Yandi E8 Targeted Flora Survey

Biologic Environmental Survey

Report to BHP Western Australian Iron Ore

February 2023

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EXECUTIVE SUMMARY

BHP Western Australia Iron Ore commissioned Biologic Environmental Survey to undertake a desktop assessment and targeted flora survey of several areas of the Yandi mine operations within tenement M270SA, including the proposed E8 pit. The Study Area is located approximately 88 kilometres north-west of Newman and covers an area of approximately 1,599 hectares.

The field survey was undertaken on 13-20 May 2022 by three Biologic personnel over 19 person days. Targeted searching was undertaken for flora of significance, as identified during the desktop assessment. Flora taxa that were confirmed or considered Very Likely, Likely or Possible to occur within the Study Area were preferentially targeted, while all other significant flora were searched broadly while traversing the Study Area.

Three significant flora taxa were recorded in the Study Area: *Ipomoea racemigera* (P2), *Rostellularia adscendens* var. *latifolia* (P3), and *Sida* sp. Barlee Range (S. van Leeuwen 1642) (P4). One species of other significance, *Imperata cylindrica*, was also recorded during the survey from Marillana Creek.

Twenty-two introduced taxa were recorded from the Study Area during the survey. None of the introduced taxa are listed as Weeds of National Significance, Declared Pests under the *Biosecurity and Agriculture Management Act 2007* or 'Priority Alert' weeds by the Department of Biodiversity, Conservation and Attractions. The most frequently observed introduced taxa were **Aerva javanica* **Bidens bipinnata*, **Cenchrus ciliaris*, and **Vachellia farnesiana*.

The survey did not record any significant vegetation that was consistent with known Threatened Ecological Communities or Priority Ecological Communities. Furthermore, the no Threatened Ecological Communities or Priority Ecological Communities are expected to occur in the Study Area.

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1 INTRODUCTION

1.1 Background

BHP Western Australia Iron Ore (BHP WAIO) required a single season targeted flora survey, in several areas of BHP WAIO Yandi operations within mining tenement M270SA, including the proposed E8 pit (hereafter referred to as the Study Area) (Figure 1.1). This flora assessment will provide local and contextual information to inform future environmental approvals across the Study Area. The Study Area is located approximately 88 kilometres (km) north-west of Newman and covers an area of approximately 1,599 hectares (ha) within the Pilbara bioregion (Figure 1.1).

BHP WAIO commissioned Biologic Environmental Survey Pty Ltd (Biologic) to undertake a desktop assessment and targeted flora survey of the Study Area. This report documents the findings of this assessment.

1.2 Objectives

This targeted flora assessment is not related to any specific development proposed by BHP WAIO but will be used to inform future environmental approvals across the Yandi mining operations area. The overarching objective of the targeted flora survey (hereafter the Survey) was to identify any significant flora values within the Study Area. This was achieved with the following scope of works:

- Completion of a desktop assessment, including the review of previous biological surveys and government and non-government databases;
- Completion of a single season targeted flora survey across the Study Area;
- Review of the results of the survey to identify any significant values within the Study Area; and
- Preparation of a report summarising and discussing the results and placing any significant values in a regional and local context.

705000 710000 715000 720000 725000

7490000 7485000 7480000

Yandi Rail Spur Line

Yandi Rail Spur Line

Western 4

Marillana Creek

M 270SA

Phils Creek

Mining Area C Railway

Yandicoogina Rail

Yandicoogina Rail

Yandicoogina Rail

Legend

- Study Area
- Live Mining Tenement
- Operating Mine
- Rail

IBRA Region	IBRA Subregion
Pilbara	Chichester
	Fortescue
	Hamersley
	Roebourne

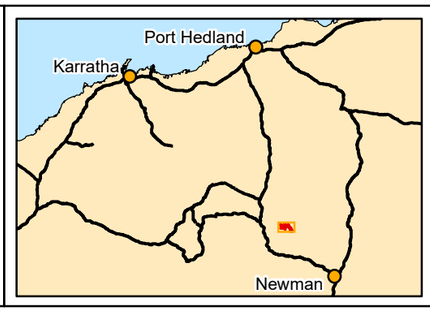
N

biologic Environmental Survey

Scale: 1:60,000

0 1 2 3 Km

Coordinate System: GDA2020 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA2020 Created 07/02/2023



BHP WAIO

Yandi E8 Targeted Flora Survey

Figure 1.1: Yandi E8 Study Area and regional context

1.3 Legislation & Compliance

Conservation significant flora and vegetation is protected at a state and federal level and legislated by the following parliamentary acts:

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

The Environmental Protection Authority (EPA) outlines guidance for biological surveys in Western Australia. All aspects of botanical assessments undertaken by Biologic are compliant with the EPA Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016b), this includes preparation, survey design, personnel, data analysis, reporting and data submission (Index for Biodiversity Surveys for Assessment; IBSA). Additionally, the work that Biologic undertakes is consistent with the values presented in the Environmental Factor Guidelines for flora and vegetation (EPA, 2016a), intended to protect the biological diversity and ecological integrity of Western Australian flora and vegetation during the Environmental Impact Assessment process (EIA).

This assessment was carried out in a manner consistent with the following documents developed by the EPA and with BHP WAIO guidelines for environmental surveying and reporting of flora and vegetation:

- EPA (2021) Statement of Environmental Principles, Factors, Objectives and Aims of EIA ;
- EPA (2016a) Environmental Factor Guideline: Flora and Vegetation;
- EPA (2016b) Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment;
- BHP WAIO's Biological Survey Spatial Data Requirements (SPR-IEN-EMS-015) (BHP WAIO, 2020); and
- BHP WAIO's Vegetation and Flora Survey Procedure (0124627) (BHP, 2018).

1.3.1 Significant Flora & Vegetation

The state and federal governments protect rare, endemic, new or special flora and vegetation communities at varying levels by classifying them under codes of significance. These codes, jurisdiction and level of protection are detailed in Appendix A.

