae (13 taxa), Scrophulariaceae (8 taxa) and Myrtaceae (8 taxa). Of the 29 families recorded, 11 were represented by one taxon, which equates to 7% of the total taxa recorded.

The dominant genera equate to 30% of the total taxa recorded and comprised *Acacia* (22 taxa), *Senna* (nine taxa), *Eremophila* (eight taxa) and *Triodia* (six taxa). Of the 70 genera recorded, 43 were represented by only one taxon, which equates 28% of the total taxa recorded.

A substantial number of taxa observed and collected from the field were difficult to confidently identify to species or infraspecies level. This was mainly due to low rainfall in the preceding months and subsequent lack of suitable material (i.e. flowers, fruits) to aid confident taxonomic identifications. Fifteen taxa have been tentatively identified to species or infraspecies level, while 18 have only been identified to genus level.

None of the 18 taxa that have been identified only to genera level are considered to be analogous with the 13 priority listed flora highly likely, likely, or with potential to occur in the Study Area (Table 4.2).

### 4.4 Survey Adequacy

A total of 39 sites have been sampled across the Study Area (34 quadrats and five relevés), which equates to approximately 0.032 sites sampled per hectare of native vegetation. BHP (2018) suggest that the intensive sampling of quadrats (i.e. during detailed surveys) shall allow for a minimum of one quadrat per square kilometre (km<sup>2</sup>). The Study Area is approximately 12 km<sup>2</sup> in size, therefore, the establishment and sampling of 34 quadrats adequately addresses BHP minimum survey intensity.

The sampling intensity is consistent with the flora and vegetation surveys reviewed in the desktop assessment, ranging from 0.321 to 0.003 sites completed per hectare (Table 4.4). Not all the reports reviewed in the desktop assessment are included in Table 4.4 due to survey type and missing information in the reports (i.e. size of the respective study areas).

**Table 4.4: Comparison of survey intensity and effort in the Study Area**

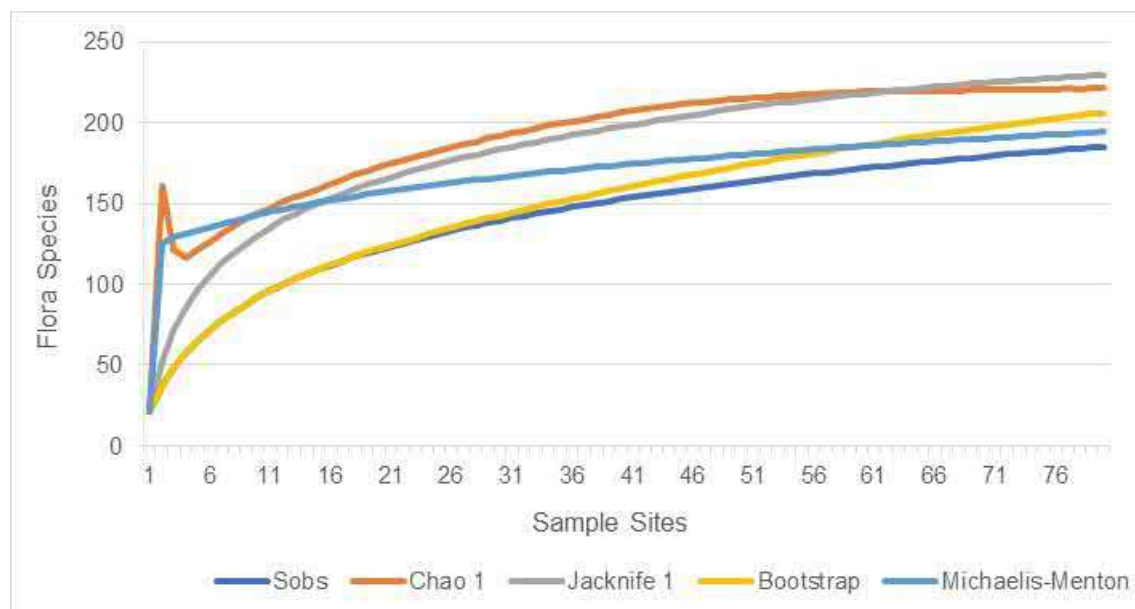
Survey	Study Area (ha)	Taxa recorded	Sampling sites	Sites/ ha
ENV (2006a)	28	117	9	0.321
Astron (2010)	23	71	7	0.304
ENV (2006c)	220	285	45	0.204
Onshore (2014b)	720	199	128	0.178
ENV (2009a)	~2,300	501	180	0.078
ENV (2009b)	~170	124	10	0.058
ENV (2006b)	250	168	10	0.040
GHD (2008)	3,600	321	141	0.039
ENV (2010)	844	189	29	0.034
<b>This Survey</b>	<b>1,204</b>	<b>153</b>	<b>39</b>	<b>0.032</b>
ENV (2011)	703	127	15	0.021
GHD (2011)	6100	347	123	0.020
Onshore (2009)	2,609	201	30	0.011
Biota (2001)	17,060	380	60	0.003

The species accumulation curve for the combined Western Ridge and Coomabanbunna Well Study Areas produced a curve that is steadily increasing. While not yet reaching asymptote, the curve has started to plateau slightly, especially Chao 1 and Michaelis Menton estimators (Figure 4.2). Richness estimators indicated that the survey was approximately 81% (Jackknife 1) to 95% (Michaelis-Menton) adequate, with an observed value of 185 vascular flora taxa (Table 4.5). These results indicate that additional survey effort may contribute a greater vascular flora taxa count than what was actually observed when referring to the observed value of 168. The survey effort may be considered adequate when the additional native vascular flora taxa recorded opportunistically (34 native confirmed taxa) within the Study Area are taken into account (Table 4.5).

**Table 4.5: Expected native species richness for the combined Study Areas (Western Ridge and Coomabanbunna Well)**

Treatment	Results	Richness Estimates based on Sobs (185)	Richness Estimates based on Actual (219)
Chao 1	221	84%	99%
Jackknife 1	229	81%	96%
Bootstrap	206	90%	106%
Michaelis-Menton	194	95%	113%
Sobs	185	N/A	N/A

NB: percentage values have been rounded to the nearest whole number.



**Figure 4.2: Species accumulation curve for the Study Area**

## 4.5 Flora of Conservation Significance

### 4.5.1 Federal and State Listing

The desktop assessment did not identify any federal or state listed threatened flora species as occurring in, or near, the Study Area. The field survey confirmed that there were no threatened flora occurring, or likely to occur within the Study Area. The vegetation and habitats present within the Study Area and the known locations of threatened flora confirm that it is unlikely that any threatened flora would occur within the Study Area.

The desktop assessment identified 75 priority listed taxa as potentially occurring within the Study Area (Section 4.2.1). Prior to the field trip, one priority taxon was considered highly likely to occur, five were considered likely to occur and seven were considered to possibly occur within the Study Area (Appendix G). Following the completion of the field survey, no priority listed taxa were recorded from the Study Area, despite targeted searches in suitable habitat.

### 4.5.2 Review of Significant Flora Highly Likely to Occur in the Study Area

One priority listed taxa, *Goodenia nuda* (P4), was considered highly likely to occur in the Study Area. Following the completion of the field survey *Goodenia nuda* is still considered highly likely to occur in the Study Area based on suitable habitat and recent records in close proximity to the Study Area.

### 4.5.3 Review of Significant Flora Likely to Occur in the Study Area

Five priority listed taxa, *Ipomoea racemigera* (P2), *Aristida jerichoensis* var. *subspinulifera* (P3), *Indigofera gilesii* (P3), *Eremophila magnifica* subsp. *magnifica* (P4) and *Lepidium catapycnon* (P4), were considered likely to occur in the Study Area. Following the completion of the field survey, *Ipomoea racemigera*, *Indigofera gilesii* and *Aristida jerichoensis* var. *subspinulifera* are now considered to potentially occur, while the remaining two taxa are considered unlikely to occur in the Study Area.



Limited suitable habitat (drainage areas, floodplains, hardpan plains and drainage lines) for *Ipomoea racemigera* and *Aristida jerichoensis* var. *subspinulifera* was located within the Study Area. Drainage areas, floodplains hardpan plains and drainage lines were present, however they were minor expressions limiting the likelihood of occurrence. *Ipomoea racemigera* (P2) is also an annual taxon which would not have been identifiable during the field survey. Flowering and/ or fruiting material is required for a positive identification of *Aristida jerichoensis* var. *subspinulifera*, which would not have been flowering or fruiting at the time of the survey. The basalt hills and ironstone ridgelines may provide limited habitat for *Indigofera gilesii*, while a recent fire (24 to 48 months prior to the survey) had passed across the Study Area which may have hindered the confident identification of the priority taxon.

Suitable habitat for the remaining taxa, *Eremophila magnifica* subsp. *magnifica* (P4) and *Lepidium catapycnon* (P4), was not present in the Study Area. As such the likelihood of occurrence of these two priority taxa has been downgraded to unlikely.

#### 4.5.4 Review of Significant Flora with Potential to Occur in the Study Area

Seven priority listed taxa, *Eremophila* sp. Hamersley Range (K. Walker KW 136) (P3), *Isotropis parviflora* (P2), *Eremophila magnifica* subsp. *velutina* (P3), *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (P3), *Themeda* sp. Hamersley Station (M.E. Trudgen 11431) (P3), *Triodia* sp. Mt Ella (M.E. Trudgen 12739) (P3), and *Acacia bromilowiana* (P4), were considered to potentially occur in the Study Area. Following the completion of the field survey all seven priority taxa are considered unlikely to occur in the Study Area. The Study Area provides marginal or no suitable habitat for the seven priority listed taxa, while no known records occur in close proximity (less than 10 km) to the Study Area.

#### 4.5.5 Flora of “Other” Significance

The EPA (2004) advises that flora species, subspecies, varieties, hybrids and ecotypes may be considered significant for reasons other than listing as a Threatened or Priority Flora taxa. This may include, but is not limited to, range extensions, keystone species, relic status, local endemism and anomalous features. Based on these features, no taxa recorded from the Study Area during the current assessment were considered to be flora of “other” significance.

### 4.6 Introduced Flora Taxa

Three introduced taxa, Buffel Grass (*\*Cenchrus ciliaris*), Spiked Malvastrum (*\*Malvastrum americanum*) and Mimosa Bush (*\*Vachellia farnesiana*), were recorded from the Study Area. The three introduced taxa are not listed as WoNS, DPPs under the BAM Act or ‘Priority Alert’ weeds by Parks and Wildlife. All introduced taxa were recorded in association with the drainage lines and floodplains, especially along the unnamed creek in the north (Figure 4.3).

*\*Cenchrus ciliaris* was a dominant understorey species along the channel and banks of the unnamed creek in the east and the unnamed creek in the south. The individuals of *\*Cenchrus ciliaris* have been grazed heavily and were showing signs of drought stress due to the timing of the survey. In total, *\*Cenchrus ciliaris* was recorded from 45 locations, with the majority located on the drainage lines, floodplains and the mulga woodlands (Figure 4.3).

*Malvastrum americanum* was recorded from four locations consisting of seven individuals within drainage areas/ floodplains and medium drainage lines (Figure 4.3 and Plate 4.2). The individuals of *Malvastrum americanum* were in poor condition from drought stress and cattle grazing and trampling. No further individuals of *Malvastrum americanum* were located in the Study Area, however the timing of the survey was not ideal.

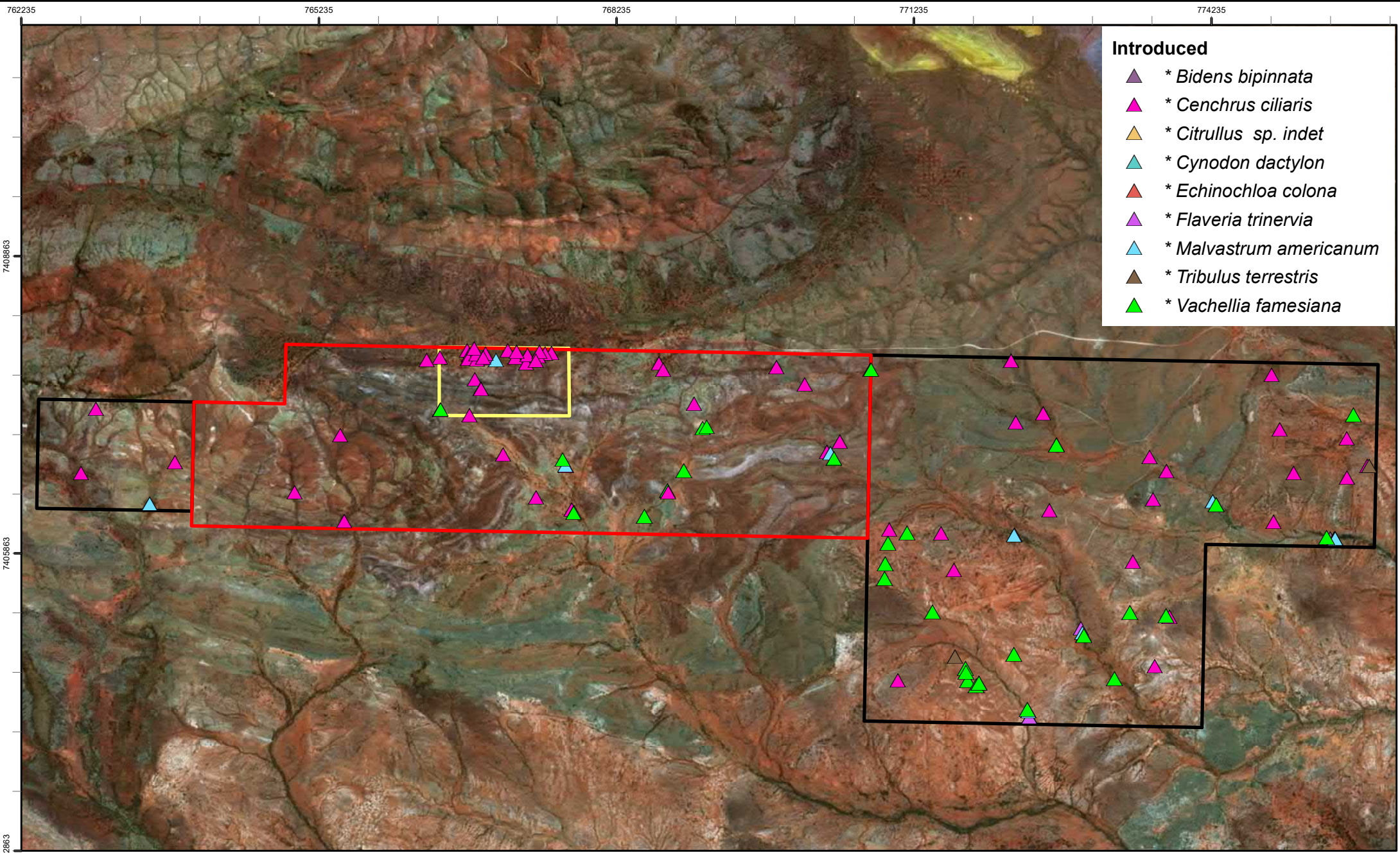
*Vachellia farnesiana* was recorded from 11 locations consisting of 50 individuals within drainage areas/ floodplains, medium drainage lines and gilgai plains (Figure 4.3 and Plate 4.2). Individuals were considerably large and healthy and did not appear to be heavily grazed.



Plate 4.1: *Cenchrus ciliaris* individuals covering a floodplain (left) and an individual of *Cenchrus ciliaris* showing stunted growth and minor flowering (right)



Plate 4.2: *Malvastrum americanum* showing drought stress and *Vachellia farnesiana* individual recorded from the Study Area



- Introduced**
- ▲ \* *Bidens bipinnata*
  - ▲ \* *Cenchrus ciliaris*
  - ▲ \* *Citrullus sp. indet*
  - ▲ \* *Cynodon dactylon*
  - ▲ \* *Echinochloa colona*
  - ▲ \* *Flaveria trinervia*
  - ▲ \* *Malvastrum americanum*
  - ▲ \* *Tribulus terrestris*
  - ▲ \* *Vachellia famesiana*

**Legend**

- Western Ridge
- Coombanbunna
- Targeted Diversion Area

**biologic**  
Environmental Survey

N  
1:49,000  
0 0.5 1 2 km

**BHP Western Australian Iron Ore  
Western Ridge Detailed Flora and  
Vegetation Survey  
Figure 4.3: Introduced Flora**

Coordinate System: GDA 1994 MGA Zone 50  
Projection: Transverse Mercator  
Datum: GDA 1994

Size A4. Created 13/05/2019

## 4.7 Vegetation Units

### 4.7.1 Broad Floristic Formations

Seven broad floristic formations were described from the Study Area, based on the dominant growth form and land cover genus for the dominant stratum. The seven broad floristic formations were:

- *Acacia* low open woodland;
- *Eragrostis* low open tussock grassland;
- *Senna* mid open shrubland;
- *Tecticornia* low scattered shrubs;
- *Themeda* mid tussock grassland;
- *Triodia* mid hummock grassland; and
- *Triodia* mid open hummock grassland.

The dominant broad floristic formation based on extent across the Study Area is *Triodia* mid hummock grassland. This broad floristic formation supported the highest number of vegetation associations (six). Three broad floristic formations (*Eragrostis* low open tussock grassland, *Senna* mid open shrubland and *Tecticornia* scattered low shrubs) supported only one vegetation association, while the remaining broad floristic formations either supported two or three vegetation associations.

### 4.7.2 Vegetation Associations

#### Super Groups

The analysis of the floristic data collected from the Western Ridge and Coomabanbunna Well Study Areas identified five 'Super Groups' (spliced at 30% similarity; Appendix J) (Table 4.6). Of the five super groups only four occurred in the Study Area, with the Degraded Mulga Medium Drainage Line being wholly located within the Coomabanbunna Well Study Area.

The five super groups can be further divided into 13 'Groups' (spliced at 40% similarity; Appendix J) occurring within the Western Ridge and Coomabanbunna Well Study Areas (Table 4.6). Of the 13 groups, ten occur in the Study Area, while the remaining three wholly occur in the Coomabanbunna Well Study Area (Table 4.6). Three groups were wholly located in the Study Area (Table 4.6).

**Table 4.6: Super Group and Group Differentiation and Occurrence in the Study Area**

Super Group	Group	Sample Sites	Study Area Occurrence
Degraded Mulga Medium Drainage Line	Degraded Mulga Medium Drainage Line	5	CW
Open Stony and Gilgai Plains	Open Stony Plains	6	CW
	Gilgai Plains	4	WR & CW
	Tecticornia Stony Plain	1	WR
	Hakea Stony Plains	3	CW
Mulga Medium Drainage Lines and Tussock Grasslands	Mulga Medium Drainage Line	2	WR
	Tussock Grasslands	5	WR & CW

Super Group	Group	Sample Sites	Study Area Occurrence
Stony Plains and Undulating Low Hills variously dominated by Mulga and shrublands	Stony Plain	19	WR & CW
	Drainage Area/ Floodplain	9	WR & CW
<i>Triodia</i> Hummock Grasslands on Hill Slopes, Crests and Undulating Low Hills	Snappy Gum Undulating Low Hill	2	WR
	<i>Triodia</i> Stony Plains	8	WR & CW
	<i>Triodia</i> Drainage Area/ Floodplains	3	WR & CW
	<i>Triodia</i> Hillslopes and Hillcrests/ Upper Hillslopes	23	WR & CW

WR – Western Ridge; CW – Coomabanbunna Well

### Vegetation Associations





As discussed in Section 3.4, the floristic data collected from the Study Area were analysed in conjunction with the Coomabanbunna Well floristic data, as the Project Areas abut each other. The landforms and vegetation units extend across each Project Area with the establishment and sampling of quadrats extended across the Project Areas to maximise spatial coverage and variation in communities.





A total of 16 vegetation associations were described and delineated from the Study Area (Table 4.7 and Figure 4.4) based on the results of the statistical analysis (Appendix J), review of the floristic data collected and the vegetation associations previously described adjacent to the Study Area. The vegetation associations were located across 12 landforms; basalt outcrops, drainage area/ floodplain, gilgai plain, hillcrest/ upper hillslope, hillslope, ironstone outcrops, medium drainage line, minor drainage line, sand plain, sandy/ stony plain, stony plain and undulating low hills.





The majority of the Study Area has been subjected to a fire within the last two to five years (discussed further in Sections 4.9 and 3.7). The fires have impacted on the structure and cover of the vegetation units, in particular the hummock grassland cover. The vegetation association descriptions may alter over time, while the identification of some of the *Triodia* species may change once more suitable material (inflorescences, including glumes and lemmas) is available. In addition, the survey occurred following a period of high temperatures and low rainfall. This resulted in a low number of taxa flowering and/ or fruiting, while the germination and growth of annual and ephemeral taxa was substantially lower than what would be expected. This is discussed further in Section 3.7.

Where relevant and appropriate, the vegetation association mapping in the Study Area was completed to ensure consistency between the Study Area, the Coomabanbunna Well Project Study Area (Biologic, in prep.) and the vegetation mapping occurring to the north of the Study Area (Onshore, 2014b).


**Table 4.7: Vegetation association descriptions**

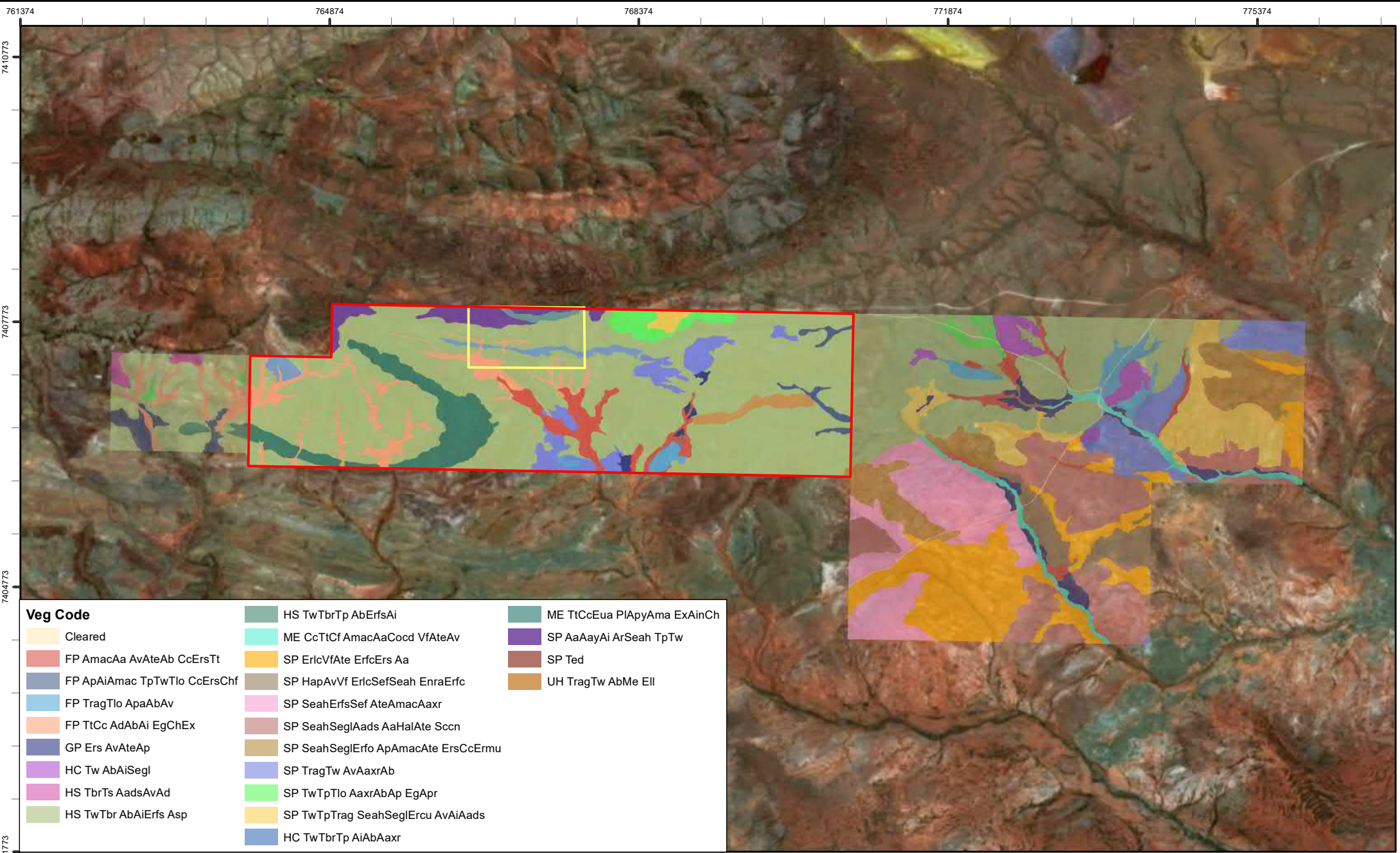
Code	Description	Sample Sites	Extent (ha / %)	Significant features	Condition	Photo
<b>Acacia low open woodland</b>						
FP AmacAa AvAteAb CcErsTt	Low open woodland of <i>Acacia macraneura</i> and <i>Acacia aptaneura</i> over mid to tall open shrubland of <i>Acacia victoriae</i> , <i>Acacia tetragonophylla</i> and <i>Acacia bivenosa</i> over low open tussock grassland of * <i>Cenchrus ciliaris</i> , <i>Eragrostis setifolia</i> and <i>Themeda triandra</i> with mid scattered hummock grasses of <i>Triodia pungens</i> on red sandy clay loam on drainage areas/ floodplains	CBW-57, WRI-29, WRI-30, WRI-39, WRI-28	44 / 3.7	• Nil	Good	
FP ApAiAmac TpTwTlo CcErsChf	Low open woodland of <i>Acacia paraneura</i> , <i>Acacia ? incurvaneura</i> and <i>Acacia macraneura</i> over mid open hummock grassland of <i>Triodia pungens</i> , <i>Triodia wiseana</i> and occasional <i>Triodia longiceps</i> over low open tussock grassland of * <i>Cenchrus ciliaris</i> , <i>Eragrostis setifolia</i> and <i>Chrysopogon fallax</i> on red clay loam on drainage areas/ floodplains	CBW-20, CBW-23, WRI-36, CBW-06	11 / 0.9	• Nil	Good	
SP AaAayAi ArSeah TpTw	Low open woodland of <i>Acacia aptaneura</i> , <i>Acacia ? ayersiana</i> (hybrid) and <i>Acacia ? incurvaneura</i> over tall to mid scattered shrubs of <i>Acacia rhodophloia</i> and <i>Senna artemisioides</i> subsp. <i>helmsii</i> over mid scattered hummock grasses of <i>Triodia pungens</i> and <i>Triodia wiseana</i> on red clay loam on stony plains	WRI-02, WRI-04, WRI-07	38 / 3.2	• Nil	Very Good	
<b>Eragrostis low open tussock grassland</b>						
GP Ers AvAteAp	Low open tussock grassland of <i>Eragrostis setifolia</i> with mid to tall scattered shrubs of <i>Acacia victoriae</i> , <i>Acacia tetragonophylla</i> and <i>Acacia paraneura</i> on red light clay on gilgai plains	CBW-04, CBW-60, WRI-33, WRI-81	5 / 0.4	• Nil	Good Degraded	

Code	Description	Sample Sites	Extent (ha / %)	Significant features	Condition	Photo
<b>Senna mid open shrubland</b>						
SP SeahSeglErf0 ApAmacAte ErsCcErmu	Mid open shrubland of <i>Senna artemisioides</i> subsp. <i>helmsii</i> , <i>Senna glutinosa</i> subsp. <i>luerssenii</i> and <i>Eremophila forrestii</i> with tall scattered shrubs of <i>Acacia paraneura</i> , <i>Acacia macraneura</i> and <i>Acacia tetragonophylla</i> over low scattered tussock grasses <i>Eragrostis setifolia</i> , <i>*Cenchrus ciliaris</i> and <i>Eriachne mucronata</i> on red clay loam on stony plains	Sampled in Coombanbunna Well (Biologic, in prep.)	1 / 0.1	• Nil	Good	
<b>Tecticornia low scattered shrubs</b>						
SP Ted	Low scattered shrubs of <i>Tecticornia ? disarticulata</i> on red light clay on stony plains	WRI-32	1 / 0.1	• Nil	Good	
<b>Themeda mid tussock grassland</b>						
FP TtCc AdAbAi EgChEx	Mid open tussock grassland of <i>Themeda triandra</i> and <i>*Cenchrus ciliaris</i> with mid to tall open shrubland of <i>Acacia dictyophleba</i> , <i>Acacia bivenosa</i> and <i>Acacia inaequilatera</i> with low scattered trees of <i>Eucalyptus gamophylla</i> , <i>Corymbia hamersleyana</i> and <i>Eucalyptus xerothermica</i> on red sandy clay loam on drainage areas/ floodplains	CBW-22, CBW-50, WRI-11, WRI-14, WRI-15	68 / 5.6	• Nil	Very Good	
ME TtCcEua PIAPyAma ExAinCh	Mid tussock grassland of <i>Themeda triandra</i> , <i>*Cenchrus ciliaris</i> and <i>Eulalia aurea</i> with mid to tall open shrubland of <i>Petalostylis labicheoides</i> , <i>Acacia pyrifolia</i> and <i>Acacia maitlandii</i> with low scattered trees of <i>Eucalyptus xerothermica</i> , <i>Acacia ? incurvaneura</i> and <i>Corymbia hamersleyana</i> on red silty clay loam on medium drainage lines	WRI-01, WRI-03	7 / 0.6	• Medium Drainage Line	Good	

Code	Description	Sample Sites	Extent (ha / %)	Significant features	Condition	Photo
<b>Triodia mid hummock grassland</b>						
FP TragTlo ApaAbAv	Mid hummock grassland of <i>Triodia angusta</i> and occasional <i>Triodia ? longiceps</i> with mid open shrubland of <i>Acacia pachyacra</i> , <i>Acacia bivenosa</i> and <i>Acacia victoriae</i> on pink sandy clay loam on drainage areas/ floodplains	CBW-01, CBW-76, WRI-82	13 / 1.1	• Nil	Excellent	
HC TwTbrTp AiAbAaxr	Mid hummock grassland of <i>Triodia wiseana</i> , <i>Triodia brizoides</i> and <i>Triodia pungens</i> with mid open shrubland of <i>Acacia inaequilatera</i> , <i>Acacia bivenosa</i> and <i>Acacia ? adsurgens x rhodophloia</i> on red silty loam on hillcrests/ upper hillslopes and undulating low hills	WRI-05, WRI-08, WRI-17	21 / 1.7	• Nil	Excellent	
HS TwTbrTp AbErfsAi	Mid hummock grassland of <i>Triodia wiseana</i> , <i>Triodia brizoides</i> and <i>Triodia pungens</i> with mid to tall open shrubland <i>Acacia bivenosa</i> , <i>Eremophila fraseri</i> subsp. <i>fraseri</i> and <i>Acacia inaequilatera</i> on red silty loam on hillslopes, hillcrest/ upper hillslopes and undulating low hills	CBW-21, WRI-09, WRI-12, WRI-13, WRI-83, WRI-84	85 / 7.1	• Nil	Excellent	
SP TragTw AvAaxrAb	Mid hummock grassland of <i>Triodia angusta</i> and <i>Triodia wiseana</i> with mid to tall open shrubland of <i>Acacia victoriae</i> , <i>Acacia ? adsurgens x rhodophloia</i> and <i>Acacia bivenosa</i> on brown silty clay loam on stony plains	CBW-73, CBW-79, WRI-19, WRI-41, WRI-43	53 / 4.4	• Nil	Excellent	



Code	Description	Sample Sites	Extent (ha / %)	Significant features	Condition	Photo
SP TwTpTlo AaxrAbAp EgApr	Mid hummock grassland of <i>Triodia wiseana</i> , <i>Triodia pungens</i> and <i>Triodia ? longiceps</i> with mid to tall open shrubland of <i>Acacia ? adsurgens x rhodophloia</i> , <i>Acacia bivenosa</i> and <i>Acacia paraneura</i> with low isolated trees of <i>Eucalyptus gamophylla</i> and <i>Acacia pruinocarpa</i> on red clay loam on stony plains and drainage areas/ floodplains	CBW-25, CBW-65, WRI-16	27 / 2.2	• Nil	Excellent	
UH TragTw AbMe Ell	Mid hummock grassland of <i>Triodia angusta</i> and <i>Triodia wiseana</i> with mid open shrubland of <i>Acacia bivenosa</i> and <i>Melaleuca eleuterostachya</i> with low scattered trees of <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> on brown sandy clay loam on undulating low hills	WRI-34, WRI-35	17 / 1.4	• Nil	Excellent	
<b>Triodia mid open hummock grassland</b>						
HS TwTbr AbAiErfAsp	Mid open hummock grassland of <i>Triodia wiseana</i> and <i>Triodia brizoides</i> with mid to tall open shrubland of <i>Acacia bivenosa</i> , <i>Acacia inaequilatera</i> and <i>Eremophila fraseri</i> subsp. <i>fraseri</i> over low scattered shrubs of <i>Acacia spondylophylla</i> on red silty loam on hillslopes, hillcrest/ upper hillslopes and undulating low hills	CBW-26, CBW-59, WRI-10, WRI-31, WRI-37, WRI-38, WRI-40, WRI-42, WRI-85	805 / 66.9	• Nil	Excellent	
SP TwTpTrag SeahSeglErcu AvAiAads	Mid open hummock grassland of <i>Triodia wiseana</i> , <i>Triodia pungens</i> and occasional <i>Triodia angusta</i> with mid open shrubland of <i>Senna artemisioides</i> subsp. <i>helmsii</i> , <i>Senna glutinosa</i> subsp. <i>luerssenii</i> and <i>Eremophila cuneifolia</i> with tall scattered shrubs of <i>Acacia victoriae</i> , <i>Acacia ? incurvaneura</i> and <i>Acacia ? adsurgens</i> on red silty loam on stony plains and undulating low hills	CBW-53, CBW-70, CBW-75, CBW-80, WRI-18	8 / 0.6	• Nil	Very Good	



Veg Code		
Cleared	HS TwTbrTp AbErsAi	ME TtCcEua PIAPyAma ExAinCh
FP AmacAa AvAteAb CcErsTt	ME CcTtCf AmacAaCocd VfAteAv	SP AaAayAi ArSeah TpTw
FP ApAiAmac TpTwTlo CcErsChf	SP EricVfAte ErfcErs Aa	SP Ted
FP TragTlo ApaAbAv	SP HapAvVf EricSefSeah EnraErfc	UH TragTw AbMe Ell
FP TtCc AdAbAi EgChEx	SP SeahErsSef AteAmacAaxr	
GP Ers AvAteAp	SP SeahSeglAads AaHalAte Sccon	
HC Tw AbAiSegl	SP SeahSeglErfc ApAmacAte ErsCcErmu	
HS TbrTs AadsAvAd	SP TragTw AvAaxrAb	
HS TwTbr AbAiErs Asp	SP TwTpTlo AaxrAbAp EgApr	
	SP TwTpTrag SeahSeglErcu AvAiAads	
	HC TwTbrTp AiAbAaxr	

**Legend**

Study Area

Targeted Diversion Area

**biologic**  
Environmental Survey

N  
1:55,000  
0 0.5 1 2 km

**BHP Western Australian Iron Ore  
Western Ridge Detailed Flora and  
Vegetation Survey  
Figure 4.4: Vegetation Association Mapping in the  
Study Area**

Coordinate System: GDA 1994 MGA Zone 50  
Projection: Transverse Mercator  
Datum: GDA 1994  
Size A4. Created 10/12/2019

### 4.7.3 Groundwater and Sheet Flow Dependent Vegetation

A review of the Bureau of Meteorology (BoM) Groundwater Dependent Ecosystem Atlas suggests that it is unlikely that any of the drainage/floodplain areas in the Study Area have a potential to be a GDE (BoM, 2012). Similarly, based on aerial imagery, sheet flow dependent Mulga communities are unlikely to occur in the Study Area.

## 4.8 Vegetation of Conservation Significance

### 4.8.1 Federal and State Listing

The desktop assessment (Section 4.2.2) did not identify any known TECs or PECs as potentially occurring within the Study Area. The vegetation associations described and delineated from the Study Area are not considered to be analogous with any TECs and PECs known to occur in the Pilbara Region (which includes the Study Area).

### 4.8.2 Vegetation of “Other” Significance

The EPA (2004) advises that vegetation may be of significance for reasons other than a listing as a TEC or a PEC. This may include, although is not limited to, scarcity, novel combination of species, role as a refuge, restricted distribution and vegetation extent being below a threshold level.

The vegetation associations described from the Study Area are not considered to be of regional significance, as they are not analogous with any known TECs or PECs, do not support unique floristic assemblages, do not support any known threatened flora species and do not occur in association with any regionally significant drainage lines.

No semi-permanent or permanent waterbodies were recorded within the Study Area during the survey. It is likely that temporary waterbodies, such as along the medium and minor drainage lines, will be present in the Study Area after substantial rainfall events. The longevity of the temporary waterbodies would be determined by the amount, intensity and frequency of the rainfall in the immediate region and within the catchment of the creeks. There are several Gilgai plains that would potentially flood following substantial rainfall events. The Gilgai plains were dry during the field survey and were also mostly devoid of vegetation, including herbs and grasses. No other significant feature that may support a unique floristic assemblage was present in the Study Area.

## 4.9 Vegetation Condition

The condition of the vegetation within the Study Area ranged from Degraded to Excellent (Table 4.8 and Figure 4.5). The main disturbances observed in the Study Area were associated with pastoralism and wildfires. There were signs of cattle grazing and trampling across the majority of the Study Area, excluding the hillcrests and ridges. It is likely that the main weed species, *\*Cenchrus ciliaris*, *\*Malvastrum americanum* and *\*Vachellia farnesiana*, have been transported across the Study Area via pastoralism and cattle grazing. The areas of the Study Area lower in the landscape were more heavily impacted by cattle. Including the floodplains and drainage lines.

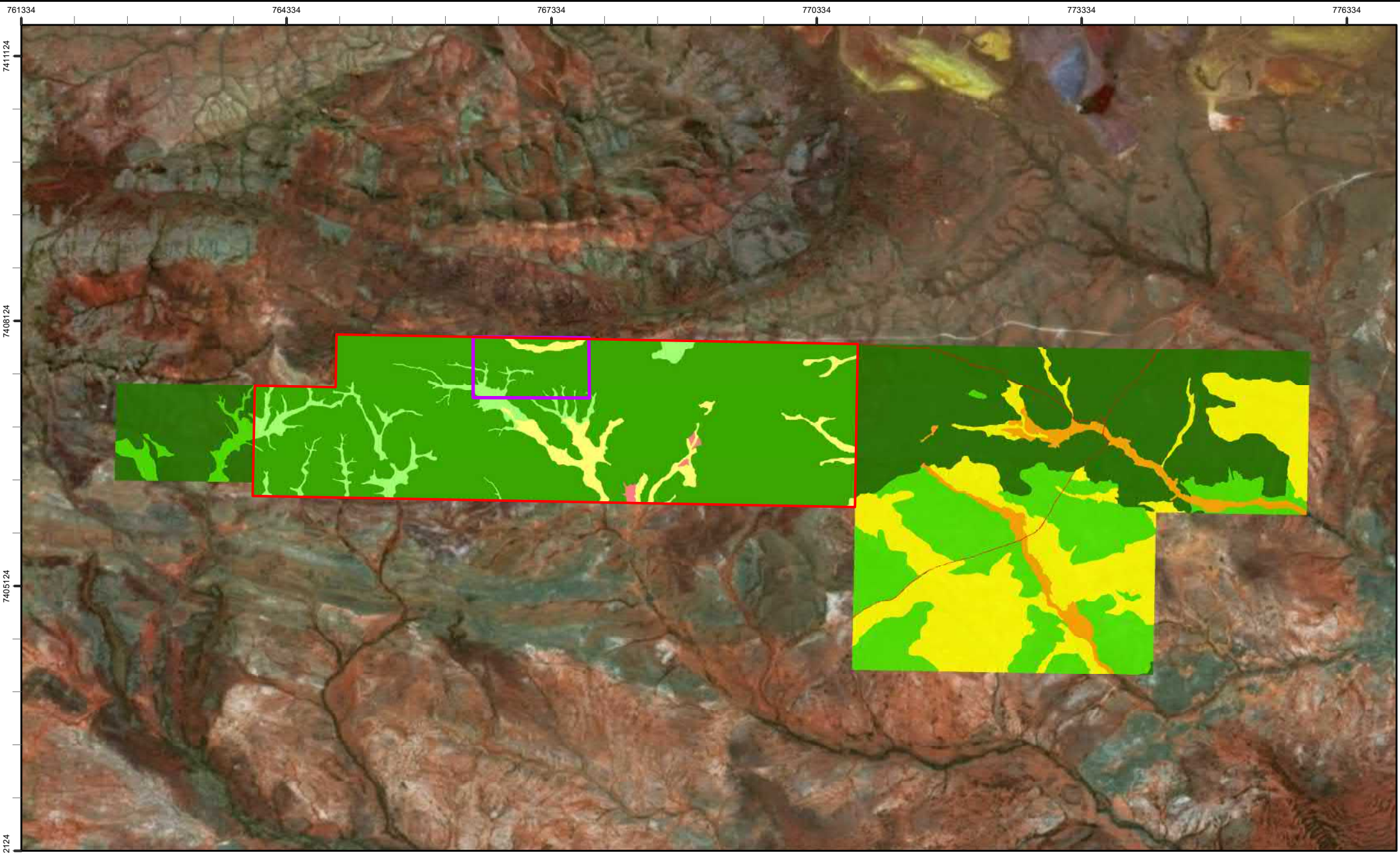
A substantial portion (approximately 75%) of the Study Area has been subjected to a fire within the last 24 to 48 months. The vegetation was showing signs of recovery; however, the below average rainfall has

limited the recovery of most of the perennial species, which was most evident in the *Triodia* hummocks. The hummocks on the hills were stunted and had minimal vegetative growth with low ground coverage.








Fire in the Pilbara is a common phenomenon and its presence does not necessarily warrant a lowering in vegetation condition. Successive, high intensity fires across the landscape can have a detrimental impact on vegetation and vegetation recovery. However, this is not the case for the Study Area and the vegetation, although slowly, is recovering from the fire. As a result, the majority of the vegetation was considered to be in excellent condition.


**Table 4.8: Vegetation condition extent in the Study Area**

Condition	Extent (ha / %)	Comment
Excellent	887 / 74	Occurred across the majority of the Study Area and showed negligible signs of disturbances.
Very Good	152 / 13	Occurred across a large portion of the Study Area and showed only minimal signs of disturbances associated with cattle grazing and trampling.
Good	160 / 13	Generally occurred in association with drainage lines and floodplains, areas subjected to recent, intense wildfires and vegetation associations with a weed presence. Cattle grazing and trampling was more evident in some locations (i.e. drainage lines).
Degraded	5 / 0.4	Associated with the floodplain and drainage areas in the southern central portion of the Study Area. The dominant understorey consisted of <i>Cenchrus ciliaris</i> with scattered <i>Vachellia farnesiana</i> shrubs, while cattle grazing and trampling was evident via a lack of native understorey species and trampling lines creating small erosional issues.



**Legend**

- |                                                                                    |                         |                                                                                     |                                                                                     |                                                                                     |           |
|------------------------------------------------------------------------------------|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------|
|  | Study Area              | <b>Condition</b>                                                                    |  | Good                                                                                |           |
|  | Targeted Diversion Area |  | Completely Degraded                                                                 |  | Very Good |
|                                                                                    |                         |  | Degraded                                                                            |  | Excellent |



1:55,000

0 0.5 1 2 km

**BHP Western Australian Iron Ore  
Western Ridge Detailed Flora and  
Vegetation Survey  
Figure 4.5: Vegetation Condition Mapping  
in the Study Area**

Coordinate System: GDA 1994 MGA Zone 50  
Projection: Transverse Mercator  
Datum: GDA 1994

Size A4. Created 07/06/2019

## 5 DISCUSSION

The following section discusses the results of the Survey and places the results in a regional and local context, consistent with the requirements of EPA (2016c).

### 5.1 Flora of Conservation Significance

The Survey did not identify any Federal or State threatened (declared rare) flora species listed under the EPBC Act or the BC Act. No Priority taxa as listed by the DBCA were recorded during the Survey. No other flora species recorded during the Survey are considered to be significant due to range extensions, unusual/ unique taxa or recorded at the extremities of their known geographical range.

#### 5.1.1 Regional Significance

No regionally significant flora taxa were recorded from the Study Area. The native flora taxa recorded from the Study Area have previously been recorded or are known to occur in the general region of the Study Area (ALA, 2018a; DBCA, 2018a; WAH, 1998-).

### 5.2 Vegetation of Conservation Significance

The survey did not identify any vegetation units that are consistent with ecological communities listed as threatened under the EPBC Act or the BC Act. No Priority Ecological Communities as listed by DBCA were identified from the Study Area.

#### 5.2.1 Regional Significance

The vegetation associations recorded from the Study Area were not considered to be regionally significant. The vegetation associations are well represented from a regional context across the Pilbara bioregion.

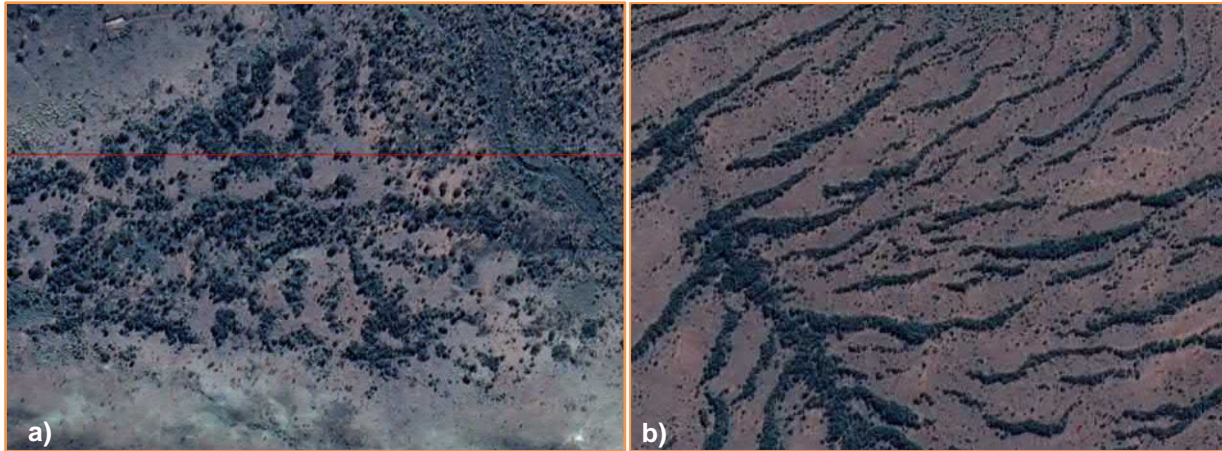
The Mulga communities (*Acacia aneura* and close relatives) along the lower slopes could be representative of an ecosystem at risk (Kendrick, 2001). The major vegetation sub-group of the lower-slope mulga ecosystem is arid *Acacia* low open woodlands and shrublands with hummock grass (Kendrick, 2001). This partially resembles vegetation association SP AaAayAi ArSeah TpTw, although this association was mapped on stony plains not hillslopes.

The vegetation system associations (18 and 82), as mapped by Beard (1975), are considered to have a moderate and a low priority reservation status, respectively, for the Hamersley subregion (Kendrick, 2001).