Significant flora may extend beyond the assigned codes and may include:

- Being identified as Threatened, Critically Endangered, Endangered or Vulnerable species (BC Act and/or EPBC Act);
- Being listed as Priority flora species (DBCA, 2022d)
- Locally endemic or associated with a restricted habitat type (e.g., surface water or groundwater dependent ecosystems);

- New species or anomalous features that indicate a potential new species;
- Range extensions or representative of outer population extent (particularly at the extremes of range, recently discovered range extensions or isolated outliers of the main range);
- Unusual species; restricted subspecies, varieties, naturally occurring hybrids, or complex taxonomic groups; or
- Relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

Significant vegetation may extend beyond the assigned codes and may include:

- Being identified as Threatened Ecological Community (TEC), Critically Endangered, Endangered or Vulnerable ecological community (BC Act and/or EPBC Act);
- Identified as a Priority Ecological Community (PEC) (DBCA, 2021);
- Restricted or endemic distribution;
- Degree of historical impact from threatening processes (such as mining or agricultural);
- A role as a refuge for significant flora; or
- Providing an important function required to maintain ecological integrity of a significant ecosystem.

1.3.2 Introduced Flora

Introduced flora can pose a threat to native vegetation and biodiversity. A database of declared pests is kept by the Department of Primary Industries and Regional Development (DPIRD) (formerly the Department of Agriculture and Food Western Australia, DAFWA). This database falls under state jurisdiction, legislated by the *Biosecurity and Agricultural Management Act 2007* (BAM Act) (DPIRD, 2007). They are managed at both a state and federal level and can be classified as either Weeds of National Significance (WoNS), Declared Pests (DPs) under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) or listed as 'Priority Alert Weeds' according to the DBCAs Weed Prioritisation Process.

Weeds of National Significance

The Australian government, 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 (DAWE, 2021; Department of Agriculture, Water and the Environment). 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.

Declared Pests

To protect Western Australian agriculture DPIRD regulates harmful plants under the BAM Act (DPIRD, 2007). 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 Declared Pests (DPs) 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, Declared Pests mean prohibited pests (under Section 12 of the Act) and pests declared under Section 22 of the Act. All Declared Pests listed under Section 22 (not including pests listed under Section 12 of the BAM Act; Prohibited Pests) are placed in one of three control categories:

- Category 1 (C1) – Exclusion: if in the opinion of the Minister introduction of the declared pest into an area or part of an area for which it is declared should be prevented;
- Category 2 (C2) – Eradication: if in the opinion of the Minister eradication of the declared pest from an area or part of an areas for which it is declared is feasible;
- Category 3 (C3) – Management: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is not feasible but that it is necessary to:
    - Alleviate the harmful impact of the declared pest in the area; or
    - Reduce the number or distribution of the declared pest in the area; or
    - Prevent or contain the spread of the declared pest in the area.

Prohibited pests listed under Section 12 of the BAM Act are assigned separate control categories and include:

- Category 1 (C1) – Exclusion: if in the opinion of the Minister introduction of the prohibited organism into the state or a part of the state should be prevented; and
- Category 2 (C2) – Eradication: if in the opinion of the Minister eradication of the prohibited organism from the state or a part of the state is feasible.

Weed Prioritisation

In 2008, the former Department of Environment and Conservation (now DBCA) developed and implemented an integrated approach to weed management on DBCA-managed lands in WA, the Weed Prioritisation Process (Bettink & Keighery, 2008). It was updated in 2013 and further revised in 2016. DBCA 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 key priorities are centred on 'Priority Alert' weeds and weeds that receive a rating for 'ecological impact' and 'invasiveness'.

2 EXISTING ENVIRONMENT

2.1 Biogeography

The Study Area is located within the Pilbara bioregion and Hamersley (PIL3) subregion, as defined by the Interim Biogeographic Regionalisation of Australia (IBRA; Thackway & Cresswell, 1995) (Figure 1.1). 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 (*Acacia aneura* complex) low woodlands or snappy gum (*Eucalyptus leucophloia*) over bunch and hummock grasses (Bastin, 2008). The Hamersley subregion is characterised by mountainous areas of Proterozoic sedimentary ranges (ironstone ranges) and plateaux dissected by gullies and gorges (Kendrick, 2001). Mulga low woodland over bunch grasses on fine-textured soils dominates in valley floors, while skeletal soils of the ranges are dominated by snappy gum over *Triodia brizoides* (Kendrick, 2001). Drainage is typically into the Fortescue River to the north, the Ashburton River to the south, or the Robe River to the west (Kendrick, 2001).

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 low pressure systems and cyclonic activity in the region (Leighton, 2004). Winter rainfall is generally lighter and often associated with cold fronts moving north easterly across the state (Leighton, 2004). The average annual rainfall ranges from 200–350 mm, although there are significant fluctuations between years, (BoM, 2021; McKenzie *et al.*, 2009).

2.3 Geology

The Hamersley subregion contains Proterozoic sedimentary ranges and gorges of basalt, shale and dolerite. This subregion also contains calcrete deposits (Kendrick, 2001).

The Study Area occurs across one broad (1:500,000) geological unit, Weeli Wolli formation (P-Haj-xci-od) characterised as a banded iron formation (commonly jaspilitic) containing mudstone, siltstone and numerous doleritic sills (Figure 2.1).

2.4 Soils

The CSIRO (2009) Atlas of Australian Soils described and mapped the soils of Australia following Bettany *et al.* (1967). The Study Area occurs over two soil units, Fa13 (1,521.47 ha, 95.1%) and Fb3 (78.07 ha, 4.9%) (Figure 2.2), with the dominant soil type Fa13 characterised by 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

(Um5.51) along with some (Uc5. 11) soils on the steeper slopes. Associated are (Dr2.33 and Dr2.32) (Bettany *et al.*, 1967). The remainder of the Study Area (along the western boundary) is comprised of soil Fb3 and comprises of high-level valley plains set in extensive areas of unit Fa13. There are extensive areas of pisolitic limonite deposits: principal soils are deep earthy loams (Um5.52) along with small areas of (Gn2.12) soils (Bettany *et al.*, 1967).

2.5 Land Systems

Payne *et al.* (1988) and Van Vreeswyk *et al*. (2004) classified and mapped the land systems of the Pilbara bioregions according to similarities in landform, soil, vegetation, geology and geomorphology. There are five land systems occurring within the Study Area. The dominant land system is the McKay land system, covering approximately 74.2% of the Study Area (Figure 2.3; Table 2.1). The McKay land system is defined as “Hills, ridges, plateaux remnants and breakaways of meta sedimentary and sedimentary rocks supporting hard spinifex grasslands”(van Vreeswyk *et al.*, 2004). The second most dominant is the Robe land system, covering approximately 13.0% of the Study Area and the three remaining land systems, River, Newman and Boolgeeda occupy only 5.9%, 4.7% and 2.2% of the Study Area respectively (Figure 2.3; Table 2.1).