#### 5.2.2 Groundwater and Sheet Flow Dependent Ecosystems

Of the four land systems that occur in the Study Area (Section 2.6) two, Boolgeeda and Elimunna, may be subjected to sheet flow (van Vreeswyk *et al.*, 2004). The Boolgeeda land system includes stony lower plains and small groves that may receive run-off from the adjacent slopes and rises (van Vreeswyk *et al.*, 2004) The Elimunna land system includes stony and gilgai plains with moderately sized groves on hardpan plains. Mulga dominated communities (represented by *Acacia aptaneura*, *Acacia paraneura* and *Acacia pteraneura*) or communities with Mulga species present, were mapped within the Boolgeeda and Elimunna land systems. The Mulga communities mapped within the Study Area did not appear to display

any distinctive groving and inter-groving (Plate 5.1) when compared to the prominent groving and inter-groving seen in adjacent surrounds (for example, approximately 5 km to the south).



**Plate 5.1: a) Mulga community in the Study Area no banding (red line represents northern boundary of the Study Area) and b) prominent mulga banding observed to the south (approximately 5 km) of the Study Area.**

## 6 CONCLUSION

A single season Detailed Flora and Vegetation Survey was completed over eight days across the Study Area, with all the major vegetation units visited and sampled. A total of 34 quadrats and five relevés were sampled within the Study Area, while an additional 45 quadrats and five relevés were sampled in the adjacent Coombanbunna Well Project. The floristic data collected from these 89 sample sites was used to record the vegetation communities and their condition, as well as collecting an inventory of flora species present. The Study Area included a Targeted Diversion Area (~73 ha) that was intensively targeted for conservation significant flora. The single season Detailed Flora and Vegetation Survey recorded:

- 152 vascular flora taxa from 29 families and 70 genera, including 149 native species and three introduced taxa. An additional 66 native taxa and six introduced species were recorded from the Coombanbunna Well Project;
- No threatened or priority listed taxa were recorded from the Study Area;
- No WoNS or DPP were recorded from the Study Area;
- 16 vegetation units were described and delineated from the Study Area;
- No TECs or PECs were recorded from the Study Area; and
- The vegetation condition ranged from Degraded to Excellent, with the majority considered to be Excellent.



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## 8 APPENDICES

### Appendix A: State and Federal Conservation Codes

**International Union for Conservation of Nature**

Category	Definition
<b>Extinct (EX)</b>	A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
<b>Extinct in the Wild (EW)</b>	A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
<b>Critically Endangered (CR)</b>	A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V), and it is therefore considered to be facing an extremely high risk of extinction in the wild.
<b>Endangered (EN)</b>	A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V), and it is therefore considered to be facing a very high risk of extinction in the wild.
<b>Vulnerable (VU)</b>	A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Section V), and it is therefore considered to be facing a high risk of extinction in the wild.
<b>Near Threatened (NT)</b>	A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
<b>Least Concern (LTC)</b>	A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.
<b>Data Deficient (DD)</b>	A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.
<b>Not Evaluated (NE)</b>	A taxon is Not Evaluated when it has not yet been evaluated against the criteria.

**Environment Protection and Biodiversity Conservation Act 1999**

Category	Definition
<b>Threatened Flora Species</b>	
<b>Extinct (EX)</b>	A native species is eligible to be included in the Extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
<b>Extinct in the Wild (EW)</b>	A native species is eligible to be included in the Extinct in the Wild category at a particular time if, at that time: <ul style="list-style-type: none"> <li>(a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or</li> <li>(b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.</li> </ul>
<b>Critically Endangered (CR)</b>	A native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
<b>Endangered (EN)</b>	A native species is eligible to be included in the endangered category at a particular time if, at that time: <ul style="list-style-type: none"> <li>(a) it is not critically endangered; and</li> <li>(b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.</li> </ul>
<b>Vulnerable (VU)</b>	A native species is eligible to be included in the vulnerable category at a particular time if, at that time: <ul style="list-style-type: none"> <li>(a) it is not critically endangered or endangered; and</li> <li>(b) it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.</li> </ul>
<b>Conservation Dependent (CD)</b>	A native species is eligible to be included in the Conservation Dependent category at a particular time if, at that time: <ul style="list-style-type: none"> <li>(a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming Vulnerable, Endangered or Critically Endangered; or</li> <li>(b) the following subparagraphs are satisfied: <ul style="list-style-type: none"> <li>(i) the species is a species of fish;</li> <li>(ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised;</li> <li>(iii) the plan of management is in force under a law of the Commonwealth or a State or Territory;</li> <li>(iv) cessation of the plan of management would adversely affect the conservation status of the species.</li> </ul> </li> </ul>

Category	Definition
<b>Threatened Ecological Communities</b>	
<b>Critically Endangered</b>	An ecological community is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
<b>Endangered</b>	An ecological community is eligible to be included in the endangered category at a particular time if, at that time: <ul style="list-style-type: none"> <li>(a) it is not critically endangered; and</li> <li>(b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.</li> </ul>
<b>Vulnerable</b>	An ecological community is eligible to be included in the vulnerable category at a particular time if, at that time: <ul style="list-style-type: none"> <li>(a) it is not critically endangered nor endangered; and</li> <li>(b) it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.</li> </ul>

### **Biodiversity Conservation Act 2016**

Category	Definition
<b>Threatened Flora Species</b>	
<b>Critically Endangered (CR)</b>	Threatened species considered to be “facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines”. Published under schedule 1 of the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> for critically endangered flora.
<b>Endangered (EN)</b>	Threatened species considered to be “facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines”. Published under schedule 2 of the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> for endangered flora.
<b>Vulnerable (VU)</b>	Threatened species considered to be “facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines”. Published under schedule 3 of the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> for vulnerable flora.
<b>Extinct (EX)</b>	Species where “there is no reasonable doubt that the last member of the species has died”, and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act). Published as presumed extinct under schedule 4 of the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> for extinct flora.
<b>Extinct in the Wild (EW)</b>	Species that “is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form”, and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no threatened flora species listed as extinct in the wild.



Category	Definition
<b>Threatened Ecological Communities</b>	
<b>Critically Endangered (CR)</b>	<p>An ecological community is eligible for listing in the category of critically endangered ecological community at a particular time if, at that time —</p> <p>(a) it is facing an extremely high risk of becoming eligible for listing as a collapsed ecological community in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines; and</p> <p>(b) listing in that category is otherwise in accordance with the ministerial guidelines.</p>
<b>Endangered (EN)</b>	<p>An ecological community is eligible for listing in the category of endangered ecological community at a particular time if, at that time —</p> <p>(a) it is not a critically endangered ecological community; and</p> <p>(b) it is facing a very high risk of becoming eligible for listing as a collapsed ecological community in the near future, as determined in accordance with criteria set out in the ministerial guidelines; and</p> <p>(c) listing in that category is otherwise in accordance with the ministerial guidelines.</p>
<b>Vulnerable (VU)</b>	<p>An ecological community is eligible for listing in the category of vulnerable ecological community at a particular time if, at that time —</p> <p>(a) it is not a critically endangered ecological community or an endangered ecological community; and</p> <p>(b) it is facing a high risk of becoming eligible for listing as a collapsed ecological community in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines; and</p> <p>(c) listing in that category is otherwise in accordance with the ministerial guidelines.</p>
<b>Collapsed</b>	<p>An ecological community is eligible for listing as a collapsed ecological community at a particular time if, at that time —</p> <p>(a) there is no reasonable doubt that the last occurrence of the ecological community has collapsed; or</p> <p>(b) the ecological community has been so extensively modified throughout its range that no occurrence of it is likely to recover —</p> <p style="padding-left: 40px;">(i) its species composition or structure; or</p> <p style="padding-left: 40px;">(ii) its species composition and structure.</p>






**Department of Biodiversity, Conservation and Attractions Priority Definitions**

Category	Definition
<b>Threatened Flora Species</b>	
<b>Priority 1 (P1)</b>	<p><b>Poorly-known Species</b></p> <p>Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.</p>
<b>Priority 2 (P2)</b>	<p><b>Poorly-known Species</b></p> <p>Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.</p>
<b>Priority 3 (P3)</b>	<p><b>Poorly-known Species</b></p> <p>Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.</p>
<b>Priority 4 (P4)</b>	<p><b>Rare, Near Threatened and other species in need of monitoring</b></p> <p>(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.</p> <p>(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.</p> <p>(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p>

Category	Definition
<b>Threatened Ecological Communities</b>	
<b>Priority 1 (P1)</b>	<p><b>Poorly-known ecological communities</b></p> <p>Ecological communities that are known from very few occurrences with a very restricted distribution (generally <math>\leq 5</math> occurrences or a total area of <math>\leq 100</math>ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.</p>
<b>Priority 2 (P2)</b>	<p><b>Poorly-known Ecological Communities</b></p> <p>Communities that are known from few occurrences with a restricted distribution (generally <math>\leq 10</math> occurrences or a total area of <math>\leq 200</math>ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.</p>
<b>Priority 3 (P3)</b>	<p><b>Poorly-known Ecological Communities</b></p> <p>(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:</p> <p>(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or;</p> <p>(iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.</p> <p>Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.</p>

Category	Definition
<p><b>Priority 4 (P4)</b></p>	<p><b>Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.</b></p> <p>(i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.</p> <p>(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for a higher threat category.</p> <p>(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.</p>
<p><b>Priority 5 (P5)</b></p>	<p><b>Conservation Dependent Ecological Communities</b></p> <p>Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.</p>






**Appendix B: Sample Site Data**





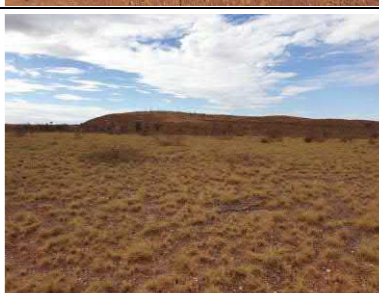
LATITUDE	LONGITUDE	SITE ID	DATE	LANDFORM	BROAD FF	VEG CODE	VEG_ASSOC	VEG_COND	ASPECT	SLOPE	SOIL TYPE	SOIL COLOUR	FIRE	DISTURB	PHOTO
-23.4170393	119.6179195	WRI-01	13/03/2019	Medium Drainage Line	Themeda mid open tussock grassland	ME TtCcEua PIApySeaf ExAin	Themeda triandra, Cenchrus ciliaris and Eulalia aurea mid open tussock grassland with Petalostylis labicheoides, Acacia pyrifolia and Senna artemisioides subsp. filifolia mid to tall open shrubland with Eucalyptus xerothermica and Acacia incurvaneura low scattered trees	Good	South	Flat	Clay Loam	Red	Moderate (3 to 5 yr)	Weed Invasion	
-23.4167688	119.6150897	WRI-02	14/03/2019	Stony Plain	Acacia low open woodland	SP AaApr	Tall open woodland of Acacia aptaneura and Acacia pruinocarpa	Very Good	South	Low	Clay Loam	Red	Moderate (3 to 5 yr)	Cattle Grazing	
-23.41754	119.612224	WRI-03	14/03/2019	Medium Drainage Line	Themeda tussock grassland	ME TtCcEua PIApyAma Ch	Themeda triandra, Cenchrus ciliaris and Eulalia aurea tussock grassland with mid open shrubland of Petalostylis labicheoides, Acacia pyrifolia and Acacia maitlandii with occasional Corymbia hamersleyana	Good	Flat	Low	Silty Loam	Red	Old (6+ yr)	Cattle Grazing	
-23.417444	119.6060402	WRI-04	14/03/2019	Stony Plain	Acacia mid open woodland	SP AaAprAin Tp	Acacia aptaneura, Acacia pruinocarpa and Acacia incurvaneura mid open woodland over sparse Triodia pungens hummock grassland	Very Good	South	Flat	Clay Loam	Red	Old (6+ yr)	Cattle Grazing	
-23.4210622	119.6148472	WRI-05	14/03/2019	Hillcrest/ Upper Hillslope	Triodia low open hummock grassland	HC TbrTp AiAbSegg CyaTtEnl	Triodia brizoides and Triodia pungens low open hummock grassland with Acacia inaequilatera, Acacia bivenosa and Senna glutinosa subsp. glutinosa mid sparse shrubland over Cymbopogon ambiguus, Themeda triandra and Enneapogon lindleyanus low sparse tussock grassland	Very Good	West	Low	Silty Loam	Red	Moderate (3 to 5 yr)	Frequent Fire	

LATITUDE	LONGITUDE	SITE ID	DATE	LANDFORM	BROAD FF	VEG CODE	VEG_ASSOC	VEG_COND	ASPECT	SLOPE	SOIL TYPE	SOIL COLOUR	FIRE	DISTURB	PHOTO
-23.4169492	119.5931024	WRI-07	15/03/2019	Stony Plain	Acacia low woodland	SP AaAinAay ArSeah TpTw	Acacia aptaneura, Acacia incurvaneura and Acacia ayersiana low woodland over Acacia rhodophloia and Senna artemisioides subsp. helmsii tall to mid sparse shrubland over Triodia pungens and Triodia wiseana mid open hummock grassland	Very Good	South/ East	Flat	Clay Loam	Red	Old (6+ yr)	Cattle Grazing	
-23.422384	119.5866975	WRI-08	15/03/2019	Undulating Low Hills	Triodia mid hummock grassland	HS Tw AaxrAinAb	Triodia wiseana mid hummock grassland with Acacia adsurgens x rhodophloia, Acacia inaequilatera and Acacia bivenosa tall sparse shrubs	Excellent	South/ West	Moderate	Silty Loam	Red	Old (6+ yr)	None Discernible	
-23.4305393	119.5862571	WRI-09	15/03/2019	Basalt Outcrops	Triodia mid open hummock grassland	BO TbrTpTw AbErfs	Triodia brizoides, Triodia pungens and Triodia wiseana mid open hummock grassland with Acacia bivenosa and Eremophila fraseri subsp. fraseri mid to tall sparse shrubland	Excellent	North	Moderate	Clay Loam	Red	Old (6+ yr)	None Discernible	
-23.4263385	119.5903005	WRI-10	15/03/2019	Undulating Low Hills	Triodia mid open hummock grassland	HS Tw AinAbSegp	Triodia wiseana low open hummock grassland with Acacia inaequilatera, Acacia bivenosa and Senna glutinosa subsp. pruinosa low to mid sparse shrubs	Very Good	West	Low	Silty Loam	Red	Moderate (3 to 5 yr)	Frequent Fire	
-23.4296284	119.593338	WRI-11	15/03/2019	Drainage Area/ Floodplain	Themeda mid open tussock grassland	FP Tt Tp AdAb EgCh	Themeda triandra open tussock grassland with occasional Triodia pungens hummock grasses with Acacia dictyophleba and Acacia bivenosa with occasional low Eucalyptus gamophylla and Corymbia hamersleyana trees	Very Good	South	Low	Sandy Clay Loam	Red	Old (6+ yr)	Cattle Grazing	






LATITUDE	LONGITUDE	SITE ID	DATE	LANDFORM	BROAD FF	VEG CODE	VEG_ASSOC	VEG_COND	ASPECT	SLOPE	SOIL TYPE	SOIL COLOUR	FIRE	DISTURB	PHOTO
-23.4222559	119.599038	WRI-12	15/03/2019	Hillslope	Triodia open hummock grassland	HS TragTp AbSegp Ell	Triodia angusta and Triodia pungens low open hummock grassland with Acacia bivenosa and Senna glutinosa subsp. pruinosa mid scattered shrubs with Eucalyptus leucophloia subsp. leucophloia scattered low trees	Very Good	South	Moderate	Silty Loam	Red	Moderate (3 to 5 yr)	Frequent Fire	
-23.4272696	119.6061392	WRI-13	15/03/2019	Hillslope	Triodia hummock grassland	HS TpTw AaxrAb Ell	Triodia pungens and Triodia wiseana mid hummock grassland with Acacia adsurgens x rhodophloia and Acacia bivenosa tall sparse shrubland with Eucalyptus leucophloia subsp. leucophloia low scattered trees	Excellent	West	Moderate	Silty Loam	Red	Old (6+ yr)	None Discernible	
-23.4326397	119.5983529	WRI-14	15/03/2019	Drainage Area/ Floodplain	Themeda mid tussock grassland	FP TtCc AbAi ChEx	Themeda triandra and Cenchrus ciliaris tussock grassland with Acacia bivenosa, Acacia inaequilatera and Hakea lorea subsp. lorea tall sparse shrubland with occasional low Corymbia hamersleyana and Eucalyptus xerothermica trees	Good	South/ East	Low	Medium Clay	Brown	Old (6+ yr)	Cattle Grazing	
-23.4248761	119.5978683	WRI-15	15/03/2019	Drainage Area/ Floodplain	Triodia open hummock grassland	FP Tp AdAbAi Eg	Triodia pungens open hummock grassland with Acacia dictyophleba, Acacia bivenosa and Acacia inaequilatera low to mid sparse shrubland with Eucalyptus gamophylla low scattered trees	Very Good	Flat	Flat	Sandy Clay Loam	Red	Moderate (3 to 5 yr)	Frequent Fire	
-23.4176066	119.6261873	WRI-16	13/03/2019	Stony Plain	Triodia tall hummock grassland	SP TloTw AsAaxrAb EgApr	Triodia longiceps and Triodia wiseana tall to mid hummock grassland with Acacia sp., Acacia adsurgens x rhodophloia and Acacia bivenosa mid to tall open shrubland with Eucalyptus gamophylla and Acacia pruinocarpa low isolated trees	Excellent	North	Flat	Clay Loam	Red	Old (6+ yr)	Cattle Grazing	







LATITUDE	LONGITUDE	SITE ID	DATE	LANDFORM	BROAD FF	VEG CODE	VEG_ASSOC	VEG_COND	ASPECT	SLOPE	SOIL TYPE	SOIL COLOUR	FIRE	DISTURB	PHOTO
-23.420541	119.6244017	WRI-17	13/03/2019	Hillcrest/ Upper Hillslope	Triodia mid hummock grassland	HS TpTw AvErfS	Triodia pungens and Triodia wiseana hummock grassland with Acacia victoriae and Eremophila fraseri subsp. fraseri mid sparse shrubland	Excellent	North	Moderate	Light Clay	Red	Moderate (3 to 5 yr)	Frequent Fire	
-23.4180971	119.6291459	WRI-18	13/03/2019	Stony Plain	Triodia mid open hummock grassland	SP Tp Segl Ain	Triodia pungens mid open hummock grassland with Senna glutinosa subsp. x luersennii mid open shrubland with occasional Acacia incurvaneura tall shrubs	Very Good	North	Flat	Clay Loam	Red	Old (6+ yr)	Cattle Grazing	
-23.4209954	119.6324197	WRI-19	13/03/2019	Drainage Area/ Floodplain	Triodia mid hummock grassland	FP TwTrag AbSegl EII	Triodia wiseana and Triodia angusta mid hummock grassland with Acacia bivenosa and Senna glutinosa subsp. x luersennii tall open shrubland over Eucalyptus leucophloia subsp. leucophloia low scattered trees	Excellent	South	Low	Silty Loam	Brown	Old (6+ yr)	Cattle Grazing	
-23.4311855	119.6208312	WRI-28	16/03/2019	Drainage Area/ Floodplain	Acacia low open woodland	FP Ap CcTtErs AteErfO	Acacia paraneura low open woodland over Cenchrus ciliaris, Themeda triandra and Eragrostis setifolia low sparse tussock grassland with Acacia tetragonophylla and Eremophila forrestii	Degraded	Flat	Flat	Light Clay	Red	Old (6+ yr)	Cattle Grazing	
-23.4293121	119.63024	WRI-29	16/03/2019	Drainage Area/ Floodplain	Acacia tall sparse shrubland	FP AvVf ErsCc	Acacia victoriae and Vachellia farnesiana tall sparse shrubland over Eragrostis setifolia and Cenchrus ciliaris sparse tussock grassland	Degraded	South	Low	Sandy Clay Loam	Red	Old (6+ yr)	Cattle Grazing	

LATITUDE	LONGITUDE	SITE ID	DATE	LANDFORM	BROAD FF	VEG CODE	VEG_ASSOC	VEG_COND	ASPECT	SLOPE	SOIL TYPE	SOIL COLOUR	FIRE	DISTURB	PHOTO
-23.4272798	119.6201455	WRI-30	14/03/2019	Drainage Area/ Floodplain	Acacia low open woodland	FP Aa AvErfHc CcTt	Acacia aptaneura low open woodland over Acacia victoriae, Eremophila forrestii and Hakea chordophylla mid to tall sparse shrubland over Cenchrus ciliaris and Themeda triandra low sparse tussock grassland.	Good	Flat	Flat	Light Clay	Red	Old (6+ yr)	Cattle Grazing	
-23.4266928	119.6251656	WRI-31	16/03/2019	Hillcrest/ Upper Hillslope	Triodia low open hummock grassland	HC Tbr AmaAin	Triodia low open hummock grassland with Acacia maitlandii and Acacia inaequilatera mid sparse shrubland	Very Good	West	Steep	Silty Loam	Red	Moderate (3 to 5 yr)	Frequent Fire	
-23.4297467	119.631268	WRI-32	16/03/2019	Stony Plain	Tecticornia low scattered shrubs	SP Tsp	Tecticornia sp. scattered low shrubs	Good	Flat	Flat	Light Clay	Red	Old (6+ yr)	Cattle Grazing	
-23.432362	119.6253204	WRI-33	16/03/2019	Gilgai Plain	Eragrostis scattered low tussock grasses	GP Ers AvApHap	Eragrostis scattered low tussock grasses with Acacia victoriae, Acacia paraneura, Hakea preissii scattered tall shrubs	Degraded	Flat	Flat	Light Clay	Pink	Old (6+ yr)	Cattle Grazing	
-23.4274261	119.636244	WRI-34	13/03/2019	Stony Plain	Triodia low hummock grassland	SP Trag Me Ab	Triodia angusta low hummock grassland with sparse mid shrubland of Melaleuca eleuterostachya with occasional mid scattered Acacia bivenosa shrubs	Excellent	West	Low	Clay Loam	Brown	Moderate (3 to 5 yr)	Frequent Fire	

LATITUDE	LONGITUDE	SITE ID	DATE	LANDFORM	BROAD FF	VEG CODE	VEG_ASSOC	VEG_COND	ASPECT	SLOPE	SOIL TYPE	SOIL COLOUR	FIRE	DISTURB	PHOTO
-23.4253302	119.6414188	WRI-35	12/03/2019	Undulating Low Hills	Triodia low open hummock grassland	HS TragTw Ab Eil	Triodia angusta and Triodia wiseana low open hummock grassland with Acacia bivenosa mid open shrubland with Eucalyptus leucophloia subsp. leucophloia low isolated trees	Excellent	North	Low	Sandy Clay Loam	Brown	Moderate (3 to 5 yr)	Frequent Fire	
-23.4254528	119.645849	WRI-36	12/03/2019	Drainage Area/ Floodplain	Acacia tall open shrubland	DP ApAteAv Tp CcErsChf	Acacia paraneura, Acacia tetragonophylla and Acacia victoriae tall open shrubland over Triodia pungens mid open hummock grassland over Cenchrus ciliaris, Eragrostis setifolia and Chrysopogon fallax mid open tussock grassland	Good	South/ East	Flat	Clay Loam	Red	Old (6+ yr)	Cattle Grazing	
-23.4211857	119.648531	WRI-37	12/03/2019	Hillcrest/ Upper Hillslope	Triodia mid open hummock grassland	HC AmaAspErfS AinHc	Triodia brizoides mid open hummock grassland with Acacia maitlandii, Acacia spondolophylla and Eremophila fraseri subsp. fraseri mid sparse shrubland with occasional Acacia inaequilatera and Hakea chordophylla tall shrubs	Excellent	North	Moderate	Clay Loam	Red	Moderate (3 to 5 yr)	Frequent Fire	
-23.4295886	119.6391988	WRI-38	13/03/2019	Hillcrest/ Upper Hillslope	Triodia mid hummock grassland	HC AmaAinErfS Asp	Triodia wiseana mid hummock grassland with Acacia maitlandii, Acacia inaequilatera and Eremophila fraseri subsp. fraseri mid to tall sparse shrubland over Acacia spondylophylla low sparse shrubland	Excellent	North/ West	Moderate	Silty Loam	Red	Old (6+ yr)	Frequent Fire	
-23.4260893	119.613447	WRI-39	14/03/2019	Sand Plain	Triodia mid open hummock grassland	SA Tp AbAvAte SeoErf	Triodia pungens mid open hummock grassland with mid sparse shrubland of Acacia bivenosa, Acacia victoriae and Acacia tetragonophylla with open low shrubland of Senna artemisioides subsp. oligophylla and Eremophila forrestii	Very Good	Flat	Flat	Sandy Clay Loam	Orange	Old (6+ yr)	Cattle Grazing	