Table 2.1: Land systems of the Study Area

Land system	Land type	Description	Extent in Study Area	
			Area (ha)	%
McKay (McK)	Hills and ranges with spinifex grasslands	Hills, ridges, plateaux remnants and breakaways of meta sedimentary and sedimentary rocks supporting hard spinifex grasslands.	1,187.46	74.2
Robe (Rob)	Mesas, breakaways and stony plains with spinifex grasslands	Low plateaux, mesas and buttes of limonites supporting soft spinifex (and occasionally hard spinifex) grasslands.	208.20	13.0
River (Riv)	River plains with grassy woodlands and tussock grasslands	Active flood plains, major rivers and banks supporting grassy eucalypt woodlands, tussock grasslands and soft spinifex grasslands	93.77	5.9
Newman (New)	Hills and ranges with spinifex grasslands	Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands.	74.53	4.7
Boolgeeda (Bgd)	Stony plains with spinifex grasslands	Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands.	35.57	2.2
Total			**1,599.54**	**100%**

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M 270SA

Yandi Rail Spur Line
Yandi Rail Spur Line
Yandicoogina Rail
Yandicoogina Rail
Mining Area C Railway

Western 4
Marillana Creek
Phils Creek
Yandi/HI
Junction Southeast

Legend

- Study Area
- Live Mining Tenement
- Operating Mine
- Rail

Bedrock Geology

- P-HAj-xci-od; Weeli Wolli Formation
- P-HAb-cib; Brockman Iron Formation
- AP-HAu-xsl-ci; Mount McRae Shale and Mount Sylvia Formation

N

biologic Environmental Survey

Scale: 1:100,000

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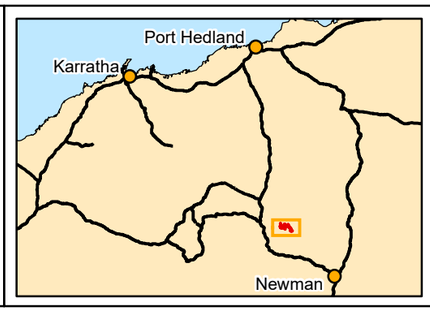
Coordinate System: GDA2020 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA2020 Created 07/02/2023



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Yandi E8 Targeted Flora Survey

Figure 2.1: Broad Geology of the Study Area

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730000
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7480000
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M 270SA
M 270SA
Yandi Rail Spur Line
Yandi Rail Spur Line
Western 4
Marillana Creek
Phils Creek
Yandi/HI
Junction Southeast
Yandicoogina Rail
Yandicoogina Rail
Mining Area C Railway

Legend

- Study Area
- Live Mining Tenement
- Operating Mine
- Rail

Soil Unit

- Fa13
- Fb3
- My55

N

biologic Environmental Survey

Scale: 1:100,000

0 2 4 6 Km

Coordinate System: GDA2020 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA2020 Created 07/02/2023

Port Hedland
Karratha
Newman

BHP WAIO

Yandi E8 Targeted Flora Survey

Figure 2.2: Soils of the Study Area

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7480000
M 270SA
Yandi Rail Spur Line
Yandi Rail Spur Line
Western 4
Marillana Creek
Phils Creek
Yandi/HI
Junction Southeast
Yandicoogina Rail
Yandicoogina Rail
Mining Area C Railway

Legend

- Study Area
- Live Mining Tenement
- Operating Mine
- Rail

Land System

- Boolgeeda System
- Calcrete System
- McKay System
- Newman System
- Oakover System
- Pindering System
- Platform System
- River System
- Robe System
- Rocklea System

N

biologic Environmental Survey

Scale: 1:100,000

0 2 4 6 Km

Coordinate System: GDA2020 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA2020 Created 07/02/2023

Port Hedland
Karratha
Newman

BHP WAIO

Yandi E8 Targeted Flora Survey

Figure 2.3: Land Systems of the Study Area

2.6 Hydrology and Surface Drainage

The Study Area occurs along two major watercourses, Marillana Creek and Lamb Creek, with Marillana Creek's un-named tributaries also intersecting the Study Area (Figure 2.4). The confluence of Marillana Creek and the southerly flowing Lamb Creek falls within the Study Area. The Marillana Creek flows in an easterly direction, running through a large proportion of the Study Area towards Weeli Wolli Creek, approximately 15km to the east of the Study Area. Marillana Creek is an important source of surface water runoff to Weeli Wolli Creek, which flows to the north and discharges into the Fortescue River Valley and into Fortescue Marsh, a nationally important wetland, approximately 29 km to the north of the Study Area (EPA, 2018). Marillana Creek typically only flows during the wet season following significant rainfall and it is periodically subject to major flooding as a result of cyclonic weather events in the region. Marillana Creek is also a source of recharge to the Marillana Creek CID groundwater aquifer (WRC, 2003). In addition to Fortescue March, the nationally important wetland, Karijini (Hamersley Range) Gorges, is located approximately 34 km to the north-west of the Study Area.

2.7 Pre-European Vegetation

Beard (1975) broadly (1:1,000,000) mapped the major structural vegetation types of Western Australia. Shepherd *et al.* (2002) reinterpreted and updated the vegetation association mapping to reflect the National Vegetation Information System (NVIS) standards (ESCAVI, 2003). This update also accounts for extensive clearing since Beard (1975) mapping.

Two vegetation associations occur within the Study Area (Figure 2.5). The dominant vegetation association is Hammersley-82 which covers approximately 86.8% (1,387.8ha) of the Study Area. The second largest vegetation association is Hammersley-18, covering approximately 13.2% (211.8ha) of the Study Area. The Hammersley-82 association comprises of hummock grasslands, low tree steppe and snappy gums over *Triodia wiseana*. Hammersley-18 comprises of low mulga woodland dominated by *Acacia aneura* (Shepherd *et al.*, 2002).

2.8 Land Use and Tenure

The Study Area is located upon two pastoral leases, with the western portion occurring on the Juna Downs Station and the eastern portion on Marillana Station. A small portion on the southern edge of the Study Area is vacant Crown Land, with a smaller portion in the north-western most section of the Study Area designated as Unallocated Crown Land. Dominant land use within the Study Area is mining activities, with the Study Area comprising nine separate areas on BHP WAIO Yandi mining operations.