LATITUDE	LONGITUDE	SITE ID	DATE	LANDFORM	BROAD FF	VEG CODE	VEG_ASSOC	VEG_COND	ASPECT	SLOPE	SOIL TYPE	SOIL COLOUR	FIRE	DISTURB	PHOTO
-23.4180616	119.6399951	WRI-40	12/03/2019	Ironstone Outcrops	Acacia low open woodland	IO Aa SeglAb Cc	Acacia aptaneura low open woodland over Senna glutinosa subsp. x luersenii and Acacia bivenosa mid sparse shrubland over Cenchrus ciliaris scattered tussock grasses	Excellent	North	Moderate	Clay Loam	Red	Old (6+ yr)	Cattle Grazing	
-23.4191614	119.6434123	WRI-41	12/03/2019	Stony Plain	Triodia mid hummock grassland	SP Trag AbAvAp Ain	Triodia angusta mid hummock grassland with Acacia bivenosa, Acacia victoriae and Acacia adsurgens x rhodophloia tall sparse shrubland with occasional Acacia inaequilatera scattered tall shrubs	Excellent	East	Low	Clayey Sand	Orange	Old (6+ yr)	Cattle Grazing	
-23.4216702	119.6416929	WRI-42	12/03/2019	Hillslope	Triodia mid open hummock grassland	HS Tbr AmaAbAsp Ain	Triodia brizoides mid open hummock grassland with Acacia maitlandii, Acacia bivenosa and Acacia spondylophylla low to mid sparse shrubland with Acacia inaequilatera tall isolated shrubs	Excellent	North/ West	Moderate	Silty Loam	Red	Moderate (3 to 5 yr)	Frequent Fire	
-23.4298077	119.6168946	WRI-43	14/03/2019	Sandy/ Stony Plain	Triodia mid hummock grassland	SA Trag Av	Triodia angusta real mid hummock grassland with Acacia victoriae tall sparse shrubland	Excellent	Flat	Flat	Clay Loam	Pink	Old (6+ yr)	Cattle Grazing	
-23.4234651	119.6339171	WRI-81	13/03/2019	Gilgai Plain	Eragrostis low open tussock grassland	GP Ers Av	Eragrostis low open tussock grassland with tall sparse Acacia victoriae shrubs	Good	South/ West	Flat	Light Clay	Red	Old (6+ yr)	Cattle Grazing	

LATITUDE	LONGITUDE	SITE ID	DATE	LANDFORM	BROAD FF	VEG CODE	VEG_ASSOC	VEG_COND	ASPECT	SLOPE	SOIL TYPE	SOIL COLOUR	FIRE	DISTURB	PHOTO
-23.4307373	119.6301275	WRI-82	16/03/2019	Stony Plain	Triodia mid hummock grassland	SP Trag AvAb	Triodia angusta mid hummock grassland with sparse Acacia victoriae and Acacia bivenosa shrubs	Excellent	West	Low	Sandy Clay Loam	Brown	Old (6+ yr)	Cattle Grazing	
-23.4306513	119.6060365	WRI-83	18/03/2019	Hillcrest/ Upper Hillslope	Triodia mid open hummock grassland	HC Tp Ai	Triodia pungens mid open hummock grassland with Acacia incurvaneura sparse mid shrubs	Excellent	Flat	Moderate	Clay Loam	Red	Old (6+ yr)	None Discernible	
-23.4302784	119.6084921	WRI-84	18/03/2019	Minor Drainage Line	Themeda mid tussock grassland	Mi TtCyaErmu AmaAspErfS Ch	Themeda triandra, Cymbopogon ambiguus and Eriachne mucronata mid tussock grassland with Acacia maitlandii, Acacia spondylophylla and Eremophila fraseri mid to low sparse shrubland with Corymbia hamersleyana low scattered trees	Excellent	East	Moderate	Silty Loam	Orange	Moderate (3 to 5 yr)	None Discernible	
-23.4297048	119.6110091	WRI-85	18/03/2019	Hillslope	Triodia low open hummock grassland	HS Tw AbAinErfS	Triodia wiseana mid low open hummock grassland with Acacia bivenosa, Acacia inaequilatera and Eremophila fraseri subsp. fraseri mid to tall sparse shrubland	Very Good	South/ East	Moderate	Silty Loam	Red	Moderate (3 to 5 yr)	Frequent Fire	

## Appendix C: Vegetation Structure Definition

### NVIS Vegetation Structural Classifications

Cover Characteristics							
Foliage cover *	70-100	30-70	10-30	<10	≈0	0-5	unknown
Crown cover **	>80	50-80	20-50	0.25-20	<0.25	0-5	unknown
% Crown cover ***	>80	50-80	20-50	0.25-20	<0.25	0-5	unknown
Cover code	d	c	i	r	bi	bc	unknown

Growth Form	Height ranges (m)	Structural Formation Classes							
tree, palm	>30 Tall	closed forest	open forest	woodland	open woodland	isolated trees	isolated clumps of trees	trees	
	10-30 Mid								
	<10 Low								
tree mallee	10-30 Tall	closed forest mallee	open forest mallee	mallee woodland	open woodland mallee	isolated trees mallee	isolated clumps of mallee trees	mallee trees	
	<10 Mid								
	<3 Low								
shrub, cycad, grass-tree, fern	>2 Tall	closed shrubland	shrubland	open shrubland	sparse shrubland	isolated shrubs	isolated clumps of shrubs	shrubs	
	1-2 Mid								
	<1 Low								
mallee shrub	10-30 Tall	closed shrubland mallee	mallee shrubland	open shrubland mallee	sparse shrubland mallee	isolated shrubs mallee	isolated clumps of mallee shrubs	mallee shrubs	
	<10 Mid								
	<3 Low								
heath shrub	>2 Tall	closed heathland	heathland	open heathland	sparse heathland	isolated shrubs heath	isolated clumps of heath shrubs	heath shrubs	
	1-2 Mid								
	<1 Low								
chenopod shrub	>2 Tall	closed chenopod shrubland	chenopod shrubland	open chenopod shrubland	sparse chenopod shrubland	isolated chenopod shrubs	isolated clumps of chenopod shrubs	chenopod shrubs	
	1-2 Mid								
	<1 Low								

Growth Form	Height ranges (m)	Structural Formation Classes						
samphire shrub	>0.5 Low	closed samphire shrubland	samphire shrubland	open samphire shrubland	sparse samphire shrubland	isolated samphire shrubs	isolated clumps of samphire shrubs	samphire shrubs
	<0.5 Low							
hummock grass	>2 Tall	closed hummock grassland	hummock grassland	open hummock grassland	sparse hummock grassland	isolated hummock grasses	isolated clumps of hummock grasses	hummock grasses
	<2 Tall							
tussock grass	>0.5 Mid	closed tussock grassland	tussock grassland	open tussock grassland	sparse tussock grassland	isolated tussock grasses	isolated clumps of tussock grasses	tussock grasses
	<0.5 Low							
other grass	>0.5 Mid	closed grassland	grassland	open grassland	sparse grassland	isolated grasses	isolated clumps of grasses	other grasses
	<0.5 Low							
sedge	>0.5 Mid	closed sedgeland	sedgeland	open sedgeland	sparse sedgeland	isolated sedges	isolated clumps of sedges	sedges
	<0.5 Low							
rush	>0.5 Mid	closed rushland	rushland	open rushland	sparse rushland	isolated rushes	isolated clumps of rushes	rushes
	<0.5 Low							
forb	>0.5 Mid	closed forbland	forbland	open forbland	sparse forbland	isolated forbs	isolated clumps of forbs	forbs
	<0.5 Low							
fern	>2 Tall	closed fernland	fernland	open fernland	sparse fernland	isolated ferns	isolated clumps of ferns	ferns
	1-2 Tall							
	<1 Low							
bryophyte	<0.5	closed bryophyte land	bryophyte land	open bryophyte land	sparse bryophyte land	isolated bryophytes	isolated clumps of bryophytes	bryophytes
lichen	<0.5	closed lichenland	lichenland	open lichenland	sparse lichenland	isolated lichens	isolated clumps of lichens	lichens
vine	>30 Tall	closed vineland	vineland	open vineland	sparse vineland	isolated vines	isolated clumps of vines	vines
	10-30 Med							
	<10 Low							
aquatic	<1 Tall	closed aquatic bed	aquatic bed	open aquatic bed	sparse aquatics	isolated aquatics	isolated clumps of aquatics	aquatics
	0-0.5 Low							
seagrass	<1 Tall	closed seagrass bed	Seagrass bed	open seagrass bed	sparse seagrass bed	isolated seagrasses	isolated clumps of seagrasses	seagrasses



From: NVIS Structural Formation Terminology (Australian Vegetation Attribute Manual Version 6.0 August 2003  
<http://www.environment.gov.au/erin/nvis/publications/avam/pubs/vegetation-attribute-manual-6.pdf>)

\* Foliage Cover is defined for each stratum as 'the proportion of the ground, which would be shaded if sunshine came from directly overhead'. It includes branches and leaves and is similar to the Crown type of Walker and Hopkins (1990) but is applied to a stratum or plot rather than an individual crown. It is generally not directly measured in the field for the upper stratum, although it can be measured by various line interception methods for ground layer vegetation. For the attribute COVER CODE in the Stratum table, the ground cover category refers to ground foliage cover not percentage cover.

\*\* Crown Cover (canopy cover) as per Walker and Hopkins (1990). Although relationships between the two are dependent on season, species, species age etc. (Walker & Hopkins, 1990), the crown cover category classes have been adopted as the defining measure.

\*\*\* The percentage cover is defined as the percentage of a strictly defined plot area, covered by vegetation. This can be an estimate and is a less precise measure than using, for example, a point intercept transect methods on ground layer, or overstorey vegetative cover. That is for precisely measured values (e.g. crown densitometer or point intercept transects) the value measured would be 'foliage' cover. Where less precise or qualitative measures are used these will most probably be recorded as 'percentage' cover.

## Appendix D: Vegetation Condition Definition

**Vegetation Condition Scale (adapted from Keighery (1994) and Trudgen (1988))**

<b>Condition Scale</b>	<b>Description</b>
<b>Excellent (1)</b>	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement
<b>Very Good (2)</b>	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks cause by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
<b>Good (3)</b>	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
<b>Poor (4)</b>	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
<b>Degraded (5)</b>	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.
<b>Completely Degraded (6)</b>	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 E: Flora Species Reconciliation and Amalgamation for Statistical Analysis

Confirmed	Reconciled Taxon
? <i>Pluchea rubelliflora</i>	Removed
? <i>Senna hamersleyensis</i>	Removed
? <i>Sorghum plumosum</i>	? <i>Sorghum plumosum</i>
? <i>Tephrosia</i> sp.	Removed
<i>Abutilon cryptopetalum</i>	<i>Abutilon cryptopetalum</i>
<i>Abutilon oxycarpum</i> subsp. Prostrate (A.A. Mitchell PRP 1266)	<i>Abutilon oxycarpum</i> subsp. Prostrate (A.A. Mitchell PRP 1266)
<i>Abutilon</i> sp.	Removed
<i>Acacia aptaneura</i>	<i>Acacia aptaneura</i>
<i>Acacia</i> ? <i>Adsurgens</i>	<i>Acacia</i> ? <i>adsurgens</i>
<i>Acacia</i> ? <i>Adsurgens</i> x <i>rhodophloia</i>	<i>Acacia</i> ? <i>adsurgens</i> x <i>rhodophloia</i>
<i>Acacia</i> ? <i>Aptaneura</i>	<i>Acacia aptaneura</i>
<i>Acacia</i> ? <i>Atkinsiana</i>	<i>Acacia</i> ? <i>atkinsiana</i>
<i>Acacia</i> ? <i>Ayersiana</i> (hybrid)	<i>Acacia</i> ? <i>ayersiana</i> (hybrid)
<i>Acacia</i> ? <i>Citrinoviridis</i>	<i>Acacia citrinoviridis</i>
<i>Acacia</i> ? <i>Incurvaneura</i>	<i>Acacia</i> ? <i>incurvaneura</i>
<i>Acacia</i> ? <i>Macraneura</i>	<i>Acacia macraneura</i>
<i>Acacia</i> ? <i>Paraneura</i>	<i>Acacia paraneura</i>
<i>Acacia ancistrocarpa</i>	<i>Acacia ancistrocarpa</i>
<i>Acacia aptaneura</i>	<i>Acacia aptaneura</i>
<i>Acacia bivenosa</i>	<i>Acacia bivenosa</i>
<i>Acacia citrinoviridis</i>	<i>Acacia citrinoviridis</i>
<i>Acacia dictyophleba</i>	<i>Acacia dictyophleba</i>
<i>Acacia inaequilatera</i>	<i>Acacia inaequilatera</i>
<i>Acacia macraneura</i>	<i>Acacia macraneura</i>
<i>Acacia maitlandii</i>	<i>Acacia maitlandii</i>
<i>Acacia pachyacra</i>	<i>Acacia pachyacra</i>
<i>Acacia paraneura</i>	<i>Acacia paraneura</i>
<i>Acacia pruinocarpa</i>	<i>Acacia pruinocarpa</i>
<i>Acacia pyrifolia</i>	<i>Acacia pyrifolia</i>
<i>Acacia rhodophloia</i>	<i>Acacia rhodophloia</i>
<i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i>	<i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i>
<i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i> x ?	<i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i> x ?
<i>Acacia</i> sp.	Removed
<i>Acacia</i> sp. Mulga Group	<i>Acacia</i> sp. Mulga Group
<i>Acacia spondylophylla</i>	<i>Acacia spondylophylla</i>
<i>Acacia tetragonophylla</i>	<i>Acacia tetragonophylla</i>
<i>Acacia victoriae</i>	<i>Acacia victoriae</i>
<i>Alternanthera nana</i>	<i>Alternanthera nana</i>
<i>Amyema</i> ? <i>Fitzgeraldii</i>	<i>Amyema</i> ? <i>fitzgeraldii</i>
<i>Androcalva luteiflora</i>	<i>Androcalva luteiflora</i>
<i>Anthobolus leptomerioides</i>	<i>Anthobolus leptomerioides</i>
<i>Aristida contorta</i>	<i>Aristida contorta</i>
<i>Aristida holathera</i> var. <i>holathera</i>	<i>Aristida holathera</i> var. <i>holathera</i>

Confirmed	Reconciled Taxon
Aristida inaequiglumis	<i>Aristida inaequiglumis</i>
Aristida latifolia	<i>Aristida latifolia</i>
Aristida sp.	Removed
Bidens bipinnata	Removed
Boerhavia coccinea	<i>Boerhavia coccinea</i>
Boerhavia paludosa	<i>Boerhavia paludosa</i>
Boerhavia schomburgkiana	<i>Boerhavia schomburgkiana</i>
Bulbostylis barbata	<i>Bulbostylis barbata</i>
Capparis lasiantha	<i>Capparis lasiantha</i>
Cenchrus ciliaris	Removed
Cheilanthes brownii	<i>Cheilanthes brownii</i>
Cheilanthes sp.	Removed
Chenopodium sp.	Removed
Chrysopogon fallax	<i>Chrysopogon fallax</i>
Citrullus sp.	Removed
Cleome viscosa	<i>Cleome viscosa</i>
Corchorus ? Lasiocarpus subsp. lasiocarpus	<i>Corchorus ? lasiocarpus</i> subsp. <i>lasiocarpus</i>
Corchorus laniflorus	<i>Corchorus laniflorus</i>
Corchorus sp.	Removed
Corchorus tridens	<i>Corchorus tridens</i>
Corymbia candida subsp. dipsodes	<i>Corymbia candida</i> subsp. <i>dipsodes</i>
Corymbia hamersleyana	<i>Corymbia hamersleyana</i>
Cucumis variabilis	<i>Cucumis variabilis</i>
Cullen graveolens	<i>Cullen graveolens</i>
Cymbopogon ambiguus	<i>Cymbopogon ambiguus</i>
Cynodon convergens	<i>Cynodon convergens</i>
Cynodon dactylon	Removed
Cyperus iria	<i>Cyperus iria</i>
Dactyloctenium radulans	<i>Dactyloctenium radulans</i>
Desmodium filiforme	<i>Desmodium filiforme</i>
Dipteracanthus australasicus subsp. australasicus	<i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i>
Dodonaea coriacea	<i>Dodonaea coriacea</i>
Dodonaea petiolaris	<i>Dodonaea petiolaris</i>
Duperreya commixta	<i>Duperreya commixta</i>
Echinochloa colona	Removed
Enchylaena tomentosa var. tomentosa	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>
Enneapogon ? Lindleyanus	<i>Enneapogon lindleyanus</i>
Enneapogon lindleyanus	<i>Enneapogon lindleyanus</i>
Enneapogon polyphyllus	<i>Enneapogon polyphyllus</i>
Enneapogon sp.	Removed
Enneapogon sp.	Removed
Enteropogon ramosus	<i>Enteropogon ramosus</i>
Eragrostis ? Setifolia	<i>Eragrostis setifolia</i>

Confirmed	Reconciled Taxon
Eragrostis dielsii	<i>Eragrostis dielsii</i>
Eragrostis eriopoda	<i>Eragrostis eriopoda</i>
Eragrostis setifolia	<i>Eragrostis setifolia</i>
Eragrostis sp.	Removed
Eremophila ? Lachnocalyx	<i>Eremophila ? lachnocalyx</i>
Eremophila cuneifolia	<i>Eremophila cuneifolia</i>
Eremophila exilifolia	<i>Eremophila exilifolia</i>
Eremophila forrestii	<i>Eremophila forrestii</i>
Eremophila fraseri subsp. fraseri	<i>Eremophila fraseri</i> subsp. <i>fraseri</i>
Eremophila latrobei subsp. latrobei	<i>Eremophila latrobei</i> subsp. <i>latrobei</i>
Eremophila longifolia	<i>Eremophila longifolia</i>
Eremophila platycalyx subsp. ? Pardalota	<i>Eremophila platycalyx</i> subsp. <i>pardalota</i>
Eremophila platycalyx subsp. pardalota	<i>Eremophila platycalyx</i> subsp. <i>pardalota</i>
Eremophila sp.	Removed
Eriachne ? Mucronata	<i>Eriachne mucronata</i>
Eriachne aristidea	<i>Eriachne aristidea</i>
Eriachne flaccida	<i>Eriachne flaccida</i>
Eriachne mucronata	<i>Eriachne mucronata</i>
Eriachne sp	Removed
Eriachne sp.	Removed
Eucalyptus ? Lucasii	<i>Eucalyptus ? lucasii</i>
Eucalyptus gamophylla	<i>Eucalyptus gamophylla</i>
Eucalyptus leucophloia subsp. leucophloia	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>
Eucalyptus xerothermica	<i>Eucalyptus xerothermica</i>
Eulalia aurea	<i>Eulalia aurea</i>
Euphorbia australis var. hispidula	<i>Euphorbia australis</i> var. <i>hispidula</i>
Euphorbia boophthona	<i>Euphorbia boophthona</i>
Euphorbia careyi	<i>Euphorbia careyi</i>
Euphorbia coghlanii	<i>Euphorbia coghlanii</i>
Euphorbia sp.	Removed
Evolvulus alsinoides	<i>Evolvulus alsinoides</i>
Evolvulus alsinoides var. villosicalyx	<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>
Fimbristylis sp.	Removed
Flaveria trinervia	Removed
Gomphrena affinis subsp. pilbarensis	<i>Gomphrena affinis</i> subsp. <i>pilbarensis</i>
Gomphrena sp.	Removed
Goodenia muelleriana	<i>Goodenia muelleriana</i>
Goodenia stobbsiana	<i>Goodenia stobbsiana</i>
Goodenia triodiophila	<i>Goodenia triodiophila</i>
Gossypium australe	<i>Gossypium australe</i>
Gossypium robinsonii	<i>Gossypium robinsonii</i>
Grevillea striata	<i>Grevillea striata</i>
Hakea chordophylla	<i>Hakea chordophylla</i>
Hakea lorea subsp. lorea	<i>Hakea lorea</i> subsp. <i>lorea</i>

Confirmed	Reconciled Taxon
Hakea preissii	<i>Hakea preissii</i>
Heliotropium ? Cunninghamamii	<i>Heliotropium ? cunninghamii</i>
Heliotropium tanythrix	<i>Heliotropium tanythrix</i>
Hibiscus coatesii	<i>Hibiscus coatesii</i>
Hibiscus sp.	Removed
Hibiscus sturtii var. campylochlamys	<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>
Indigofera ? Georgei	<i>Indigofera georgei</i>
Indigofera colutea	<i>Indigofera colutea</i>
Indigofera georgei	<i>Indigofera georgei</i>
Indigofera linifolia	<i>Indigofera linifolia</i>
Indigofera linnaei	<i>Indigofera linnaei</i>
Indigofera monophylla	<i>Indigofera monophylla</i>
Indigofera sp.	Removed
Isotropis atropurpurea	<i>Isotropis atropurpurea</i>
Jasminum didymum subsp. lineare	<i>Jasminum didymum</i> subsp. <i>lineare</i>
Lepidium ? Pedicellosum	<i>Lepidium ? pedicellosum</i>
Maireana melanocoma	<i>Maireana melanocoma</i>
Maireana pyramidata	<i>Maireana pyramidata</i>
Maireana sp.	Removed
Maireana sp.	Removed
Maireana triptera	<i>Maireana triptera</i>
Malvastrum americanum	Removed
Marsdenia australis	<i>Marsdenia australis</i>
Marsilea hirsuta	<i>Marsilea hirsuta</i>
Marsilea sp.	Removed
Melaleuca eleuterostachya	<i>Melaleuca eleuterostachya</i>
Neobassia astrocarpa	<i>Neobassia astrocarpa</i>
Neptunia dimorphantha	<i>Neptunia dimorphantha</i>
Oldenlandia crouchiana	<i>Oldenlandia crouchiana</i>
Operculina aequisepala	<i>Operculina aequisepala</i>
Paraneurachne muelleri	<i>Paraneurachne muelleri</i>
Petalostylis labicheoides	<i>Petalostylis labicheoides</i>
Phyllanthus erwinii	<i>Phyllanthus erwinii</i>
Pluchea ? Dunlopii	<i>Pluchea ? dunlopii</i>
Polycarpaea longiflora	<i>Polycarpaea longiflora</i>
Portulaca cyclophylla	<i>Portulaca cyclophylla</i>
Portulaca filifolia	<i>Portulaca filifolia</i>
Portulaca oleracea	<i>Portulaca oleracea</i>
Portulaca sp.	Removed
Psydrax latifolia	<i>Psydrax latifolia</i>
Psydrax suaveolens	<i>Psydrax suaveolens</i>
Pterocaulon sp.	Removed
Ptilotus aervoides	<i>Ptilotus aervoides</i>
Ptilotus astrolasius	<i>Ptilotus astrolasius</i>



Confirmed	Reconciled Taxon
Ptilotus calostachyus	<i>Ptilotus calostachyus</i>
Ptilotus exaltatus	<i>Ptilotus exaltatus</i>
Ptilotus gomphrenoides	<i>Ptilotus gomphrenoides</i>
Ptilotus obovatus	<i>Ptilotus obovatus</i>
Ptilotus rotundifolius	<i>Ptilotus rotundifolius</i>
Rhagodia eremaea	<i>Rhagodia eremaea</i>
Rhynchosia minima	<i>Rhynchosia minima</i>
Salsola australis	<i>Salsola australis</i>
Santalum lanceolatum	<i>Santalum lanceolatum</i>
Scaevola spinescens	<i>Scaevola spinescens</i>
Sclerolaena bicornis	<i>Sclerolaena bicornis</i>
Sclerolaena cornisheana	<i>Sclerolaena cornisheana</i>
Sclerolaena cuneata	<i>Sclerolaena cuneata</i>
Senna artemisioides subsp. filifolia	<i>Senna artemisioides</i> subsp. <i>filifolia</i>
Senna artemisioides subsp. helmsii	<i>Senna artemisioides</i> subsp. <i>helmsii</i>
Senna artemisioides subsp. helmsii x oligophylla	<i>Senna artemisioides</i> subsp. <i>helmsii</i> x <i>oligophylla</i>
Senna artemisioides subsp. oligophylla	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>
Senna artemisioides subsp. x artemisioides	<i>Senna artemisioides</i> subsp. x <i>artemisioides</i>
Senna ferraria x ?	<i>Senna ferraria</i> x ?
Senna glutinosa subsp. Chatelainiana	<i>Senna glutinosa</i> subsp. <i>Chatelainiana</i>
Senna glutinosa subsp. glutinosa	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>
Senna glutinosa subsp. luerksenii	<i>Senna glutinosa</i> subsp. <i>luerksenii</i>
Senna glutinosa subsp. pruinosa	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>
Senna notabilis	<i>Senna notabilis</i>
Senna sp. Meekatharra (E. Bailey 1-26)	<i>Senna</i> sp. Meekatharra (E. Bailey 1-26)
Senna stricta	<i>Senna stricta</i>
Sida ? Sp. spiciform panicles (E. Leyland s.n. 14/8/90)	<i>Sida</i> ? Sp. spiciform panicles (E. Leyland s.n. 14/8/90)
Sida ectogama	<i>Sida ectogama</i>
Sida fibulifera	<i>Sida fibulifera</i>
Sida sp.	Removed
Sida sp. Supplejack Station (T.S. Henshall 2345)	<i>Sida</i> sp. Supplejack Station (T.S. Henshall 2345)
Solanum cleistogamum	<i>Solanum cleistogamum</i>
Solanum lasiophyllum	<i>Solanum lasiophyllum</i>
Sporobolus australasicus	<i>Sporobolus australasicus</i>
Stemodia viscosa	<i>Stemodia viscosa</i>
Stenopetalum ? Decipiens	<i>Stenopetalum</i> ? <i>decipiens</i>
Streptoglossa liatroides	<i>Streptoglossa liatroides</i>
Tecticornia sp.	Removed
Tephrosia ? Sp. Newman (A.A. Mitchell PRP 29)	<i>Tephrosia</i> ? Sp. Newman (A.A. Mitchell PRP 29)
Tephrosia rosea var. Fortescue creeks (M.I.H. Brooker 2186)	<i>Tephrosia rosea</i> var. Fortescue creeks (M.I.H. Brooker 2186)
Tephrosia sp. Clay Soils (S. van Leeuwen et.al. PBS0273)	<i>Tephrosia</i> sp. Clay Soils (S. van Leeuwen et.al. PBS0273)
Themeda triandra	<i>Themeda triandra</i>

Confirmed	Reconciled Taxon
Tragus australianus	<i>Tragus australianus</i>
Trianthema sp.	Removed
Tribulus suberosus	<i>Tribulus suberosus</i>
Tribulus terrestris	Removed
Trichodesma zeylanicum	<i>Trichodesma zeylanicum</i>
Trigonella suavissima	<i>Trigonella suavissima</i>
Triodia ? Longiceps	<i>Triodia ? longiceps</i>
Triodia ? Vanleeuwenii	<i>Triodia ? vanleeuwenii</i>
Triodia angusta	<i>Triodia angusta</i>
Triodia brizoides	<i>Triodia brizoides</i>
Triodia pungens	<i>Triodia pungens</i>
Triodia sp.	Removed
Triodia wiseana	<i>Triodia wiseana</i>
Vachellia farnesiana	Removed
Vigna lanceolata	<i>Vigna lanceolata</i>

## Appendix F: Database Search Results

Parks and Wildlife Service (DBCA, 2018c)  
EPBC Act Protected Matters Search (DoEE, 2018)  
NatureMap (DBCA, 2018a)  
Atlas of Living Australia (ALA, 2018a)  
Western Australian Organism List (DPIRD, 2018)

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Acanthaceae	<i>Dipteracanthus australasicus</i>			.						
Aizoaceae	<i>Trianthera glossostigmum</i>			.						
Aizoaceae	<i>Trianthera pilosum</i>			.						
Aizoaceae	<i>Trianthera triquetrum</i>			.						
Alismataceae	<i>Sagittaria platyphylla</i>					.				Y
Amaranthaceae	<i>Alternanthera angustifolia</i>			.						
Amaranthaceae	<i>Alternanthera denticulata</i>			.						
Amaranthaceae	<i>Amaranthus centralis</i>	.							3	
Amaranthaceae	<i>Amaranthus cuspidifolius</i>			.						
Amaranthaceae	<i>Gomphrena canescens</i>			.						
Amaranthaceae	<i>Gomphrena cunninghamii</i>			.	.					
Amaranthaceae	<i>Gomphrena kanisii</i>			.	.					
Amaranthaceae	<i>Gomphrena lanata</i>			.						
Amaranthaceae	<i>Gomphrena sordida</i>			.						
Amaranthaceae	<i>Ptilotus aervoides</i>			.						
Amaranthaceae	<i>Ptilotus aphyllus</i>			.	.					
Amaranthaceae	<i>Ptilotus astrolasius</i>			.						
Amaranthaceae	<i>Ptilotus auriculifolius</i>			.						
Amaranthaceae	<i>Ptilotus axillaris</i>			.						
Amaranthaceae	<i>Ptilotus calostachyus</i>			.						
Amaranthaceae	<i>Ptilotus carinatus</i>			.						
Amaranthaceae	<i>Ptilotus clementii</i>			.						
Amaranthaceae	<i>Ptilotus drummondii</i>			.						
Amaranthaceae	<i>Ptilotus gaudichaudii</i>			.						
Amaranthaceae	<i>Ptilotus gomphrenoides</i>			.						

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Amaranthaceae	<i>Ptilotus helipteroides</i>			.						
Amaranthaceae	<i>Ptilotus incanus</i>			.						
Amaranthaceae	<i>Ptilotus nobilis</i>			.						
Amaranthaceae	<i>Ptilotus obovatus</i>			.						
Amaranthaceae	<i>Ptilotus polystachyus</i>			.						
Amaranthaceae	<i>Ptilotus roei</i>			.						
Amaranthaceae	<i>Ptilotus rotundifolius</i>			.						
Amaranthaceae	<i>Ptilotus schwartzii</i>			.						
Amaranthaceae	<i>Ptilotus subspinescens</i>	.							3	
Amaranthaceae	<i>Ptilotus tetrandrus</i>	.							1	
Amaranthaceae	<i>Ptilotus wilsonii</i>	.							1	
Apocynaceae	<i>Calotropis procera</i>					.				Y
Apocynaceae	<i>Cryptostegia madagascariensis</i>					.				Y
Apocynaceae	<i>Cynanchum floribundum</i>			.	.					
Apocynaceae	<i>Gymnanthera cunninghamii</i>	.		.					3	
Araceae	<i>Pistia stratiotes</i>					.				Y
Araceae	<i>Zantedeschia aethiopica</i>					.				Y
Araliaceae	<i>Hydrocotyle ranunculoides</i>					.				Y
Araliaceae	<i>Trachymene oleracea</i>			.						
Asparagaceae	<i>Asparagus asparagoides</i>					.				Y
Asteraceae	<i>Bidens bipinnata</i>					.				Y
Asteraceae	<i>Blumea tenella</i>			.						
Asteraceae	<i>Calocephalus beardii</i>			.						
Asteraceae	<i>Calocephalus pilbarensis</i>			.	.					
Asteraceae	<i>Calocephalus</i> sp. Wittenoom (A.S.George 1082)				.					

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Asteraceae	<i>Calotis latiuscula</i>	•		•					3	
Asteraceae	<i>Calotis multicaulis</i>			•						
Asteraceae	<i>Centipeda minima</i> subsp. <i>macrocephala</i>			•						
Asteraceae	<i>Centipeda thespidioides</i>			•	•					
Asteraceae	<i>Chondrilla juncea</i>					•				Y
Asteraceae	<i>Chrysocephalum apiculatum</i> subsp. <i>pilbarens</i>			•						
Asteraceae	<i>Chrysocephalum gilesii</i>			•						
Asteraceae	<i>Chrysocephalum pterochaetum</i>			•						
Asteraceae	<i>Flaveria trinervia</i>			•						Y
Asteraceae	<i>Gnephosis arachnoidea</i>			•	•					
Asteraceae	<i>Iotasperma sessilifolium</i>	•		•					3	
Asteraceae	<i>Minuria integerrima</i>			•	•					
Asteraceae	<i>Minuria</i> sp. Little Sandy Desert (S. van Leeuwen 4919)	•							1	
Asteraceae	<i>Olearia stuartii</i>			•						
Asteraceae	<i>Onopordum acaulon</i>					•				Y
Asteraceae	<i>Peripleura arida</i>			•						
Asteraceae	<i>Pluchea dentex</i>			•						
Asteraceae	<i>Pluchea dunlopii</i>			•	•					
Asteraceae	<i>Pluchea ferdinandi-muelleri</i>			•	•					
Asteraceae	<i>Pluchea rubelliflora</i>			•	•					
Asteraceae	<i>Podolepis capillaris</i>			•						
Asteraceae	<i>Podolepis eremaea</i>			•						
Asteraceae	<i>Pseudognaphalium luteoalbum</i>			•						
Asteraceae	<i>Pterocaulon sphacelatum</i>			•						
Asteraceae	<i>Pterocaulon sphaeranthoides</i>			•						

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Asteraceae	<i>Rhodanthe charsleyae</i>			.						
Asteraceae	<i>Rhodanthe floribunda</i>			.	.					
Asteraceae	<i>Roebuckiella similis</i>			.						
Asteraceae	<i>Rutidosis helichrysoides</i>			.						
Asteraceae	<i>Rutidosis helichrysoides</i> subsp. <i>helichrysoides</i>			.						
Asteraceae	<i>Schoenia cassiniana</i>			.						
Asteraceae	<i>Silybum marianum</i>					.				Y
Asteraceae	<i>Streptoglossa decurrens</i>			.	.					
Asteraceae	<i>Streptoglossa macrocephala</i>			.						
Asteraceae	<i>Vittadinia arida</i>				.					
Asteraceae	<i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwen 4684)	.		.					1	
Asteraceae	<i>Xanthium spinosum</i>					.				Y
Asteraceae	<i>Xanthium strumarium</i>					.				Y
Asteraceae	<i>Xerochrysum boreale</i>	.							3	
Bixaceae	<i>Cochlospermum macnamarae</i>	.							1	
Boraginaceae	<i>Echium plantagineum</i>					.				Y
Boraginaceae	<i>Halgania erecta</i>			.						
Boraginaceae	<i>Halgania solanacea</i> var. Mt Doreen (G.M. Chippendale 4206)			.						
Boraginaceae	<i>Heliotropium cunninghamii</i>			.	.					
Boraginaceae	<i>Heliotropium heteranthum</i>			.						
Boraginaceae	<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>			.						
Brassicaceae	<i>Lepidium catapycnon</i>	.		.					4	
Brassicaceae	<i>Lepidium echinatum</i>			.						
Brassicaceae	<i>Lepidium muelleri-ferdinandii</i>			.						
Brassicaceae	<i>Lepidium oxytrichum</i>			.	.					

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Brassicaceae	<i>Lepidium pedicellosum</i>			.						
Brassicaceae	<i>Lepidium phlebopetalum</i>			.						
Brassicaceae	<i>Lepidium pholidogynum</i>			.						
Brassicaceae	<i>Stenopetalum anfractum</i>			.						
Brassicaceae	<i>Stenopetalum decipiens</i>			.	.					
Brassicaceae	<i>Stenopetalum velutinum</i>			.						
Cactaceae	<i>Austrocyllindropuntia cylindrica</i>					.				Y
Cactaceae	<i>Austrocyllindropuntia subulata</i>					.				Y
Cactaceae	<i>Cylindropuntia fulgida</i>					.				Y
Cactaceae	<i>Cylindropuntia imbricata</i>					.				Y
Cactaceae	<i>Cylindropuntia kleiniae</i>					.				Y
Cactaceae	<i>Cylindropuntia pallida</i>					.				Y
Cactaceae	<i>Cylindropuntia tunicata</i>					.				Y
Cactaceae	<i>Opuntia elata</i>					.				Y
Cactaceae	<i>Opuntia elatior</i>					.				Y
Cactaceae	<i>Opuntia engelmannii</i>					.				Y
Cactaceae	<i>Opuntia ficus-indica</i>					.				Y
Cactaceae	<i>Opuntia microdasys</i>					.				Y
Cactaceae	<i>Opuntia monacantha</i>					.				Y
Cactaceae	<i>Opuntia polyacantha</i>					.				Y
Cactaceae	<i>Opuntia puberula</i>					.				Y
Cactaceae	<i>Opuntia stricta</i>					.				Y
Cactaceae	<i>Opuntia tomentosa</i>					.				Y
Campanulaceae	<i>Wahlenbergia tumidifructa</i>			.	.					
Capparaceae	<i>Capparis spinosa</i>			.						



Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Caryophyllaceae	<i>Polycarpaea corymbosa</i>			.	.					
Caryophyllaceae	<i>Polycarpaea corymbosa</i> var. <i>corymbosa</i>			.						
Caryophyllaceae	<i>Polycarpaea holtzei</i>			.						
Caryophyllaceae	<i>Polycarpaea involucrata</i>			.						
Caryophyllaceae	<i>Polycarpaea longiflora</i>			.	.					
Celastraceae	<i>Macgregoria racemigera</i>			.						
Celastraceae	<i>Stackhousia clementii</i>	.							3	
Chenopodiaceae	<i>Atriplex semilunaris</i>			.						
Chenopodiaceae	<i>Atriplex spinulosa</i>	.							1	
Chenopodiaceae	<i>Dysphania kalpari</i>			.						
Chenopodiaceae	<i>Dysphania melanocarpa</i>			.						
Chenopodiaceae	<i>Dysphania rhadinostachya</i> subsp. <i>inflata</i>			.						
Chenopodiaceae	<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>			.						
Chenopodiaceae	<i>Maireana amoena</i>			.						
Chenopodiaceae	<i>Maireana carnosa</i>			.						
Chenopodiaceae	<i>Maireana georgei</i>			.						
Chenopodiaceae	<i>Maireana melanocoma</i>			.						
Chenopodiaceae	<i>Maireana planifolia</i>			.						
Chenopodiaceae	<i>Maireana prosthocochaeta</i>	.		.					3	
Chenopodiaceae	<i>Maireana pyramidata</i>			.	.					
Chenopodiaceae	<i>Maireana thesioides</i>			.	.					
Chenopodiaceae	<i>Maireana tomentosa</i>			.						
Chenopodiaceae	<i>Maireana triptera</i>			.						
Chenopodiaceae	<i>Maireana villosa</i>			.						
Chenopodiaceae	<i>Rhagodia eremaea</i>			.						

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Chenopodiaceae	<i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794)	•		•					3	
Chenopodiaceae	<i>Sclerolaena convexula</i>			•						
Chenopodiaceae	<i>Sclerolaena cornishiana</i>			•						
Chenopodiaceae	<i>Sclerolaena costata</i>			•						
Chenopodiaceae	<i>Sclerolaena densiflora</i>			•						
Chenopodiaceae	<i>Sclerolaena diacantha</i>			•						
Chenopodiaceae	<i>Sclerolaena eriacantha</i>			•						
Chenopodiaceae	<i>Sclerolaena lanicuspis</i>			•	•					
Chenopodiaceae	<i>Sclerolaena minuta</i>			•	•					
Chenopodiaceae	<i>Tecticornia bibenda</i>	•							1	
Chenopodiaceae	<i>Tecticornia medua</i>	•							3	
Chenopodiaceae	<i>Tecticornia</i> sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)	•		•					1	
Chenopodiaceae	<i>Tecticornia globulifera</i>	•							1	
Chenopodiaceae	<i>Tecticornia willisii</i>	•							1	
Cleomaceae	<i>Cleome viscosa</i>			•						
Colchicaceae	<i>Wurmbea deserticola</i>			•						
Convolvulaceae	<i>Bonamia erecta</i>			•						
Convolvulaceae	<i>Bonamia rosea</i>			•						
Convolvulaceae	<i>Duperreya commixta</i>			•						
Convolvulaceae	<i>Evolvulus alsinoides</i>				•					
Convolvulaceae	<i>Evolvulus alsinoides</i> var. <i>decumbens</i>			•						
Convolvulaceae	<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>			•						
Convolvulaceae	<i>Ipomoea muelleri</i>			•						
Convolvulaceae	<i>Ipomoea plebeia</i>			•						

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Convolvulaceae	<i>Ipomoea racemigera</i>	.		.					2	
Cucurbitaceae	<i>Citrullus lanatus</i>			.						Y
Cyperaceae	<i>Bulbostylis barbata</i>			.	.					
Cyperaceae	<i>Bulbostylis turbinata</i>			.						
Cyperaceae	<i>Cyperus betchei</i> subsp. <i>commiscens</i>			.						
Cyperaceae	<i>Cyperus bifax</i>			.	.					
Cyperaceae	<i>Cyperus concinnus</i>			.						
Cyperaceae	<i>Cyperus cunninghamii</i>			.						
Cyperaceae	<i>Cyperus difformis</i>			.						
Cyperaceae	<i>Cyperus iria</i>			.	.					
Cyperaceae	<i>Cyperus ixiocarpus</i>			.						
Cyperaceae	<i>Cyperus pulchellus</i>			.						
Cyperaceae	<i>Cyperus squarrosus</i>			.	.					
Cyperaceae	<i>Cyperus vaginatus</i>			.	.					
Cyperaceae	<i>Eleocharis pallens</i>			.	.					
Cyperaceae	<i>Fimbristylis dichotoma</i>			.						
Cyperaceae	<i>Fimbristylis elegans</i>			.						
Cyperaceae	<i>Fimbristylis eremophila</i>			.						
Cyperaceae	<i>Fimbristylis microcarya</i>			.	.					
Cyperaceae	<i>Fimbristylis sieberiana</i>	.							3	
Cyperaceae	<i>Fimbristylis simulans</i>			.						
Cyperaceae	<i>Lipocarpha microcephala</i>			.	.					
Cyperaceae	<i>Schoenoplectiella dissachantha</i>			.						
Cyperaceae	<i>Schoenoplectiella laevis</i>			.						
Ditrichaceae	<i>Eccremidium arcuatum</i>			.						

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Droseraceae	<i>Drosera finlaysoniana</i>			.						
Elatinaceae	<i>Bergia pedicellaris</i>			.						
Euphorbiaceae	<i>Euphorbia boophthona</i>			.						
Euphorbiaceae	<i>Euphorbia coghlanii</i>			.						
Euphorbiaceae	<i>Euphorbia inappendiculata</i>				.					
Euphorbiaceae	<i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i>	.		.					2	
Euphorbiaceae	<i>Euphorbia porcata</i>			.	.					
Euphorbiaceae	<i>Jatropha gossypifolia</i>					.				Y
Fabaceae	<i>Acacia adoxa</i> var. <i>adoxo</i>			.						
Fabaceae	<i>Acacia adsurgens</i>			.						
Fabaceae	<i>Acacia ancistrocarpa</i>			.						
Fabaceae	<i>Acacia aphanoclada</i>	.							1	
Fabaceae	<i>Acacia aptaneura</i>			.	.					
Fabaceae	<i>Acacia arida</i>			.						
Fabaceae	<i>Acacia ayersiana</i>			.						
Fabaceae	<i>Acacia balsamea</i>			.						
Fabaceae	<i>Acacia bivenosa</i>			.	.					
Fabaceae	<i>Acacia bivenosa</i> x <i>sclerosperma</i> subsp. <i>sclerosperma</i>			.						
Fabaceae	<i>Acacia bromilowiana</i>	.		.					4	
Fabaceae	<i>Acacia catenulata</i> subsp. <i>occidentalis</i>			.						
Fabaceae	<i>Acacia citrinoviridis</i>			.						
Fabaceae	<i>Acacia clelandii</i>			.						
Fabaceae	<i>Acacia coriacea</i> subsp. <i>pendens</i>			.						
Fabaceae	<i>Acacia cuspidifolia</i>			.						
Fabaceae	<i>Acacia cyperophylla</i> var. <i>omearana</i>	.							1	

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Fabaceae	<i>Acacia dictyophleba</i>			.						
Fabaceae	<i>Acacia effusa</i>	.							3	
Fabaceae	<i>Acacia fecunda</i>	.							1	
Fabaceae	<i>Acacia hilliana</i>			.						
Fabaceae	<i>Acacia inaequilatera</i>			.						
Fabaceae	<i>Acacia kempeana</i>			.						
Fabaceae	<i>Acacia ligulata</i>			.						
Fabaceae	<i>Acacia macraneura</i>			.						
Fabaceae	<i>Acacia maitlandii</i>			.						
Fabaceae	<i>Acacia marramamba</i>			.						
Fabaceae	<i>Acacia melleodora</i>			.						
Fabaceae	<i>Acacia monticola</i>			.						
Fabaceae	<i>Acacia mulganeura</i>			.	.					
Fabaceae	<i>Acacia orthocarpa</i>			.						
Fabaceae	<i>Acacia pachyacra</i>			.						
Fabaceae	<i>Acacia paraneura</i>			.						
Fabaceae	<i>Acacia pruinocarpa</i>			.						
Fabaceae	<i>Acacia pteraneura</i>			.	.					
Fabaceae	<i>Acacia pyrifolia</i>				.					
Fabaceae	<i>Acacia pyrifolia</i> var. <i>morrisonii</i>			.						
Fabaceae	<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>			.						
Fabaceae	<i>Acacia ramulosa</i> var. <i>linophylla</i>			.						
Fabaceae	<i>Acacia rhodophloia</i>			.	.					
Fabaceae	<i>Acacia sclerosperma</i>			.	.					
Fabaceae	<i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i>			.						

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Fabaceae	<i>Acacia sericophylla</i>			.						
Fabaceae	<i>Acacia sibirica</i>			.						
Fabaceae	<i>Acacia</i> sp. East Fortescue (J. Bull & D. Roberts ONS A 27.01)			.					1	
Fabaceae	<i>Acacia</i> sp. Jimblebar (S. van Leeuwen 1342)			.						
Fabaceae	<i>Acacia</i> sp. Nullagine (B.R. Maslin 4955)	.							1	
Fabaceae	<i>Acacia subcontorta</i>			.						
Fabaceae	<i>Acacia subtiliformis</i>	.		.					3	
Fabaceae	<i>Acacia synchronicia</i>			.	.					
Fabaceae	<i>Acacia tenuissima</i>			.						
Fabaceae	<i>Acacia trudgeniana</i>			.						
Fabaceae	<i>Acacia tumida</i> var. <i>pilbarensis</i>			.						
Fabaceae	<i>Acacia victoriae</i>			.						
Fabaceae	<i>Acacia wanyu</i>			.						
Fabaceae	<i>Aenictophyton reconditum</i> subsp. <i>macrophyllum</i>			.						
Fabaceae	<i>Alhagi maurorum</i>					.				Y
Fabaceae	<i>Cajanus marmoratus</i>			.						
Fabaceae	<i>Crotalaria smithiana</i>	.		.					3	
Fabaceae	<i>Cullen cinereum</i>			.						
Fabaceae	<i>Cullen lachnostachys</i>			.						
Fabaceae	<i>Daviesia arthropoda</i>	.							3	
Fabaceae	<i>Glycine canescens</i>			.						
Fabaceae	<i>Gompholobium oreophilum</i>			.						
Fabaceae	<i>Indigofera ammobia</i>	.							3	
Fabaceae	<i>Indigofera colutea</i>			.						
Fabaceae	<i>Indigofera georgei</i>			.						