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Yandi Rail Spur Line
Marillana Creek
Yandi Rail Spur Line
Western 4
Marillana Creek
Yandicoogina Rail
Phils Creek
Yandi/HI
Junction Southeast
Lamb Creek
Yandicoogina Rail
Mining Area C Railway
Yandicoogina Creek
Yandicoogina Creek

Legend

- Study Area
- Live Mining Tenement
- Operating Mine
- Rail

Surface Hydrology

- Minor
- Major

N

biologic Environmental Survey

Scale: 1:100,000

0 2 4 6 Km

Coordinate System: GDA2020 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA2020 Created 07/02/2023

Port Hedland
Karratha
Newman

BHP WAIO

Yandi E8 Targeted Flora Survey

Figure 2.4: Hydrology of the Study Area

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M 270SA
M 270SA

Yandi Rail Spur Line
Yandi Rail/ Spur Line
Western 4
Marillana Creek
Phils Creek
Yandi/HI
Junction Southeast
Yandicoogina Rail
Yandicoogina Rail
Mining Area C Railway

Legend

- Study Area
- Live Mining Tenement
- Operating Mine
- Rail

Vegetation Association

- Fortescue Valley 29
- Hammersley 18
- Hammersley 82

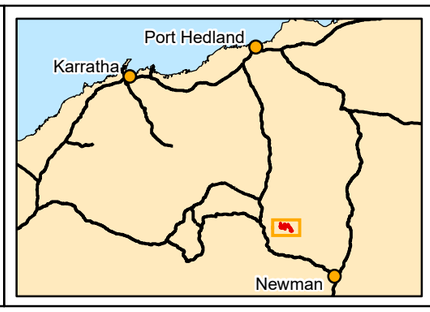
N

biologic Environmental Survey

Scale: 1:100,000

0 2 4 6 Km

Coordinate System: GDA2020 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA2020 Created 07/02/2023



BHP WAIO

Yandi E8 Targeted Flora Survey

Figure 2.5: Pre-European vegetation assocations of the Study Area

3 METHOD

3.1 Desktop Assessment

A desktop assessment, comprising database searches and a literature review, was undertaken prior to the field survey. The purpose of the desktop assessment was to identify vascular flora occurring, or potentially occurring, in the Study Area.

3.1.1 Database Searches

Database searches were undertaken to generate a list of vascular flora taxa previously recorded within, and near, the Study Area, including significant and introduced taxa. The database searches also identified ecological communities/ vegetation types of significance that occur, or may occur, within and near the Study Area. Conservation codes for flora and vegetation of significance are provided in Appendix A. Seven database searches (Table 3.1) were conducted for the Study Area with varying buffers as deemed appropriate.

Table 3.1: Details of database searches conducted

Provider	Reference	Database	Parameters
Department of Biodiversity, Conservation and Attractions	DBCA (2022a)	NatureMap	Buffer of 50 km around Study Area
	DBCA (2022b)	Threatened and Priority Ecological Communities	Buffer of 50 km around Study Area
	DBCA (2022c)	Threatened and Priority Flora	Buffer of 50 km around Study Area
Department of Agriculture, Water, and the Environment	DAWE (2022)	Protected Matters Search (MNES)[1]	Buffer of 40 km around Study Area
Atlas of Living Australia	ALA (2022)	Occurrence search	Buffer of 40 km around Study Area
BHP WAIO	BHP WAIO (2022)	BHP WAIO Flora records database	Search of BHP Yandi tenements (all within 15 km of Study Area)
Department of Primary Industry and Regional Development (DPIRD)	DPIRD (2022)	Declared Plants Database (WAOL)[1]	Search of the entire Shire of East Pilbara

[1]WAOL – Western Australian Organism List. This list was filtered to only include declared pests listed under Section 22 of the Biosecurity and Agricultural Management Act 2007.

3.1.2 Literature Review

The literature review considered 31 sources of relevance to the Study Area including field surveys and desktop assessments (Table 3.2; Appendix B). The previous surveys and assessments that were considered were provided by BHP WAIO, sourced from the Index of Biological Surveys for Assessments (IBSA) or obtained from Biologic's database. All are located within a radius of 40 km from the Study Area.

Table 3.2: Literature sources used for the review.

Report Title	Reference	Survey Type	Distance from Study Area
Ministers North Miscellaneous License Area Amendment Surveys and Yandicoogina Creek Detailed Flora and Vegetation Assessment	Biologic (2021)	Detailed Flora and Vegetation Survey	3.4 km south
Fibre Optic Cable Flora and Fauna Assessment	AECOM (2020)	Reconnaissance Flora and Vegetation Survey	30.3 km southwest
MAC4 Pipeline Reconnaissance Flora and Vegetation Assessment	Biologic (2019b)	Reconnaissance Flora and Vegetation Assessment	18.9 km south-southwest
Koodaideri Spring Gorge Ecological Monitoring - Phase 4 Baseline Report	Biota (2019)	Ecological Monitoring	16.9 km north
Area C West to Yandi Flora and Vegetation Assessment	Astron (2018)	Flora and Vegetation Values Assessment	0.1 km south
Yandicoogina Creek Reconnaissance Vegetation Survey	Onshore (2018)	Reconnaissance Flora and Vegetation Survey	Partially overlaps
Koodaideri - Flora, Vegetation and Fauna Habitat Assessment – NVCP Supporting Report	Rio Tinto (2016)	Reconnaissance and Targeted Flora and Vegetation Survey	22.4 km north-northwest
Marillana Creek Riparian Flora and Vegetation Survey	Onshore (2015)	Detailed Flora and Vegetation Survey, Riparian Vegetation Monitoring	Partially overlaps
Baby Hope Downs Flora and Vegetation Survey	Biota (2014a)	Detailed Flora and Vegetation Survey	22.2 km south
Yandicoogina Billiards Vegetation and Flora Survey – Phase 1 Interim Report	Biota (2014b)	Detailed Flora and Vegetation Survey	13.8 km west
Koodaideri Biological Assessment	Eco Logical (2014)	Detailed Flora and Vegetation Survey	20.4 km northwest
Area C West to Yandi Level 2 Flora and Vegetation Survey	Onshore (2014)	Detailed Flora and Vegetation Survey	Partially overlaps
Iron Valley Flora and Vegetation Survey	Astron (2012a)	Detailed Flora and Vegetation Survey	14 km west southwest
Koodaideri Hydrological Drilling Vegetation, Flora and Fauna Survey	Astron (2012b)	Reconnaissance Flora and Vegetation Assessment	28.8 km northwest
A Vegetation and Flora Survey of the Koodaideri Study Area	Biota (2012)	Detailed Flora and Vegetation Survey	11.8 km north northwest
Level 1 flora and fauna surveys along the Great Northern Highway for Jimblebar mine module transport	Eco Logical (2012)	Reconnaissance Flora and Vegetation Survey	37.9 km southwest
Level 2 Flora and Vegetation Survey South Flank	Onshore (2012)	Detailed Flora and Vegetation Survey	21.2 km southwest
Yandicoogina Additional Vegetation Mapping	Biota (2011)	Reconnaissance Flora and Vegetation Assessment	2.1 km southwest
Upper Marillana and Munjina Flora, Vegetation and Fauna Assessment	ENV (2011)	Detailed Flora and Vegetation Survey	2.6 km northwest
Area C and Surrounds Flora and Vegetation Survey	Onshore (2011)	Detailed Flora and Vegetation Survey	18.2 km south
Area C to Yandi Flora and Vegetation Survey	Astron (2010a)	Detailed Flora and Vegetation Survey	Directly adjacent
Packsaddle West Vegetation and Flora Survey and Fauna Assessment	Astron (2010c)	Detailed Flora and Vegetation Survey	24.4 km southwest
Vegetation and Flora Surveys of the Oxbow and Junction South West Deposits, near Yandicoogina	Biota (2010)	Detailed Flora and Vegetation Survey	Directly adjacent