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Fabaceae	<i>Indigofera gilesii</i>	•		•					3	
Fabaceae	<i>Indigofera ixocarpa</i>	•							2	
Fabaceae	<i>Indigofera monophylla</i>			•						
Fabaceae	<i>Isotropis atropurpurea</i>			•						
Fabaceae	<i>Isotropis parviflora</i>	•		•					2	
Fabaceae	<i>Jacksonia aculeata</i>			•						
Fabaceae	<i>Kennedia prorepens</i>			•						
Fabaceae	<i>Mirbelia ramulosa</i>			•						
Fabaceae	<i>Mirbelia viminalis</i>			•						
Fabaceae	<i>Muelleranthus trifoliolatus</i>			•						
Fabaceae	<i>Parkinsonia aculeata</i>		•			•				Y
Fabaceae	<i>Petalostylis cassioides</i>			•						
Fabaceae	<i>Petalostylis labicheoides</i>			•						
Fabaceae	<i>Prosopis glandulosa x velutina</i>					•				Y
Fabaceae	<i>Senna alata</i>					•				Y
Fabaceae	<i>Senna artemisioides</i> subsp. <i>helmsii</i>			•						
Fabaceae	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>			•						
Fabaceae	<i>Senna glutinosa</i>				•					
Fabaceae	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>			•						
Fabaceae	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>			•						
Fabaceae	<i>Senna glutinosa</i> subsp. <i>x luerssenii</i>			•						
Fabaceae	<i>Senna hamersleyensis</i>			•						
Fabaceae	<i>Senna notabilis</i>			•						
Fabaceae	<i>Senna obtusifolia</i>					•				Y
Fabaceae	<i>Senna</i> sp. Billabong (J.D. Alonzo 721)			•						

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Fabaceae	<i>Senna symonii</i>			.						
Fabaceae	<i>Senna venusta</i>			.						
Fabaceae	<i>Swainsona decurrens</i>			.	.					
Fabaceae	<i>Swainsona oroboides</i>			.						
Fabaceae	<i>Tephrosia oxalidea</i>			.						
Fabaceae	<i>Tephrosia rosea</i> var. Fortescue creeks (M.I.H. Brooker 2186)			.						
Fabaceae	<i>Tephrosia</i> sp. clay soils (S. van Leeuwen et al. PBS 0273)			.						
Fabaceae	<i>Tephrosia</i> sp. deserts (J.R. Maconochie 1403)			.						
Fabaceae	<i>Tephrosia</i> sp. Newman (A.A. Mitchell PRP 29)			.	.					
Fabaceae	<i>Tephrosia</i> sp. Northern (K.F. Kenneally 11950)			.						
Fabaceae	<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)			.	.					
Fabaceae	<i>Tephrosia</i> sp. Willowra (G.M.Chippendale 4809)			.	.					
Fabaceae	<i>Ulex europaeus</i>					.				Y
Fabaceae	<i>Vigna lanceolata</i>				.					
Fabaceae	<i>Vigna lanceolata</i> var. <i>lanceolata</i>			.						
Fabaceae	<i>Vigna</i> sp. Hamersley Clay (A.A. Mitchell PRP 113)			.						
Frankeniaceae	<i>Frankenia glomerata</i>	.							4	
Frankeniaceae	<i>Frankenia setosa</i>			.	.					
Goodeniaceae	<i>Brunonia australis</i>			.						
Goodeniaceae	<i>Dampiera candicans</i>			.						
Goodeniaceae	<i>Dampiera cinerea</i>			.						
Goodeniaceae	<i>Goodenia armitiana</i>			.						
Goodeniaceae	<i>Goodenia berringbinensis</i>	.		.					4	
Goodeniaceae	<i>Goodenia lamprosperma</i>			.						
Goodeniaceae	<i>Goodenia lyrata</i>	.							3	



Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Goodeniaceae	<i>Goodenia microptera</i>			.						
Goodeniaceae	<i>Goodenia modesta</i>	.							3	
Goodeniaceae	<i>Goodenia muelleriana</i>			.	.					
Goodeniaceae	<i>Goodenia nuda</i>	.		.					4	
Goodeniaceae	<i>Goodenia pedicellata</i>	.							1	
Goodeniaceae	<i>Goodenia prostrata</i>			.						
Goodeniaceae	<i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727)	.		.					3	
Goodeniaceae	<i>Goodenia</i> sp. Sandy Creek (R.D. Royce 1653)			.	.					
Goodeniaceae	<i>Goodenia tenuiloba</i>			.						
Goodeniaceae	<i>Goodenia triodiophila</i>			.						
Goodeniaceae	<i>Goodenia vilmoriniae</i>			.						
Goodeniaceae	<i>Scaevola acacioides</i>			.						
Goodeniaceae	<i>Scaevola browniana</i>			.						
Goodeniaceae	<i>Scaevola browniana</i> subsp. <i>browniana</i>			.						
Goodeniaceae	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>			.						
Goodeniaceae	<i>Scaevola spinescens</i>			.	.					
Goodeniaceae	<i>Velleia connata</i>			.						
Goodeniaceae	<i>Velleia glabrata</i>			.						
Gyrostemonaceae	<i>Codonocarpus cotinifolius</i>			.						
Haloragaceae	<i>Gonocarpus ephemerus</i>			.						
Haloragaceae	<i>Haloragis gossei</i>			.						
Iridaceae	<i>Moraea flaccida</i>					.				Y
Iridaceae	<i>Moraea miniata</i>					.				Y
Lamiaceae	<i>Dicrastylis cordifolia</i>			.						
Lamiaceae	<i>Dicrastylis kumarinensis</i>			.						

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Lamiaceae	<i>Dicrastylis mitchellii</i>	•		•					1	
Lamiaceae	<i>Newcastelia cephalantha</i>			•						
Lamiaceae	<i>Newcastelia hexarrhena</i>			•						
Lamiaceae	<i>Teucrium pilbaranum</i>	•							2	
Lauraceae	<i>Cassytha capillaris</i>			•						
Loganiaceae	<i>Mitrasacme connata</i>			•						
Loranthaceae	<i>Amyema fitzgeraldii</i>			•						
Loranthaceae	<i>Amyema gibberula</i> var. <i>gibberula</i>			•						
Loranthaceae	<i>Amyema preissii</i>			•						
Lythraceae	<i>Ammannia multiflora</i>			•						
Lythraceae	<i>Rotala diandra</i>			•						
Malvaceae	<i>Abutilon amplum</i>			•						
Malvaceae	<i>Abutilon fraseri</i>			•						
Malvaceae	<i>Abutilon lepidum</i>			•						
Malvaceae	<i>Abutilon macrum</i>			•						
Malvaceae	<i>Abutilon malvifolium</i>			•	•					
Malvaceae	<i>Abutilon oxycarpum</i>			•	•					
Malvaceae	<i>Abutilon oxycarpum</i> subsp. <i>Prostrate</i> (A.A. Mitchell PRP 1266)			•						
Malvaceae	<i>Abutilon</i> sp. <i>Dioicum</i> (A.A. Mitchell PRP 1618)			•						
Malvaceae	<i>Abutilon</i> sp. <i>Pilbara</i> (W.R. Barker 2025)			•						
Malvaceae	<i>Androcalva luteiflora</i>			•						
Malvaceae	<i>Corchorus crozophorifolius</i>			•						
Malvaceae	<i>Corchorus lasiocarpus</i>			•	•					
Malvaceae	<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>			•						
Malvaceae	<i>Corchorus lasiocarpus</i> subsp. <i>parvus</i>			•						

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Malvaceae	<i>Corchorus sidoides</i>			.	.					
Malvaceae	<i>Corchorus sidoides</i> subsp. <i>sidoides</i>			.						
Malvaceae	<i>Corchorus</i> sp. Hamersley Range hilltops (S. van Leeuwen 3826)			.						
Malvaceae	<i>Corchorus tridens</i>			.						
Malvaceae	<i>Gossypium hirsutum</i>			.						
Malvaceae	<i>Hibiscus arenicola</i>			.						
Malvaceae	<i>Hibiscus austrinus</i> var. <i>austrinus</i>			.						
Malvaceae	<i>Hibiscus burtonii</i>			.	.					
Malvaceae	<i>Hibiscus campanulatus</i>			.					1	
Malvaceae	<i>Hibiscus haynaldii</i>			.						
Malvaceae	<i>Hibiscus</i> sp. Carnarvon (S. van Leeuwen 5110)	.							1	
Malvaceae	<i>Hibiscus sturtii</i>			.	.					
Malvaceae	<i>Hibiscus sturtii</i> var. <i>truncatus</i>			.						
Malvaceae	<i>Hibiscus verdcourtii</i>			.						
Malvaceae	<i>Malvastrum americanum</i>			.	.					Y
Malvaceae	<i>Seringia elliptica</i>			.						
Malvaceae	<i>Seringia nephrosperma</i>			.						
Malvaceae	<i>Sida arsinata</i>			.						
Malvaceae	<i>Sida brownii</i>			.	.					
Malvaceae	<i>Sida calyxhymania</i>			.						
Malvaceae	<i>Sida cardiophylla</i>			.						
Malvaceae	<i>Sida echinocarpa</i>			.						
Malvaceae	<i>Sida ectogama</i>			.	.					
Malvaceae	<i>Sida fibulifera</i>			.						
Malvaceae	<i>Sida kingii</i>			.						

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Malvaceae	<i>Sida</i> sp. Barlee Range (S. van Leeuwen 1642)	•							3	
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. Pilbara (A.A. Mitchell PRP 1543)			•						
Malvaceae	<i>Sida</i> sp. Shovelanna Hill (S. van Leeuwen 3842)			•						
Malvaceae	<i>Sida</i> sp. tiny glabrous fruit (A.A. Mitchell PRP1152)			•						
Malvaceae	<i>Sida</i> sp. verrucose glands (F.H. Mollemans 2423)			•						
Malvaceae	<i>Triumfetta leptacantha</i>			•						
Malvaceae	<i>Triumfetta maconochieana</i>			•						
Malvaceae	<i>Waltheria virgata</i>			•						
Molluginaceae	<i>Hypertelis cerviana</i>			•						
Molluginaceae	<i>Trigastrotheca molluginea</i>			•						
Montiaceae	<i>Calandrinia balonensis</i>			•						
Montiaceae	<i>Calandrinia stagnensis</i>			•						
Montiaceae	<i>Calandrinia tepperiana</i>			•						
Myrtaceae	<i>Calytrix carinata</i>			•						
Myrtaceae	<i>Corymbia aspera</i>			•						
Myrtaceae	<i>Corymbia candida</i>			•						
Myrtaceae	<i>Corymbia candida</i> subsp. <i>dipsodes</i>			•						
Myrtaceae	<i>Corymbia deserticola</i> subsp. <i>deserticola</i>			•						
Myrtaceae	<i>Corymbia ferritcola</i>			•						
Myrtaceae	<i>Corymbia hamersleyana</i>			•						
Myrtaceae	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusata</i>			•						
Myrtaceae	<i>Eucalyptus kingsmillii</i>			•						
Myrtaceae	<i>Eucalyptus leucophloia</i>			•						

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Myrtaceae	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>			.						
Myrtaceae	<i>Eucalyptus repullulans</i>			.						
Myrtaceae	<i>Eucalyptus rowleyi</i>	.		.					3	
Myrtaceae	<i>Eucalyptus semota</i>	.							1	
Myrtaceae	<i>Eucalyptus socialis</i>			.	.					
Myrtaceae	<i>Eucalyptus trivalva</i>			.						
Myrtaceae	<i>Eucalyptus xerothermica</i>			.						
Myrtaceae	<i>Lamarchea sulcata</i>			.						
Myrtaceae	<i>Melaleuca glomerata</i>			.						
Nyctaginaceae	<i>Boerhavia coccinea</i>			.						
Nyctaginaceae	<i>Boerhavia repleta</i>			.						
Orobanchaceae	<i>Buchnera linearis</i>			.						
Orobanchaceae	<i>Striga squamigera</i>			.						
Phrymaceae	<i>Peplidium maritimum</i>			.						
Phyllanthaceae	<i>Phyllanthus erwinii</i>			.	.					
Phyllanthaceae	<i>Phyllanthus maderaspatensis</i>			.						
Phyllanthaceae	<i>Phyllanthus virgatus</i>			.						
Phyllanthaceae	<i>Synostemon rhytidospermus</i>			.						
Plantaginaceae	<i>Stemodia viscosa</i>			.	.					
Poaceae	<i>Acrachne racemosa</i>			.						
Poaceae	<i>Alloteropsis cimicina</i>			.	.					
Poaceae	<i>Amphipogon caricinus</i>			.						
Poaceae	<i>Amphipogon sericeus</i>			.						
Poaceae	<i>Aristida contorta</i>			.	.					
Poaceae	<i>Aristida holathera</i>			.						

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Poaceae	<i>Aristida inaequiglumis</i>			.	.					
Poaceae	<i>Aristida jerichoensis</i>				.					
Poaceae	<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	.		.					3	
Poaceae	<i>Aristida lazaridis</i>	.		.					2	
Poaceae	<i>Cenchrus setiger</i>			.						Y
Poaceae	<i>Chloris pectinata</i>			.						
Poaceae	<i>Chloris pumilio</i>			.						
Poaceae	<i>Chrysopogon fallax</i>			.						
Poaceae	<i>Cymbopogon ambiguus</i>			.	.					
Poaceae	<i>Cymbopogon obtectus</i>			.	.					
Poaceae	<i>Cynodon dactylon</i>			.						Y
Poaceae	<i>Cynodon prostratus</i>			.						
Poaceae	<i>Dichanthium fecundum</i>			.						
Poaceae	<i>Dichanthium sericeum</i> subsp. <i>sericeum</i>			.						
Poaceae	<i>Digitaria brownii</i>			.						
Poaceae	<i>Digitaria ctenantha</i>			.						
Poaceae	<i>Digitaria longiflora</i>			.	.					
Poaceae	<i>Diplachne fusca</i> subsp. <i>muelleri</i>			.						
Poaceae	<i>Echinochloa colona</i>			.						Y
Poaceae	<i>Elytrophorus spicatus</i>			.						
Poaceae	<i>Enneapogon caeruleascens</i>			.						
Poaceae	<i>Enneapogon robustissimus</i>			.						
Poaceae	<i>Eragrostis cumingii</i>			.						
Poaceae	<i>Eragrostis dielsii</i>			.						
Poaceae	<i>Eragrostis elongata</i>			.	.					

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Poaceae	<i>Eragrostis eriopoda</i>			.						
Poaceae	<i>Eragrostis leptocarpa</i>			.						
Poaceae	<i>Eragrostis olida</i>			.	.					
Poaceae	<i>Eragrostis pergracilis</i>			.						
Poaceae	<i>Eragrostis speciosa</i>			.						
Poaceae	<i>Eragrostis tenellula</i>			.						
Poaceae	<i>Eragrostis xerophila</i>			.						
Poaceae	<i>Eriachne aristidea</i>			.						
Poaceae	<i>Eriachne lanata</i>			.	.					
Poaceae	<i>Eriachne mucronata</i>			.						
Poaceae	<i>Eriachne obtusa</i>			.						
Poaceae	<i>Eriachne pulchella</i> subsp. <i>dominii</i>			.						
Poaceae	<i>Eriachne tenuiculmis</i>			.						
Poaceae	<i>Eriochloa pseudoacrotricha</i>			.						
Poaceae	<i>Eulalia aurea</i>			.						
Poaceae	<i>Iseilema eremaeum</i>			.						
Poaceae	<i>Iseilema membranaceum</i>			.						
Poaceae	<i>Leptochloa digitata</i>			.						
Poaceae	<i>Monachather paradoxus</i>			.	.					
Poaceae	<i>Panicum decompositum</i>			.						
Poaceae	<i>Panicum effusum</i>			.						
Poaceae	<i>Paraneurachne muelleri</i>			.						
Poaceae	<i>Paspalidium clementii</i>			.						
Poaceae	<i>Paspalidium constrictum</i>			.						
Poaceae	<i>Paspalidium rarum</i>			.						

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Poaceae	<i>Perotis rara</i>			.						
Poaceae	<i>Schizachyrium fragile</i>			.						
Poaceae	<i>Setaria surgens</i>			.						
Poaceae	<i>Sporobolus actinocladius</i>			.						
Poaceae	<i>Sporobolus australasicus</i>			.						
Poaceae	<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)	.		.					3	
Poaceae	<i>Thyridolepis xerophila</i>			.						
Poaceae	<i>Tragus australianus</i>			.						
Poaceae	<i>Triodia angusta</i>			.						
Poaceae	<i>Triodia basedowii</i>			.	.					
Poaceae	<i>Triodia birriliburu</i>	.							3	
Poaceae	<i>Triodia longiceps</i>			.						
Poaceae	<i>Triodia melvillei</i>			.						
Poaceae	<i>Triodia pungens</i>			.						
Poaceae	<i>Triodia schinzii</i>			.	.					
Poaceae	<i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739)	.		.					3	
Poaceae	<i>Triodia vanleeuwenii</i>			.						
Poaceae	<i>Tripogonella loliiformis</i>			.						
Poaceae	<i>Xerochloa imberbis</i>			.						
Poaceae	<i>Yakirra australiensis</i> var. <i>australiensis</i>			.						
Polygalaceae	<i>Polygala glaucifolia</i>			.						
Polygalaceae	<i>Comesperma sabulosum</i>	.		.					3	
Polygalaceae	<i>Comesperma viscidulum</i>	.							4	
Polygonaceae	<i>Rumex vesicarius</i>			.						Y
Portulacaceae	<i>Portulaca cyclophylla</i>			.						



Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Portulacaceae	<i>Portulaca filifolia</i>			.						
Portulacaceae	<i>Portulaca oleracea</i>			.						
Portulacaceae	<i>Portulaca pilosa</i>			.						Y
Primulaceae	<i>Samolus</i> sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702)	.		.					1	
Proteaceae	<i>Grevillea juncifolia</i>				.					
Proteaceae	<i>Grevillea juncifolia</i> subsp. <i>juncifolia</i>			.						
Proteaceae	<i>Grevillea saxicola</i>	.							3	
Proteaceae	<i>Grevillea striata</i>			.	.					
Proteaceae	<i>Hakea lorea</i> subsp. <i>lorea</i>			.						
Proteaceae	<i>Hakea preissii</i>			.						
Pteridaceae	<i>Cheilanthes austrotenuifolia</i>			.	.					
Pteridaceae	<i>Cheilanthes lasiophylla</i>			.	.					
Rhamnaceae	<i>Cryptandra monticola</i>			.						
Rhamnaceae	<i>Ventilago viminalis</i>			.						
Rhamnaceae	<i>Ziziphus mauritiana</i>					.				Y
Ricciaceae	<i>Riccia crinita</i>			.						
Rosaceae	<i>Rubus ulmifolius</i>					.				Y
Rubiaceae	<i>Oldenlandia galioides</i>			.	.					
Rubiaceae	<i>Psydrax suaveolens</i>			.	.					
Ruppiaceae	<i>Ruppia polycarpa</i>			.						
Santalaceae	<i>Anthobolus leptomerioides</i>			.						
Santalaceae	<i>Santalum lanceolatum</i>			.	.					
Santalaceae	<i>Santalum spicatum</i>			.						
Sapindaceae	<i>Diplopeltis stuartii</i> var. <i>stuartii</i>			.						
Sapindaceae	<i>Dodonaea coriacea</i>			.						

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Scrophulariaceae	<i>Eremophila anomala</i>	•							1	
Scrophulariaceae	<i>Eremophila appressa</i>	•							1	
Scrophulariaceae	<i>Eremophila capricornica</i>	•		•					1	
Scrophulariaceae	<i>Eremophila cuneifolia</i>			•						
Scrophulariaceae	<i>Eremophila fraseri</i> subsp. <i>fraseri</i>			•						
Scrophulariaceae	<i>Eremophila jucunda</i> subsp. <i>jucunda</i>			•						
Scrophulariaceae	<i>Eremophila lachnocalyx</i>			•						
Scrophulariaceae	<i>Eremophila lanceolata</i>			•	•					
Scrophulariaceae	<i>Eremophila maculata</i> subsp. <i>maculata</i>	•		•						
Scrophulariaceae	<i>Eremophila magnifica</i> subsp. <i>magnifica</i>	•		•					4	
Scrophulariaceae	<i>Eremophila magnifica</i> subsp. <i>velutina</i>	•							3	
Scrophulariaceae	<i>Eremophila margarethae</i>			•						
Scrophulariaceae	<i>Eremophila oppositifolia</i>				•					
Scrophulariaceae	<i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>			•						
Scrophulariaceae	<i>Eremophila platycalyx</i> subsp. <i>platycalyx</i>			•						
Scrophulariaceae	<i>Eremophila pusilliflora</i>	•							2	
Scrophulariaceae	<i>Eremophila rhegos</i>	•		•					1	
Scrophulariaceae	<i>Eremophila rigida</i>	•		•					3	
Scrophulariaceae	<i>Eremophila</i> sp. Hamersley Range (K. Walker KW 136)	•		•					3	
Scrophulariaceae	<i>Eremophila</i> sp. West Angelas (S. van Leeuwen 4068)	•		•					1	
Scrophulariaceae	<i>Eremophila youngii</i> subsp. <i>lepidota</i>	•		•					4	
Solanaceae	<i>Nicotiana benthamiana</i>			•						
Solanaceae	<i>Nicotiana occidentalis</i>			•						
Solanaceae	<i>Nicotiana umbratica</i>	•							3	
Solanaceae	<i>Solanum austropiceum</i>			•						

Family	Taxon	DBCA	EPBC Act	NatureMap	ALA	WAOL	Conservation Rating			Introduced
							EPBC Act	WC Act	DBCA	
Solanaceae	<i>Solanum centrale</i>			.						
Solanaceae	<i>Solanum cleistogamum</i>			.	.					
Solanaceae	<i>Solanum elaeagnifolium</i>					.				Y
Solanaceae	<i>Solanum elatius</i>			.						
Solanaceae	<i>Solanum lasiophyllum</i>			.						
Solanaceae	<i>Solanum linnaeanum</i>					.				Y
Solanaceae	<i>Solanum morrisonii</i>			.						
Solanaceae	<i>Solanum piceum</i>			.						
Solanaceae	<i>Solanum</i> sp. Mosquito Creek (A.A. Mitchell et al. AAM 10795)	.							1	
Stylidiaceae	<i>Stylidium weeliwoffi</i>	.							3	
Tamaricaceae	<i>Tamarix aphylla</i>		.			.				Y
Verbenaceae	<i>Lantana camara</i>					.				Y
Violaceae	<i>Hybanthus aurantiacus</i>			.						
Zygophyllaceae	<i>Tribulus astrocarpus</i>			.	.					
Zygophyllaceae	<i>Tribulus eichlerianus</i>			.						
Zygophyllaceae	<i>Tribulus macrocarpus</i>			.						
Zygophyllaceae	<i>Tribulus minutus</i>	.							1	
Zygophyllaceae	<i>Tribulus terrestris</i>			.						Y

## Appendix G: Conservation Significant Flora Likelihood of Occurrence

### Source

A: Threatened and Priority Flora Database (DBCA, 2018c)

B: Western Australian Herbarium Specimen Database (DBCA, 2018c)

C: NatureMap (DBCA, 2018a)

Taxon	EPBC Act	WC Act	DBCAs	Source <sup>1</sup>	Habit and Habitat <sup>2</sup>	Habitat within Study Area	Within Current Known Distribution	Distance to Nearest Record	Recorded within Study Area	Likelihood of Occurrence
<i>Acacia aphanoclada</i>			1	D	Slender, wispy shrub, 1.7-5 m high. Fl. yellow, Aug to Oct. Skeletal stony soils. Rocky hills, ridges & rises	No	No	>160 km N	No	Highly Unlikely
<i>Acacia bromilowiana</i>			4	A, B	Tree or shrub, to 12 m high, bark dark grey, fibrous; phyllodes more or less glaucous & slightly pruinose; inflorescence in spikes. Fl. yellow/pink, Jul to Aug. Red skeletal stony loam, orange-brown pebbly, gravel loam, laterite, banded ironstone, basalt. Rocky hills, breakaways, scree slopes, gorges, creek beds	Potential	Yes	>32 km NW	No	Possible
<i>Acacia cyperophylla</i> var. <i>omearana</i>			1	B, D	Tree, 4-10 m high, 'minni-ritchi' bark. Fl. yellow, Mar to Apr. Stony & gritty alluvium. Along drainage lines	Yes	No	>170 km N	No	Highly Unlikely
<i>Acacia effusa</i>			3	D	Low, dense, spreading, somewhat viscid shrub, 0.3-1 m high, bark 'minni-ritchi'. Fl. yellow, May to Aug. Stony red loam. Scree slopes of low ranges	No	No	>100 km W	No	Highly Unlikely
<i>Acacia fecunda</i>			1	D	Erect, obconic shrub, to 3 m high, bark grey, smooth becoming yellow-brown on upper branches; phyllodes more or less sub-glaucous with a slight sheen; inflorescence of spikes. Fl. yellow, May or Aug. Quartzite gibbers over grey-red skeletal soil. Along shallow creeks and drainage lines, hills, road verges	No	No	>170 km N	No	Highly Unlikely
<i>Acacia</i> sp. East Fortescue (J. Bull & D. Roberts ONS A 27.01)			1	A, C	Erect, dense woody shrub with rounded growth form, to 5 m (7 m) high and 4 m wide. Diagnostic characters include flat phyllodes with anastomosing nerves, cylindrical spikes, separated calyx lobes, gland about 10 mm above the pulvinus, dense red brown glandular trichomes on new growth and edges of phyllodes (small hairlets). Fl. April to August. Low undulating weathered ironstone hills, often on breakaways and rocky drainage lines dissecting hills	No	No	>43km ENE	No	Unlikely
<i>Acacia</i> sp. Nullagine (B.R. Maslin 4955)			1	A, D	Erect, spindly shrub, to 3 m high, bark minni-ritchi, grey above, red underneath. Rocky clay. Low-lying areas between rocky hills	No	No	>195 km N	No	Highly Unlikely

Taxon	EPBC Act	WC Act	DBCA	Source <sup>1</sup>	Habit and Habitat <sup>2</sup>	Habitat within Study Area	Within Current Known Distribution	Distance to Nearest Record	Recorded within Study Area	Likelihood of Occurrence
<i>Acacia subtiliformis</i>			3	A, B, C	Spindly, slender, erect shrub, to 3.5 m high, phyllodes green, new growth slightly viscid, resinous, aromatic; inflorescence in heads to 6 mm diameter; peduncles red. Fl. yellow, Jun. On rocky calcrete plateau	No	No	>35 km N	No	Unlikely
<i>Amaranthus centralis</i>			3	B, D	Annual herb, decumbent or erect to 0.6 m high. Grows in red sand in ephemeral watercourses, sandy to clayey loam on river banks and edges of permanent pools in eucalypt lined channels, or acacia shrubland	No	No	>50 km N	No	Highly Unlikely
<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>			3	A, B, C, D	Compactly tufted perennial, grass-like or herb, 0.3-0.8 m high, lemma groove muricate. Hardpan plains	Potential	Yes	>12 km N	No	Likely
<i>Aristida lazardis</i>			2	A, B, C	Tufted perennial, grass-like or herb, 0.4-1.5 m high. Fl. green/purple, Apr. Sand or loam	Potential	No	>35 km NW	No	Unlikely
<i>Atriplex spinulosa</i>			1	A, B, D	Monoecious, erect, rounded annual, herb, ca 0.2 m high	No	No	>170 km N	No	Highly Unlikely
<i>Cochlospermum macnamarae</i>			1	D	Spreading, multi-stemmed shrub to c. 2 m high and 3 m wide. Fl. Yellow. Upper slopes of low hills/shallow, stony soil closely underlain by granitic bedrock. Granite outcrops, granite boulder piles	No	No	>190 km N	No	Highly Unlikely
<i>Comesperma sabulosum</i>			3	D	Annual, herb, to 0.4 m high. Fl. yellow, Jun. Regeneration site on floodplain. Sandy areas, dunes	No	Yes	>92 km SE	No	Highly Unlikely
<i>Comesperma viscidulum</i>			4	D	Spreading, glabrescent, perennial subshrub to 0.3 m high. Red-brown cracking clay soils associated with basalts on Chichester Plateau	No	No	>147 km SE	No	Highly Unlikely
<i>Crotalaria smithiana</i>			3	C, D	Annual, herb, to 0.4 m high. Fl. yellow, Jun. Regeneration site on floodplain	No	No	>32 km NE	No	Highly Unlikely
<i>Daviesia arthropoda</i>			3	D	Spiny, bushy shrub, to 1 m high. Fl. yellow-brown. Dunes.	No	No	>205 km SE	No	Highly Unlikely
<i>Dicrastylis mitchellii</i>			1	D	Shrub, to about 0.3 m high. Sand or clay soils. Around dunes	No	No	>140 km W	No	Highly Unlikely
<i>Eremophila anomala</i>			1	D	Shrub. Fl. white, Aug to Sep. Basalt outcrop	No	No	>170 km SE	No	Highly Unlikely

Taxon	EPBC Act	WC Act	DBCAs	Source <sup>1</sup>	Habit and Habitat <sup>2</sup>	Habitat within Study Area	Within Current Known Distribution	Distance to Nearest Record	Recorded within Study Area	Likelihood of Occurrence
<i>Eremophila appressa</i>			1	D	Spreading, weeping, open shrub, 1-3 m high. Ironstone gravel. Ridge slopes	No	No	>95 km S	No	Highly Unlikely
<i>Eremophila capricornica</i>			1	C	Compact, sometimes prostrate, shrub, with greyish foliage, to 1 m high. Fl. purple. Rocky plains	Yes	Yes	>40 km E	No	Unlikely
<i>Eremophila magnifica</i> subsp. <i>magnifica</i>			4	A, B, C	Shrub, 0.5-1.5 m high. Fl. blue-purple, Aug to Sep. Skeletal soils over ironstone. Summits and rocky scree slopes	Yes	No	7.5 km N	No	Likely
<i>Eremophila magnifica</i> subsp. <i>velutina</i>			3	A, B, C, D	Shrub, 0.5-1.5 m high. Fl. blue-purple, Aug to Sep. Skeletal soils over ironstone. Summits and rocky scree slopes	Yes	Yes	>30 km S	No	Possible
<i>Eremophila pusilliflora</i>			2	A	Low spreading shrub, to 0.8 m high. Drainage lines, broad depressions, flood plains. Red sandy loam	No	No	>110 km W	No	Highly Unlikely
<i>Eremophila rhegos</i>			1	A, B, C	Erect shrub, ca 1 m high. Fl. blue-purple-white, Sep. Skeletal stony loam over granite	No	No	>40 km S	No	Highly Unlikely
<i>Eremophila rigida</i>			3	A, B, C, D	Bushy shrub, 0.3-4 m high. Fl. cream, Sep. Red sand alluvium. Hardpan plains, stony clay depressions	Potential	No	>15 km S	No	Unlikely
<i>Eremophila</i> sp. Hamersley Range (K. Walker KW 136)			3	A, B, C, D	Erect shrub 1-3.5 m tall. Grows in open rocky slopes, gullies and rock faces associated with large hills and cliffs	Yes	Yes	>12 km N	No	Possible
<i>Eremophila</i> sp. West Angelas (S. van Leeuwen 4068)			1	A, B, C	Spindly whip shrub, to 3 m high. Skeletal soils over banded ironstone (Brockman Iron Formation). High in landscape, steep rocky slopes and scree, often on summits	No	No	>45 km W	No	Highly Unlikely
<i>Eremophila youngii</i> subsp. <i>lepidota</i>			4	A, B, C	Dense, spreading shrub, (0.2-)1-3 m high. Fl. purple-red-pink, Jan or Mar or Jun or Aug to Sep. Stony red sandy loam. Flats plains, floodplains, sometimes semi-saline, clay flats	Potential	Yes	>28 km NE	No	Unlikely
<i>Eucalyptus rowleyi</i>			3	D	Lignotuberous mallee 3-5 m tall. Fl. white, Nov-Jun. Restricted to the plains of the upper De Grey River system	No	No	>62 km NE	No	Highly Unlikely
<i>Eucalyptus semota</i>			1	D	Mallee or tree, 2-9 m high, bark rough & peeling on trunk, smooth above. Clay. Quartz outcrops	Potential	No	>150 km S	No	Highly Unlikely
<i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i>			2	C	Spreading, procumbent herb, to 0.4 m high. Fl. pink, Aug. Clay soils. Among broken rocky screes	Potential	Yes	>35 km E	No	Unlikely

Taxon	EPBC Act	WC Act	DBCA	Source <sup>1</sup>	Habit and Habitat <sup>2</sup>	Habitat within Study Area	Within Current Known Distribution	Distance to Nearest Record	Recorded within Study Area	Likelihood of Occurrence
<i>Fimbristylis sieberiana</i>			3	D	Shortly rhizomatous, tufted perennial, grass-like or herb (sedge), 0.25-0.6 m high. Fl. brown, May to Jun. Mud, skeletal soil pockets. Pool edges, sandstone cliffs	No	No	>75 km NW	No	Highly Unlikely
<i>Frankenia glomerata</i>			4	D	Prostrate shrub. Fl. pink-white, Nov. White sand	No	No	>130 km SE	No	Highly Unlikely
<i>Goodenia berringbinensis</i>			4	A, B, C	Ascending annual, herb, 0.1-0.3 m high. Fl. yellow, Oct. Red sandy loam, often clay. Along watercourses, soaks	No	No	>30 km E	No	Unlikely
<i>Goodenia lyrata</i>			3	A, D	Prostrate herb, with lyrate leaves. Fl. yellow, Aug. Red sandy loam. Near claypan	No	No	>100 km W	No	Highly Unlikely
<i>Goodenia modesta</i>			3	A, D	Herb, to 0.5 m high. Fl. yellow, probably Jan to Dec. Red loam, sand	Yes	No	>100 km SE	No	Highly Unlikely
<i>Goodenia nuda</i>			4	A, B, C	Erect to ascending herb, to 0.5 m high. Fl. yellow, Apr to Aug	Yes	Yes	1 km N	No	Highly Likely
<i>Goodenia pedicellata</i>			1	A, D	Single-stemmed perennial, herb (with dense, cottony and strigose hairs), to 0.25 m high. Rocky clayey soils. Rocky slopes and crests of small hills	No	No	>230 km W	No	Highly Unlikely
<i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727)			3	A, B, C, D	Open, erect annual or biennial, herb, to 0.2 m high. Fl. yellow. Red-brown clay soil, calcrete pebbles. Low undulating plain, swampy plains	No	Yes	>15 km NE	No	Possible
<i>Grevillea saxicola</i>			3	B, D	Shrub or small tree (1.0-)2.5-7.0 m tall. Fl. Cream to pale yellow, late spring to early autumn. Orange-brown to red-brown loam soils on the upper scree/breakaway slopes and crests, associated with banded iron formation outcrops	No	No	>55 km NW	No	Highly Unlikely
<i>Gymnanthera cunninghamii</i>			3	A, B, C	Erect emergent shrub, milky sap, 1-2 m high. Fl. cream-yellow-green, Jan to Dec. Sandy soils. Major drainage lines, rocky creeks	No	Yes	>20 km NE	No	Unlikely
<i>Hibiscus</i> aff. <i>campanulatus</i>			1	A	Erect shrub to 2 m high. Fl. large white-pink showy. Sandy soils. Drainage lines, gullies, base of breakaways. Associated with ironstone	Potential	No	>15 km N	No	Unlikely



Taxon	EPBC Act	WC Act	DBCA	Source <sup>1</sup>	Habit and Habitat <sup>2</sup>	Habitat within Study Area	Within Current Known Distribution	Distance to Nearest Record	Recorded within Study Area	Likelihood of Occurrence
<i>Hibiscus</i> sp. Carnarvon (S. van Leeuwen 5110)			1	A, B, D	Upright, erect perennial, herb or shrub, to 2 m high. Fl. mauve. Sandy soils. Creeks and drainage lines	Potential	No	>185 km S	No	Highly Unlikely
<i>Indigofera ammobia</i>			3	A	Many-stemmed shrub, to 0.5 m high. Fl. green & purple, Sep. Red sand. Sand dunes	No	No	>270 km NE	No	Highly Unlikely
<i>Indigofera gilesii</i>			3	A, B, C	Shrub, to 1.5 m high. Fl. purple-pink, May or Aug. Pebbly loam. Amongst boulders & outcrops, hills	Yes	Yes	1 km N	No	Likely
<i>Indigofera ixocarpa</i>			2	D	Shrub, to 1 m high. Fl. pink, May. Skeletal red soils over massive ironstone	No	No	>170 km N	No	Highly Unlikely
<i>Iotasperma sessilifolium</i>			3	A	Erect herb. Fl. pink. Cracking clay, black loam. Edges of waterholes, plains	No	No	>82 km NE	No	Highly Unlikely
<i>Ipomoea racemigera</i>			2	A, B, C, D, E	Creeping annual, herb or climber. Fl. white	Potential	Yes	5 km N	No	Likely
<i>Isotropis parviflora</i>			2	A, B, C	Shrub, 0.1 m high. Fl. white/pink, Mar. Valley slopes, slopes of ironstone plateau	Yes	Yes	>28 km E	No	Possible
<i>Lepidium catapycnon</i>			4	A, B, C, D	Open, woody perennial, herb or shrub, 0.2-0.3 m high, stems zigzag. Fl. white, Oct. Skeletal soils. Hillsides	No	No	7 km N	No	Likely
<i>Maireana prosthocochaeta</i>			3	A, B, C, D	Open, densely-leaved shrub, 0.3-0.6 m high. Laterite. Hills, salty places	No	No	>35 km SW	No	Highly Unlikely
<i>Minuria</i> sp. Little Sandy Desert (S. van Leeuwen 4919)			1	D	Shrub, to 0.5 m high. Saline clay soils. Flood plains, low lying areas, salt lakes	No	No	>130 km SE	No	Highly Unlikely
<i>Nicotiana umbratica</i>			3	D	Erect, short-lived annual or perennial, herb, 0.3-0.7 m high. Fl. white, Apr to Jun. Shallow soils. Rocky outcrops and boulders, granite	No	No	>170 km N	No	Highly Unlikely
<i>Ptilotus subspinescens</i>			3	D	Compact shrub, to 0.8 m high. Gentle rocky slopes, screes and the bases of screes	No	No	>230 km W	No	Highly Unlikely
<i>Ptilotus tetrandrus</i>			1	D	Annual, herb, 0.15-0.3 m high. Fl. Oct. Loamy sand.	No	No	>140 km S	No	Highly Unlikely
<i>Ptilotus wilsonii</i>			1	D	Shrub, ca 0.5 m high. Fl. green-white, Oct. Stony gravelly soils. Rocky hills	No	No	>170 km N	No	Highly Unlikely
<i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794)			3	A	Shrub, sometimes scrambling to 4 m high. Recorded from mulga on cracking clays	No	Yes	>27 km S	No	Unlikely

Taxon	EPBC Act	WC Act	DBCA	Source <sup>1</sup>	Habit and Habitat <sup>2</sup>	Habitat within Study Area	Within Current Known Distribution	Distance to Nearest Record	Recorded within Study Area	Likelihood of Occurrence
<i>Samolus</i> sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702)			1	D	Erect perennial herb 0.3-1.0 m high. Flat flood-out area alongside freshwater pool and channel of upper Fortescue River. Channel and water hole landform of Marsh Land system	Potential	Yes	85 km N	No	Highly Unlikely
<i>Sida</i> sp. Barlee Range (S. van Leeuwen 1642)			3	D	Spreading shrub, to 0.5 m high. Fl. yellow, Aug. Skeletal red soils pockets. Steep slope	Potential	No	>47km N	No	Unlikely
<i>Solanum</i> sp. Mosquito Creek (A.A. Mitchell et al. AAM 10795)			1	D	Upright grey shrub, growing up to 1 m tall. Semi saline clay plain or depressions with light brown clay	Potential	No	>160 km N	No	Highly Unlikely
<i>Stackhousia clementii</i>			3	D	Dense broom-like perennial, herb, to 0.45 m high. Fl. green/yellow/brown. Skeletal soils. Sandstone hills	No	No	>115 km NW	No	Highly Unlikely
<i>Stylidium weeliwoilli</i>			3	D	Annual, herb, 0.1-0.25 m high, throat appendages 4, rod-shaped. Fl. pink & red, Aug to Sep. Gritty sand soil, sandy clay. Edge of watercourses	No	No	>65 km NW	No	Highly Unlikely
<i>Synostemon hamersleyensis</i>			1	D	Shrub to 1 m high. Steep slopes, scree, cliffs, gorges. Ironstone	Potential	No	>95 km NW	No	Highly Unlikely
<i>Tecticornia bibenda</i>			1	A	Erect or spreading shrub, 0.5-1.2 m high. Fl. Aug to Oct. Red-brown saline sand with some clay over calcrete and gypsum. Near the edges of gypsiferous playas and salt lakes on flat to gently undulating terrain	No	No	>138 km SE	No	Highly Unlikely
<i>Tecticornia</i> sp. Christmas Creek (K.A. Shepherd & T. Colmer et. Al. KS 1063)			1	D	Perennial shrub to 0.8 m high. Widespread across the saline flats of the Fortescue Marsh on red-brown clay	No	Yes	>85 km N	No	Highly Unlikely
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867)			1	D	Perennial shrub to 0.5 m high. At salt lake edges, saline flats. On red-brown clay loam	No	No	>165 km SE	No	Highly Unlikely
<i>Tecticornia willisii</i>			1	D	Erect shrub to 1 m high. Bright chloritic green vegetative articles. Single florets in opposite decurrent pairs, anthers exerted. Salt flats, edge of lakes	No	No	>130 km S2	No	Highly Unlikely

Taxon	EPBC Act	WC Act	DBCA	Source <sup>1</sup>	Habit and Habitat <sup>2</sup>	Habitat within Study Area	Within Current Known Distribution	Distance to Nearest Record	Recorded within Study Area	Likelihood of Occurrence
<i>Teucrium pilbaranum</i>			2	D	Upright shrub, 0.2 m high. Fl. white, May or Sep. Clay. Crab hole plain in a river floodplain, margin of calcrete table	No	No	>105 km NE	No	Highly Unlikely
<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)			3	A, B, C	Tussocky perennial, grass-like or herb, 0.9-1.8 m high. Fl. Aug. Red clay. Clay pan, grass plain	Potential	No	10 km N	No	Possible
<i>Tribulus minutus</i>			1	A, B	Prostrate herb, plants villous; leaflet pairs 5-7; petals 2.5-7 mm long; spines on fruit not well-developed	No	No	>280 km N	No	Highly Unlikely
<i>Triodia birriliburu</i>			3	D	Hummock grass to 1 m tall, scapes extending to another 1 m high. Sandy soils. Dunes, dune crests	Potential	No	>95 km SE	No	Highly Unlikely
<i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739)			3	A, B, C	Perennial, grass-like or herb, 0.4 m high. Light orange-brown, pebbly loam. Amongst rocks & outcrops, gully slopes	Potential	Yes	>15 km N	No	Possible
<i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwen 4684)			1	A, C	Erect annual herb with scabrous hairs and adnate cauline leaves. Red-brown sandy clay loam. Drainage lines, floodplains	Potential	Yes	>35 km E	No	Unlikely
<i>Xerochrysum boreale</i>			3	D	Erect perennial, branched herb to 50 cm high. Loamy, sandy or gravelly soils on grassland or woodland, sometimes seasonally inundated areas	No	No	>40 km NW	No	Highly Unlikely

1: Habit and Habitat descriptions from WAH (1998-)

## Appendix H: Introduced Flora Database Results

Family	Taxon	Common Name	WoNS	DPP	Ecological	Invasiveness	Source
Fabaceae	<i>Alhagi maurorum</i>	Camelthorn	No	Yes	Not assessed	Not assessed	A
Asparagaceae	<i>Asparagus asparagoides</i>	Bridal creeper	Yes	Yes	Not assessed	Not assessed	A
Cactaceae	<i>Austrocyllindropuntia cylindrica</i>		Yes	Yes	Not assessed	Not assessed	A
Cactaceae	<i>Austrocyllindropuntia subulata</i>	Eve's needle	Yes	Yes	Not assessed	Not assessed	A
Asteraceae	<i>Bidens bipinnata</i>	Bipinnate Beggartick	No	No	Unknown	Rapid	D
Apocynaceae	<i>Calotropis procera</i>	Rubber bush	No	Yes	Not assessed	Not assessed	A
Poaceae	<i>Cenchrus setiger</i>	Birdwood Grass	No	No	High	Rapid	C
Asteraceae	<i>Chondrilla juncea</i>	Skeleton weed	No	Yes	Not assessed	Not assessed	A
Cucurbitaceae	<i>Citrullus lanatus</i>	Pie Melon	No	No	Unknown	Moderate	C
Apocynaceae	<i>Cryptostegia madagascariensis</i>	Madagascar rubber vine	No	Yes	Not assessed	Not assessed	A
Cactaceae	<i>Cylindropuntia fulgida</i>	Coral Cactus	Yes	Yes	High	Slow	A
Cactaceae	<i>Cylindropuntia imbricata</i>	Rope pear	Yes	Yes	Not assessed	Not assessed	A
Cactaceae	<i>Cylindropuntia kleiniae</i>	Klein's pencil cactus	Yes	Yes	Not assessed	Not assessed	A
Cactaceae	<i>Cylindropuntia pallida</i>	White-spined hudson pear	Yes	Yes	Not assessed	Not assessed	A
Cactaceae	<i>Cylindropuntia tunicata</i>	Thistle cholla	Yes	Yes	Not assessed	Not assessed	A
Poaceae	<i>Cynodon dactylon</i>	Couch	No	No	High	Rapid	C
Poaceae	<i>Echinochloa colona</i>	Awnless Barnyard Grass	No	No	High	Rapid	C
Boraginaceae	<i>Echium plantagineum</i>	Paterson's curse	No	Yes	Not assessed	Not assessed	A
Asteraceae	<i>Flaveria trinervia</i>	Speedy Weed	No	No	Not assessed	Not assessed	C
Araliaceae	<i>Hydrocotyle ranunculoides</i>	Water pennywort	No	Yes	Not assessed	Not assessed	A
Euphorbiaceae	<i>Jatropha gossypifolia</i>	Bellyache bush	Yes	Yes	Not assessed	Not assessed	A
Verbenaceae	<i>Lantana camara</i>	Lantana	Yes	Yes	Not assessed	Not assessed	A
Malvaceae	<i>Malvastrum americanum</i>	Spiked malvastrum	No	No	High	Rapid	C, D
Iridaceae	<i>Moraea flaccida</i>	One-leaf cape tulip	No	Yes	Not assessed	Not assessed	A