Report Title	Reference	Survey Type	Distance from Study Area
Area C West NVCP Flora, Vegetation and Fauna Assessment	ENV (2010b)	Detailed Flora and Vegetation Survey	33.4 km southwest
Marillana (E47/1408) Vegetation and Flora Report	ecologia (2009)	Detailed Flora and Vegetation Survey	16.5 km northeast
Field Survey for Priority and Rare Flora – Area C South Flank	Pilbara Flora (2008)	Targeted Flora Survey	27.0 km south
Yandicoogina JSE Project - Conservation Significant Vegetation, Flora, Fauna and Fauna Habitat Assessment	Biota (2005a)	Detailed Flora and Vegetation Survey	6.8 km west
Yandicoogina Expansion Vegetation and Flora Survey	Biota (2004)	Detailed Flora and Vegetation Survey	6.8 km west
Packsaddle Range Biological Survey	Ecologia (2004)	Detailed Flora and Vegetation Survey	12.0 km south-southwest
Area C Biological Survey	Ecologia (1998)	Detailed Flora and Vegetation Survey	17.6 km south
Yandicoogina Stage II Iron Ore Project: Biological Assessment Survey	Ecologia (1995)	Detailed Flora and Vegetation Survey	Partially overlaps

3.2 Field Survey

3.2.1 Survey Timing & Personnel

The field survey was undertaken by three Biologic personnel over 19 person days. Principal Botanist Clinton van den Bergh lead the field survey with the support of Senior Botanist, Sam Coultas and Botanist Emily Eakin-Busher (Table 3.3). Biologic has a well-established and experienced botanical team with the team lead having over 17 years' experience in botanical surveys in WA. All personnel were fully inducted to site, hold the current and relevant licencing, and have adequate experience for the bioregion.

Table 3.3: Project Team & Licences

Biologic Personnel	Project Involvement	Licencing	Experience
Clinton van den Bergh Principal Botanist	Field survey – 13-15th May 2022	FB62000105 TFL 59-1819	16 years
Samuel Coultas Senior Botanist	Field survey – 13-20th May 2022	FB62000017-2 TFL 60-1819	10 years
Emily Eakin-Busher Botanist	Field survey – 13-20th May 2022	FB62000160 TFL 53-1920	9 years

3.2.2 Weather & Climate

Long-term climatic data is not available for the Study Area itself; however, long-term data is available from the Bureau of Meteorology (BoM) weather station at Newman Aero (Station 007176), located approximately 95 km south-east of the Study Area (BoM, 2021). The Newman Aero weather station is expected to provide the most accurate long-term average (LTA) dataset for climatic conditions

experienced within the Study Area and was therefore the source of all climatic data presented herein (Figure 3.1).

In the 12 months prior to the survey (May 2021 to April 2022), mean minimum and maximum temperatures recorded at Newman Aero Station were similar to the long-term averages for most months (Figure 3.1). Rainfall in the months preceding the survey was below the long-term averages for most months, except for November 2021, February, and May 2022, which recorded above the long-term average for the month (Figure 3.1). The survey month, May 2022 experienced significant rainfall (59.4 mm), more than three times the long-term average of 18.1 mm. However, the total rainfall (209.6 mm) received in the 12 months prior to the survey (June 2021 to May 2022) was well below annual long-term average for the same period (324.4 mm) (BoM, 2021).

Observed maximum temperatures during the survey (Table 3.4) were up to 4°C lower than the long-term average, with minimum temperatures varying between 7.5°C and 18.3°C (BoM, 2021). Rainfall was recorded on four days of the survey (Table 3.4).

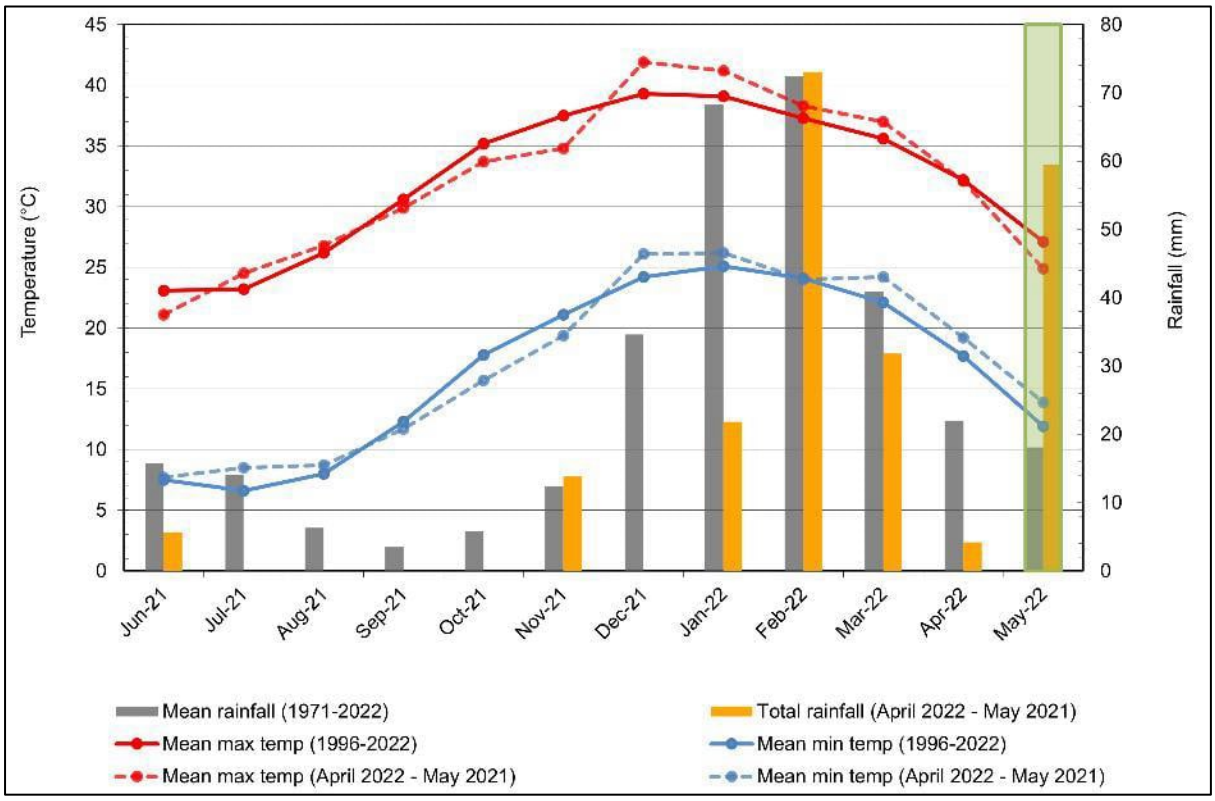


Figure 3.1: LTA and contemporary climate data recorded near the Study Area (BoM, 2021)

Note: approximate survey timing shown in shaded box

Table 3.4: Climatic conditions recorded for Newman Aero station during the current survey

Date	Min. temp (°C)	Max. temp (°C)	Rainfall (mm)
13/05/2022	16.4	23.1	5.2
14/05/2022	15.5	23.5	4.6
15/05/2022	8.3	24.6	0
16/05/2022	7.5	25.4	0
17/05/2022	16.1	24.3	0
18/05/2022	18.3	25.0	4.6
19/05/2022	15.9	26.4	0.4
20/05/2022	14.0	27.7	0

3.2.3 Targeted Flora Survey

Prior to the survey, a list of 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 (Figure 3.2).

Targeted searching was undertaken for flora of 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 preferentially targeted, while all other significant flora were searched broadly while traversing the Study Area. The meandering targeted searches while traversing the Study Area focussed on habitat considered likely to support significant flora.

If a 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;
- Broad information on vegetation type and condition; and
- Coordinates of either each plant (if few) or the extent of the population (if many) using a GPS.

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. Significant flora specimens will be vouchered with the Western Australian Herbarium (WAH), where required and appropriate.

705000
710000
715000
720000
7485000
7480000

Yandi Rail Spur Line
Marillana Creek Railway
Marillana Creek
Western 4
Mining Area C Railway
Yandicoogina Rail
Yandicoogina Rail

Legend

- Study Area
- Traverse
- Operating Mine
- Rail

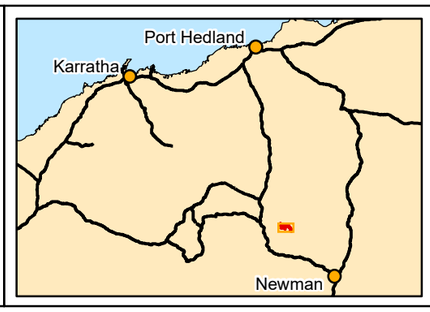
N

biologic Environmental Survey

Scale: 1:55,000

0 1 2 3 Km

Coordinate System: GDA2020 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA2020 Created 21/12/2022



BHP WAIO

Yandi E8 Targeted Flora Survey

Figure 3.2: Flora traverses

Introduced Taxa

Whilst completing the targeted flora searches, any significant environmental weeds were noted. Significant environmental weeds refer to any plant listed as Weeds of National Significance or Declared Plant Pests listed under Section 12 and Section 22 of the BAM Act. All other weeds were recorded to indicate presence of the weed species, however, not all locations and number of individuals was recorded, as it was not the key component of the survey. Weed classification definitions are provided in Appendix A

3.2.4 Nomenclature & Specimen Identification

Flora nomenclature used in this report is consistent with the WAH plant census, provided on Florabase (WAH, 1998-). All species nomenclature is current at the time of report preparation.

Specimens were identified by Dr Rachel Meissner using the appropriate taxonomic keys, and the Western Australian reference herbarium. Seven specimens (ACC/9598/E) were submitted for further identification and confirmation by relevant taxonomic experts at the WAH.

3.2.5 Assessment of Occurrence

Significant flora species identified in the desktop assessment were assessed per taxon for their likelihood of occurrence in the Study Area. Prior to field mobilisation, Biologic utilises botanical expertise and a decision matrix to guide a preliminary occurrence assessment for likely presence of significant flora. Following the field assessment, ground-truthing of existing significant flora records and presence of potential habitat is reviewed to revise the occurrence assessment per taxon.

The occurrence assessment decision matrix is outlined below in Table 3.5. The full detail of the preliminary and revised occurrence assessment is presented in Appendix D for each significant taxon identified by the desktop assessment.

Table 3.5: Occurrence Assessment decision matrix

Known Record's Proximity to the Study Area	Habitat categories within the Study Area			
	Core/ critical habitat present	Suitable habitat present/ within known distribution	Marginal habitat present/ adjacent to known distribution	Not present/ outside of known distribution
Recorded in the Study Area	Confirmed	Confirmed	Confirmed	Confirmed
Recorded within <5 km	Highly Likely	Likely	Possible	Possible
Recorded within 5-15 km	Likely	Possible	Possible	Unlikely
Recorded within 15 -40 km	Possible	Possible	Unlikely	Unlikely
Recorded >40 km	Possible	Unlikely	Unlikely	Highly Unlikely
Species considered locally/ regionally extinct	Unlikely	Unlikely	Highly Unlikely	Highly Unlikely

4 RESULTS

4.1 Desktop Assessment

4.1.1 Significant Flora

A total of 73 significant flora taxa (those listed under the EPBC Act, BC Act, or DBCA's Priority List) were identified from the database searches (Appendix C). Twenty-nine significant flora species were identified from the literature review. None the 29 significant flora species identified from the literature review were new or additional flora species to those found in the database searches.