Family	Taxon	Common Name	WoNS	DPP	Ecological	Invasiveness	Source
Iridaceae	<i>Moraea miniata</i>	Two-leaf cape tulip	No	Yes	Not assessed	Not assessed	A
Asteraceae	<i>Onopordum acaulon</i>	Stemless thistle	No	Yes	Not assessed	Not assessed	A
Cactaceae	<i>Opuntia elata</i>	Riverina pear	Yes	Yes	Not assessed	Not assessed	A
Cactaceae	<i>Opuntia elatior</i>	Red-flower prickly pear	Yes	Yes	Not assessed	Not assessed	A
Cactaceae	<i>Opuntia engelmannii</i>	Engelman pear	Yes	Yes	Not assessed	Not assessed	A
Cactaceae	<i>Opuntia ficus-indica</i>	Indian fig	Yes	Yes	Not assessed	Not assessed	A
Cactaceae	<i>Opuntia microdasys</i>	Teddy bear cactus	Yes	Yes	Not assessed	Not assessed	A
Cactaceae	<i>Opuntia monacantha</i>	Drooping tree pear	Yes	Yes	Not assessed	Not assessed	A
Cactaceae	<i>Opuntia polyacantha</i>	Plain's prickly pear	Yes	Yes	Not assessed	Not assessed	A
Cactaceae	<i>Opuntia puberula</i>	Nopal de Tortuga	Yes	Yes	Not assessed	Not assessed	A
Cactaceae	<i>Opuntia stricta</i>	Common prickly pear	Yes	Yes	High	Rapid	A
Cactaceae	<i>Opuntia tomentosa</i>	Velvet prickly pear	Yes	Yes	Not assessed	Not assessed	A
Fabaceae	<i>Parkinsonia aculeata</i>	Parkinsonia	Yes	Yes	High	Rapid	A, B
Araceae	<i>Pistia stratiotes</i>	Water lettuce	No	Yes	Not assessed	Not assessed	A
Portulacaceae	<i>Portulaca pilosa</i>	Pink purslane	No	No	Not assessed	Not assessed	C
Fabaceae	<i>Prosopis glandulosa x velutina</i>	Mesquite	Yes	Yes	High	Rapid	A
Rosaceae	<i>Rubus ulmifolius</i>	Elmleaf blackberry	Yes	Yes	Not assessed	Not assessed	A
Polygonaceae	<i>Rumex vesicarius</i>	Ruby Dock	No	No	High	Rapid	C
Alismataceae	<i>Sagittaria platyphylla</i>	Delta arrowhead	Yes	Yes	Not assessed	Not assessed	A
Fabaceae	<i>Senna alata</i>	Seven-golden-candlesticks	No	Yes	Not assessed	Not assessed	A
Fabaceae	<i>Senna obtusifolia</i>	Sicklepod senna	No	Yes	Not assessed	Not assessed	A
Asteraceae	<i>Silybum marianum</i>	Variegated thistle	No	Yes	Not assessed	Not assessed	A
Solanaceae	<i>Solanum elaeagnifolium</i>	Silver nightshade	Yes	Yes	Not assessed	Not assessed	A
Solanaceae	<i>Solanum linnaeanum</i>	Apple of Sodom	No	Yes	Not assessed	Not assessed	A

Family	Taxon	Common Name	WoNS	DPP	Ecological	Invasiveness	Source
Tamaricaceae	<i>Tamarix aphylla</i>	Athel Pine	Yes	Yes	High	Rapid	A, B
Fabaceae	<i>Ulex europaeus</i>	Gorse	Yes	Yes	Not assessed	Not assessed	A
Asteraceae	<i>Xanthium spinosum</i>	Thorny burweed	No	Yes	Not assessed	Not assessed	A
Asteraceae	<i>Xanthium strumarium</i>	Noogoora bush	No	Yes	Not assessed	Not assessed	A
Araceae	<i>Zantedeschia aethiopica</i>	Arum lily	No	Yes	Not assessed	Not assessed	A
Rhamnaceae	<i>Ziziphus mauritiana</i>	Chinese apple	No	Yes	Not assessed	Not assessed	A

Source: A - WAOL (DPIRD, 2018); B - PMST (DoEE, 2018); C - NatureMap (DBCA, 2018a); D - ALA (2018b)

**Appendix I: Flora Composition**



Family	Species	Western Ridge	Coombanbunna Well	Status		Status		
				EPBC Act	BC Act	Weed	WoNS	DPP
Acanthaceae	<i>Dipteracanthus australasicus</i> subsp. <i>australasicus</i>		•					
Amaranthaceae	<i>Alternanthera nana</i>		•					
Amaranthaceae	<i>Alternanthera</i> sp. indet	•						
Amaranthaceae	<i>Gomphrena affinis</i> subsp. <i>pilbarensis</i>		•					
Amaranthaceae	<i>Gomphrena</i> sp. indet		•					
Amaranthaceae	<i>Ptilotus aevroides</i>		•					
Amaranthaceae	<i>Ptilotus affinis</i> subsp. <i>pilbarensis</i>		•					
Amaranthaceae	<i>Ptilotus astrolasius</i>	•	•					
Amaranthaceae	<i>Ptilotus calostachyus</i>	•						
Amaranthaceae	<i>Ptilotus exaltatus</i>	•	•					
Amaranthaceae	<i>Ptilotus gomphrenoides</i>		•					
Amaranthaceae	<i>Ptilotus obovatus</i>	•	•					
Amaranthaceae	<i>Ptilotus rotundifolius</i>	•	•					
Apocynaceae	<i>Marsdenia australis</i>	•	•					
Asteraceae	<i>Bidens bipinnata</i>		•					
Asteraceae	<i>Centipeda minima</i> subsp. <i>macrocephala</i>		•					
Asteraceae	<i>Chrysocephalum apiculatum</i> subsp. <i>pilbarensis</i>		•					
Asteraceae	<i>Flaveria trinervia</i>		•					
Asteraceae	<i>Pluchea dunlopii</i>	•						
Asteraceae	<i>Pluchea rubelliflora</i>		•					
Asteraceae	<i>Pterocaulon</i> sp. indet		•					
Asteraceae	<i>Streptoglossa liatroides</i>		•					
Boraginaceae	<i>Heliotropium cunninghamii</i>	•	•					
Boraginaceae	<i>Heliotropium tanythrix</i>		•					
Boraginaceae	<i>Trichodesma zeylanicum</i>	•	•					
Brassicaceae	<i>Lepidium pedicellosum</i>	•						
Brassicaceae	<i>Stenopetalum decipiens</i>	•						
Capparaceae	<i>Capparis lasiantha</i>	•						
Capparaceae	<i>Capparis spinosa</i>	•						
Caryophyllaceae	<i>Polycarpha longiflora</i>	•	•					
Chenopodiaceae	<i>Atriplex codonocarpa</i>		•					
Chenopodiaceae	<i>Chenopodium</i> sp. indet		•					
Chenopodiaceae	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	•	•					
Chenopodiaceae	<i>Maireana georgei</i>	•						
Chenopodiaceae	<i>Maireana melanocoma</i>		•					
Chenopodiaceae	<i>Maireana pyramidata</i>		•					
Chenopodiaceae	<i>Maireana</i> sp. indet	•						
Chenopodiaceae	<i>Neobassia astrocarpa</i>		•					
Chenopodiaceae	<i>Rhagodia eremaea</i>	•	•					

Family	Species	Western Ridge	Coombanbunna Well	Status		Status		
				EPBC Act	BC Act	Weed	WoNS	DPP
Chenopodiaceae	<i>Salsola australis</i>	•	•					
Chenopodiaceae	<i>Sclerolaena bicornis</i>	•	•					
Chenopodiaceae	<i>Sclerolaena cornisheana</i>	•	•					
Chenopodiaceae	<i>Sclerolaena cuneata</i>	•	•					
Chenopodiaceae	<i>Tecticornia</i> sp. indet	•						
Cleomaceae	<i>Cleome viscosa</i>		•					
Convolvulaceae	<i>Duperreya commixta</i>	•	•					
Convolvulaceae	<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	•	•					
Cucurbitaceae	<i>Citrullus</i> sp. indet		•					
Cucurbitaceae	<i>Cucumis variabilis</i>	•						
Cyperaceae	<i>Bulbostylis barbata</i>		•					
Cyperaceae	<i>Cyperus iria</i>		•					
Cyperaceae	<i>Fimbristylis</i> sp. indet	•						
Elatinaceae	<i>Bergia pedicellaris</i>		•					
Euphorbiaceae	<i>Euphorbia australis</i> var. <i>hispidula</i>	•						
Euphorbiaceae	<i>Euphorbia boophthona</i>		•					
Euphorbiaceae	<i>Euphorbia careyi</i>	•						
Euphorbiaceae	<i>Euphorbia coghlanii</i>		•					
Euphorbiaceae	<i>Euphorbia</i> sp. indet	•						
Fabaceae	<i>Cullen graveolens</i>		•					
Fabaceae	<i>Acacia adsurgens</i>	•	•					
Fabaceae	<i>Acacia adsurgens</i> x <i>rhodophloia</i>	•	•					
Fabaceae	<i>Acacia ancistrocarpa</i>	•	•					
Fabaceae	<i>Acacia aneura</i>	•	•					
Fabaceae	<i>Acacia aptaneura</i>	•	•					
Fabaceae	<i>Acacia atkinsiana</i>		•					
Fabaceae	<i>Acacia ayersiana</i>	•						
Fabaceae	<i>Acacia bivenosa</i>	•	•					
Fabaceae	<i>Acacia citrinoviridis</i>	•	•					
Fabaceae	<i>Acacia dictyophleba</i>	•	•					
Fabaceae	<i>Acacia inaequilatera</i>	•	•					
Fabaceae	<i>Acacia incurvaneura</i>	•	•					
Fabaceae	<i>Acacia macraneura</i>		•					
Fabaceae	<i>Acacia maitlandii</i>	•	•					
Fabaceae	<i>Acacia marramamba</i>		•					
Fabaceae	<i>Acacia pachyacra</i>	•	•					
Fabaceae	<i>Acacia paraneura</i>	•	•					
Fabaceae	<i>Acacia pruinocarpa</i>	•	•					
Fabaceae	<i>Acacia pyrifolia</i>	•						

Family	Species	Western Ridge	Coombanbunna Well	Status		Status		
				EPBC Act	BC Act	Weed	WoNS	DPP
Fabaceae	<i>Acacia rhodophloia</i>	•	•					
Fabaceae	<i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i>	•	•					
Fabaceae	<i>Acacia</i> sp. indet	•	•					
Fabaceae	<i>Acacia spondylophylla</i>	•	•					
Fabaceae	<i>Acacia tetragonophylla</i>	•	•					
Fabaceae	<i>Acacia victoriae</i>	•	•					
Fabaceae	<i>Desmodium filiforme</i>		•					
Fabaceae	<i>Indigofera bovipерda</i>	•						
Fabaceae	<i>Indigofera colutea</i>		•					
Fabaceae	<i>Indigofera georgei</i>	•	•					
Fabaceae	<i>Indigofera linifolia</i>		•					
Fabaceae	<i>Indigofera linnaei</i>		•					
Fabaceae	<i>Indigofera monophylla</i>	•	•					
Fabaceae	<i>Indigofera</i> sp. indet	•						
Fabaceae	<i>Isotropis atropurpurea</i>	•						
Fabaceae	<i>Neptunia dimorphantha</i>	•	•					
Fabaceae	<i>Petalostylis labicheoides</i>	•	•					
Fabaceae	<i>Rhynchosia australis</i>	•	•					
Fabaceae	<i>Senna artemisioides</i> subsp. <i>artemisioides</i>		•					
Fabaceae	<i>Senna artemisioides</i> subsp. <i>filifolia</i>		•					
Fabaceae	<i>Senna artemisioides</i> subsp. <i>helmsii</i>	•	•					
Fabaceae	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	•	•					
Fabaceae	<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	•						
Fabaceae	<i>Senna ferraria</i> x		•					
Fabaceae	<i>Senna glutinosa</i> subsp. <i>chatelainiana</i>		•					
Fabaceae	<i>Senna glutinosa</i> subsp. <i>glutinosa</i>	•	•					
Fabaceae	<i>Senna glutinosa</i> subsp. <i>luerssenii</i>	•	•					
Fabaceae	<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	•	•					
Fabaceae	<i>Senna hamersleyensis</i>	•						
Fabaceae	<i>Senna notabilis</i>	•	•					
Fabaceae	<i>Senna</i> sp. Meekatharra (E. Bailey 1-26)	•	•					
Fabaceae	<i>Senna stricta</i>		•					
Fabaceae	<i>Tephrosia rosea</i> var. Fortescue creeks (M.I.H. Brooker 2186)	•						
Fabaceae	<i>Tephrosia</i> sp. Clay Soils (S. van Leeuwen et.al. PBS0273)		•					
Fabaceae	<i>Tephrosia</i> sp. Newman (A.A. Mitchell PRP 29)		•					
Fabaceae	<i>Vachellia farnesiana</i>	•	•					
Fabaceae	<i>Vigna lanceolata</i>		•					
Fabaceae	<i>Zornia albiflora</i>		•					

Family	Species	Western Ridge	Coombanbunna Well	Status		Status		
				EPBC Act	BC Act	Weed	WoNS	DPP
Goodeniaceae	<i>Goodenia cusackiana</i>	•						
Goodeniaceae	<i>Goodenia muelleriana</i>		•					
Goodeniaceae	<i>Goodenia stobbsiana</i>	•	•					
Goodeniaceae	<i>Goodenia triodiophila</i>	•						
Goodeniaceae	<i>Scaevola spinescens</i>		•					
Gyrostemonaceae	<i>Codonocarpus cotinifolius</i>		•					
Loranthaceae	<i>Amyema fitzgeraldii</i>	•	•					
Malvaceae	<i>Abutilon cryptopetalum</i>	•						
Malvaceae	<i>Abutilon oxycarpum</i> subsp. Prostrate (A.A. Mitchell PRP 1266)		•					
Malvaceae	<i>Abutilon sp. indet</i>	•	•					
Malvaceae	<i>Androcalva luteiflora</i>	•	•					
Malvaceae	<i>Corchorus laniflorus</i>		•					
Malvaceae	<i>Corchorus lasiocarpus</i> subsp. <i>lasiocarpus</i>	•	•					
Malvaceae	<i>Corchorus parviflorus</i>		•					
Malvaceae	<i>Corchorus sp. indet</i>	•						
Malvaceae	<i>Corchorus tridens</i>		•					
Malvaceae	<i>Gossypium australe</i>	•	•					
Malvaceae	<i>Gossypium robinsonii</i>	•	•					
Malvaceae	<i>Hibiscus coatesii</i>	•						
Malvaceae	<i>Hibiscus sp. indet</i>		•					
Malvaceae	<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>	•						
Malvaceae	<i>Malvastrum americanum</i>	•	•					
Malvaceae	<i>Sida ectogama</i>	•						
Malvaceae	<i>Sida fibulifera</i>	•	•					
Malvaceae	<i>Sida sp. indet</i>	•	•					
Malvaceae	<i>Sida sp.</i> Spiciform panicles (E. Leyland s.n. 14/8/90)		•					
Malvaceae	<i>Sida sp.</i> Supplejack Station (T.S. Henshall 2345)		•					
Malvaceae	<i>Triumfetta maconochieana</i>	•	•					
Marsileaceae	<i>Marsilea hirsuta</i>		•					
Moraceae	<i>Ficus brachypoda</i>	•						
Myrtaceae	<i>Corymbia candida</i>	•	•					
Myrtaceae	<i>Corymbia hamersleyana</i>	•	•					
Myrtaceae	<i>Eucalyptus gamophylla</i>	•	•					
Myrtaceae	<i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i>	•	•					
Myrtaceae	<i>Eucalyptus lucasii</i>	•						
Myrtaceae	<i>Eucalyptus socialis</i> subsp. <i>eucentrica</i>	•						
Myrtaceae	<i>Eucalyptus xerothermica</i>	•	•					
Myrtaceae	<i>Melaleuca eleuterostachya</i>	•						

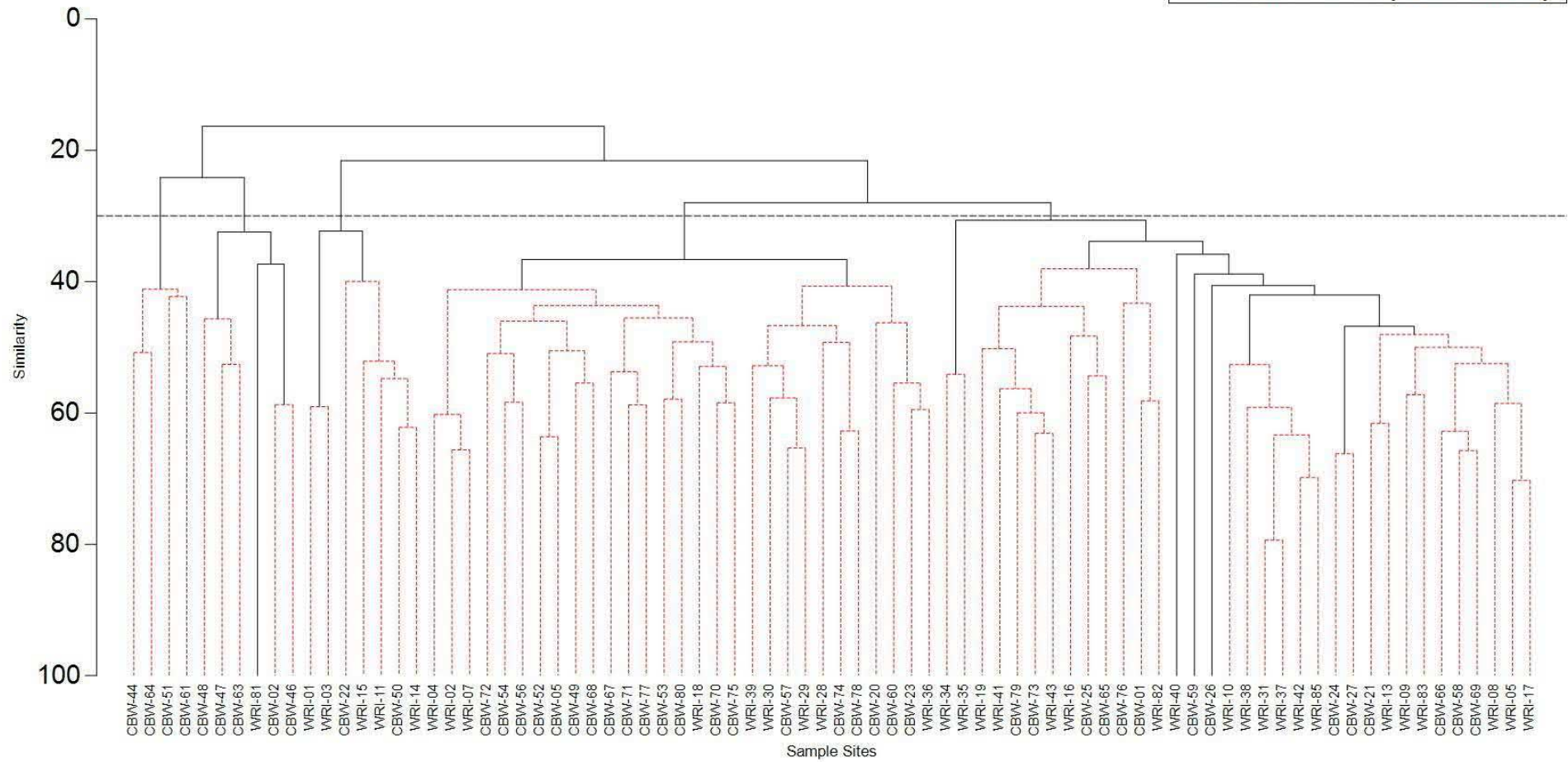
Family	Species	Western Ridge	Coombanbunna Well	Status		Status		
				EPBC Act	BC Act	Weed	WoNS	DPP
Nyctaginaceae	<i>Boerhavia burbridgeana</i>		•					
Nyctaginaceae	<i>Boerhavia coccinea</i>		•					
Nyctaginaceae	<i>Boerhavia paludosa</i>		•					
Oleaceae	<i>Jasminum didymum</i> subsp. <i>lineare</i>	•	•					
Phyllanthaceae	<i>Phyllanthus maderaspatensis</i>		•					
Plantaginaceae	<i>Stemodia viscosa</i>	•						
Poaceae	<i>Aristida contorta</i>	•	•					
Poaceae	<i>Aristida holathera</i>	•	•					
Poaceae	<i>Aristida inaequiglumis</i>	•	•					
Poaceae	<i>Aristida latifolia</i>		•					
Poaceae	<i>Aristida</i> sp. indet	•						
Poaceae	<i>Cenchrus ciliaris</i>	•	•					
Poaceae	<i>Chrysopogon fallax</i>	•	•					
Poaceae	<i>Cymbopogon ambiguus</i>	•	•					
Poaceae	<i>Cynodon convergens</i>		•					
Poaceae	<i>Cynodon dactylon</i>		•					
Poaceae	<i>Dactyloctenium radulans</i>	•	•					
Poaceae	<i>Echinochloa colona</i>		•					
Poaceae	<i>Enneapogon lindleyanus</i>	•						
Poaceae	<i>Enneapogon polyphyllus</i>		•					
Poaceae	<i>Enneapogon</i> sp. indet	•	•					
Poaceae	<i>Enteropogon ramosus</i>	•	•					
Poaceae	<i>Eragrostis dielsii</i>	•	•					
Poaceae	<i>Eragrostis eriopoda</i>	•	•					
Poaceae	<i>Eragrostis setifolia</i>	•	•					
Poaceae	<i>Eragrostis</i> sp. indet	•						
Poaceae	<i>Eriachne flaccida</i>		•					
Poaceae	<i>Eriachne mucronata</i>	•	•					
Poaceae	<i>Eriachne</i> sp. indet	•	•					
Poaceae	<i>Eulalia aurea</i>	•						
Poaceae	<i>Paraneurachne muelleri</i>	•	•					
Poaceae	<i>Sorghum plumosum</i>		•					
Poaceae	<i>Sporobolus actinocladius</i>		•					
Poaceae	<i>Sporobolus australasicus</i>		•					
Poaceae	<i>Themeda triandra</i>	•	•					
Poaceae	<i>Tragus australianus</i>		•					
Poaceae	<i>Triodia angusta</i>	•	•					
Poaceae	<i>Triodia brizoides</i>	•	•					
Poaceae	<i>Triodia longiceps</i>	•	•					

Family	Species	Western Ridge	Coombanbunna Well	Status		Status		
				EPBC Act	BC Act	Weed	WoNS	DPP
Poaceae	<i>Triodia pungens</i>	•	•					
Poaceae	<i>Triodia</i> sp. indet	•						
Poaceae	<i>Triodia vanleeuwenii</i>		•					
Poaceae	<i>Triodia wiseana</i>	•	•					
Portulacaceae	<i>Portulaca cyclophylla</i>		•					
Portulacaceae	<i>Portulaca filifolia</i>		•					
Portulacaceae	<i>Portulaca oleracea</i>		•					
Portulacaceae	<i>Portulaca</i> sp. indet	•						
Proteaceae	<i>Grevillea stenobotrya</i>	•						
Proteaceae	<i>Grevillea striata</i>	•	•					
Proteaceae	<i>Grevillea wickhamii</i>	•						
Proteaceae	<i>Hakea chordophylla</i>	•	•					
Proteaceae	<i>Hakea lorea</i> subsp. <i>lorea</i>	•	•					
Proteaceae	<i>Hakea preissii</i>	•	•					
Pteridaceae	<i>Cheilanthes</i> sp. indet	•	•					
Rubiaceae	<i>Oldenlandia crouchiana</i>		•					
Rubiaceae	<i>Psyrax latifolia</i>	•	•					
Rubiaceae	<i>Psyrax suaveolens</i>	•	•					
Santalaceae	<i>Anthobolus leptomerioides</i>	•	•					
Santalaceae	<i>Santalum lanceolatum</i>	•	•					
Sapindaceae	<i>Dodonaea coriacea</i>	•	•					
Sapindaceae	<i>Dodonaea petiolaris</i>	•						
Scrophulariaceae	<i>Eremophila cuneifolia</i>	•	•					
Scrophulariaceae	<i>Eremophila exilifolia</i>	•						
Scrophulariaceae	<i>Eremophila forrestii</i>	•	•					
Scrophulariaceae	<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	•	•					
Scrophulariaceae	<i>Eremophila lachnocalyx</i>	•	•					
Scrophulariaceae	<i>Eremophila lanceolata</i>		•					
Scrophulariaceae	<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	•	•					
Scrophulariaceae	<i>Eremophila longifolia</i>	•	•					
Scrophulariaceae	<i>Eremophila platycalyx</i> subsp. <i>pardalota</i>	•	•					
Solanaceae	<i>Solanum cleistogamum</i>	•	•					
Solanaceae	<i>Solanum lasiophyllum</i>	•	•					
Zygophyllaceae	<i>Tribulus suberosus</i>	•	•					
Zygophyllaceae	<i>Tribulus terrestris</i>		•					

**Appendix J: Western Ridge and Coombanbunna Well Dendrogram**

**Western Ridge & Coombanbunna Well**  
Group average

Transform: Square root  
Resemblance: S17 Bray-Curtis similarity





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