Of the 73 taxa recorded in the desktop assessment, there are no threatened flora taxa, 9 Priority 1 taxa, 14 Priority 2 taxa, 42 Priority 3 taxa and eight Priority 4 taxa. Flora taxa of significance identified by the desktop assessment were assessed and ranked on the likelihood of occurring within the Study Area (Appendix D).

Two of the 73 flora taxa identified by the desktop assessment were Confirmed to occur within the Study Area: *Ipomoea racemigera* (P2), and *Rostellularia adscendens* var. *latifolia* (P3). Five flora taxa were considered Highly Likely to occur within the Study Area. Nine were considered Likely, 29 taxa Possible and the remaining taxa assessed as either Unlikely (20) or Highly Unlikely (eight) to occur (Table 4.1).

Table 4.1: Assessment of occurrence of flora species within the Study Area

Taxon	Description	Distance from Study Area
Confirmed		
Ipomoea racemigera (P2)	Creeping annual, herb or climber. Fl. white.	Within Study Area
Rostellularia adscendens var. *latifolia* (P3)	Herb or shrub, 0.1-0.3 m high. Fl. blue-purple-violet, Apr to May. Ironstone soils. Near creeks, rocky hills.	Within Study Area
Highly Likely		
Aristida lazaridis (P2)	Tufted perennial, grass-like or herb, 0.4-1.5 m high. Fl. green/purple, Apr. Sand or loam.	0.4 Km SSE
Amaranthus centralis (P3)	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	1.1 Km NW
Fimbristylis sieberiana (P3)	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	4.2 Km S
Sida sp. Barlee Range (S. van Leeuwen 1642) (P4)	Spreading shrub, to 0.5 m high. Fl. yellow, Aug. Skeletal red soils pockets. Steep slope.	0.5 Km NNE
Lepidium catapycnon (P4)	Open, woody perennial, herb or shrub, 0.2-0.3 m high, stems zigzag. Fl. white, Oct. Skeletal soils. Hillsides.	0.9 Km SSW
Likely		
Synostemon hamersleyensis (P1)	Shrub to 1 m high. Steep slopes, scree, cliffs, gorges. Ironstone	6.9 Km N

Taxon	Description	Distance from Study Area
Isotropis parviflora (P3)	Shrub, 0.1 m high. Fl. white/pink, Mar. Valley slope of ironstone plateau.	5.3 Km NE
Eremophila naaykensii (P3)	Erect shrub, 1-3 m high. Fl. White/pale blue. Red brown sandy clay loam. Upper slopes, gullies, gorges.	6.4 Km SE
Euphorbia australis var. *glabra* (P3)	Annual prostrate herb, leaves green with a red tinged margins. Drainage lines on clay loam and river sand	7.7 Km W
Gymnanthera cunninghamii (P3)	Erect shrub, 1-2 m high. Fl. cream-yellow-green, Jan to Dec. Sandy soils.	7 Km NNE
Rhagodia sp. Hamersley (M. Trudgen 17794) (P3)	Tall spindly shrub, 1.5-4 m high. Fl. yellow. Red brown sandy loam or clay, ironstone plain. Undulating plains, floodplain.	14.9 Km SSE
Themeda 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.	9.2 Km E
Vittadinia sp. Coondewanna Flats (S. van Leeuwen 4684) (P3)	Erect annual herb, 0.3-1 m high. Fl. cream, Mar-May, Jul-Sept. Red-brown sandy loam. Drainage areas, floodplains, flat and/or stony plains.	10.9 Km W
Acacia bromilowiana (P4)	Tree or shrub, to 12 m high, bark dark grey, fibrous; 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.	18.9 Km S
Possible		
Calotis squamigera (P1)	Procumbent annual, herb, to 0.21 m high. Fl. yellow, Jul. Pebbly loam	22.7 Km NE
Triodia sp. Karijini (S. van Leeuwen 4111)	Hummock grass to 0.9 m high. Steep hillslopes, hillcrests, ironstone outcrops on grey-brown silty loam	29.1 Km SW
Euphorbia inappendiculata var. *inappendiculata* (P2)	Prostrate annual herb, to 0.1 m high. Red brown clay loam. Flat plain, cracking clay floodplain, gentle slopes.	29.4 Km NE
Euphorbia inappendiculata var. *queenslandica* (P2)	Spreading, procumbent herb, to 0.4 m high. Fl. pink, Aug. Clay soils. Among broken rocky screes	23.4 Km WNW
Hibiscus sp. Gurinbiddy Range (M.E. Trudgen MET 15708) (P2)	Erect slender shrub, 1-3 m high. Fl. pale purple. Loamy skeletal soils. Gorge with ironstone outcropping, gullies, drainage line.	28.3 Km S
Abutilon sp. *Pritzelianum* (S. van Leeuwen 5095) (P3)	Shrub to 2m. Fl yellow. Sand plain, floodplain, plains. Red brown sand/ sandy loam.	32.1 Km N
Acacia effusa (P3)	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	18.4 Km WSW
Acacia subtiliformis	Spindly, slender, erect shrub, to 3.5 m high, phyllodes green; inflorescence in heads to 6 mm diameter; peduncles red. Fl. yellow, Jun. On rocky calcrete plateau.	1.7 Km W
Aristida jerichoensis var. *subspinulifera* (P3)	Compactly tufted perennial, grass-like or herb, 0.3-0.8 m high, lemma groove muricate. Hardpan plains.	18.7 Km NW
Dolichocarpa sp. Hamersley Station (A.A. Mitchell PRP 1479) (P3)	Spreading annual, herb, 0.05-0.1 m high. Fl. blue, Mar. Cracking clay, basalt. Gently undulating plain with large surface rocks, flat crabholed plain	11.2 Km W
Eleocharis papillosa (P3)	Tufted perennial herb, to 5 cm. Flowers brown. Clay pans, wetlands, flats. Variety of soils	36.9 Km N

Taxon	Description	Distance from Study Area
Eragrostis crateriformis (P3)	Annual, grass-like or herb, 0.1-0.5 m high. Fl. Jan to May or Jul. Clayey loam or clay. Creek banks, depressions.	23.6 Km WNW
Glycine falcata (P3)	Mat-forming perennial, herb, to 0.2 m high. Fl. blue-purple, May or Jul. Black clayey sand. Along drainage depressions in crabhole plains on river floodplains.	11.2 Km W
Goodenia lyrata (P3)	Prostrate herb, with lyrate leaves. Fl. yellow, Aug. Red sandy loam. Near claypan	26.4 Km SW
Grevillea saxicola (P3)	Tree or shrub, to 8 m high, rough bark on trunks and stems. Fl. creamy white. Skeletal red brown sandy loam with ironstone pebble cover. Rocky gully, drainage lines, steep cliff, low rocky hills.	27.2 Km SSE
Indigofera gilesii (P3)	Shrub, to 1.5 m high. Fl. purple-pink, May or Aug. Pebbly loam. Amongst boulders & outcrops, hills.	29.9 Km SSE
Iotasperma sessilifolium (P3)	Erect herb. Fl. pink. Cracking clay, black loam. Edges of waterholes, plains	25.2 Km WNW
Nicotiana umbratica (P3)	Erect, short-lived annual or perennial, herb, 0.3-0.7 m high. Fl. white, Apr to Jun. Shallow soils. Rocky outcrops.	25.0 Km SW
Pilbara trudgenii (P3)	Gnarled, aromatic shrub, to 1 m high. Fl. Sep. Skeletal, red stony soil over ironstone. Hill summits, steep slopes, screes, cliff faces.	32.7 Km SSW
Sida sp. Hamersley Range (K. Newbey 10692) (P3)	Shrub to 2m. Fl yellow. Gully, breakaway, slope. Ironstone. Red brown loam.	17.6 Km N
Stackhousia clementii (P3)	Dense broom-like perennial, herb, to 0.45 m high. Fl. green/yellow/brown. Skeletal soils. Sandstone hills.	38.8 Km N
Stylidium weeliwolli (P3)	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	13.4 Km SSE
Swainsona thompsoniana (P3)	Prostrate annual herb, to 0.2m high, Fl. blue, Mar-Sep, Nov-Dec. Higher altitude floodplains, top of hilltops and cracking clays on red-brown clay.	42.9 Km WSW
Triodia basitricha (P3)	Hummock grass to 0.8 m high, non-resinous. Red/brown clay loam over ironstone. Floodplains, flat hill crest, lower slopes.	21.9 Km SSW
Triodia 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.	27.2 Km SSE
Eremophila magnifica subsp. magnifica (P4)	Shrub, 0.5-1.5 m high. Fl. blue, Aug to Nov. Skeletal soils over ironstone. Rocky screes.	15.2 Km N
Eremophila youngii subsp. lepidota (P4)	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.	37.9 Km NE
Ptilotus mollis (P4)	Compact, perennial shrub, to 0.5 m high, soft grey foliage. Fl. white/pink, May or Sep. Stony hills and screes.	32.7 Km SSW
Rhynchosia bungarensis (P4)	Compact, prostrate shrub, to 0.5 m high. Fl. yellow. Pebbly, shingly coarse sand amongst boulders. Banks of flow line in the mouth of a gully in a valley wall. Granite	6.7 Km NNW

600000 650000 700000 750000 800000

7500000 7450000

Yandi Rail Spur Line

Marble Bar Rd

Great Northern Hwy

Mining Area C Railway

DBCA (2022)

Priority 1

- *Barbula ehrenbergii*
- *Calotis squamigera*
- *Lindernia* sp. Pilbara (M.N. Lyons & L. Lewis FV 1069)
- *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702)
- *Synostemon hamersleyensis*
- *Tecticornia globulifera*
- *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063)
- *Triodia* sp. Karijini (S. van Leeuwen 4111)
- *Vittadinia* sp. Coondewanna Flats (S. van Leeuwen 4684)

Priority 2

- *Adiantum capillus-veneris*
- *Aristida lazaridis*
- *Arthropodium vanleeuwenii*
- *Cladium procerum*
- *Eragrostis* sp. Mt Robinson (S. van Leeuwen 4109)
- *Eremophila pusilliflora*
- *Eremophila* sp. West Angelas (S. van Leeuwen 4068)
- *Euphorbia inappendiculata* var. *inappendiculata*
- *Euphorbia inappendiculata* var. *queenslandica*
- *Hibiscus* sp. Gurinbiddy Range (M.E. Trudgen MET 15708)
- *Ipomoea racemigera*
- *Kohautia australiensis*
- *Oxalis* sp. Pilbara (M.E. Trudgen 12725)
- *Teucrium pilbaranum*

Priority 3

- *Acacia effusa*
- *Acacia subtiliformis*
- *Amaranthus centralis*
- *Ampelopteris prolifera*
- *Aristida jerichoensis* var. *subspinulifera*
- *Atriplex flabelliformis*
- *Dampiera metallorum*
- *Dolichocarpa* sp. Hamersley Station (A.A. Mitchell PRP 1479)
- *Dysphania congestiflora*
- *Eleocharis papillosa*
- *Eragrostis crateriformis*
- *Eragrostis* sp. Erect spikelets (P.K. Latz 2122)
- *Eremophila magnifica* subsp. *velutina*
- *Eremophila naaykensii*
- *Eremophila spongiocarpa*
- *Euphorbia australis* var. *glabra*
- *Fimbristylis sieberiana*
- *Glycine falcata*
- *Goodenia lyrata*
- *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727)
- *Grevillea saxicola*
- *Gymnanthera cunninghamii*
- *Indigofera gilesii*
- *Iotasperma sessilifolium*
- *Isotropis parviflora*
- *Pilbara trudgenii*
- *Rhagodia* sp. Hamersley (M. Trudgen 17794)
- *Rostellularia adscendens* var. *latifolia*
- *Solanum kentrocaule*
- *Stackhousia clementii*
- *Streptoglossa* sp. Cracking clays (S. van Leeuwen *et al.* PBS 7353)
- *Stylidium weeliwolli*
- *Swainsona thompsoniana*
- *Tecticornia medusa*
- *Themeda* sp. Hamersley Station (M.E. Trudgen 11431)
- *Triodia basitricha*
- *Triodia* sp. Mt Ella (M.E. Trudgen 12739)
- *Xerochrysum boreale*

Priority 4

- *Acacia bromilowiana*
- *Eremophila magnifica* subsp. *magnifica*
- *Eremophila youngii* subsp. *lepidota*
- *Lepidium catapycnon*
- *Ptilotus mollis*
- *Rhynchosia bungarensis*
- >*Sida* sp. Barlee Range (S. van Leeuwen 1642)

Legend

- Study Area
- State Road
- Rail

BHP (2022)

Priority 1

- *Synostemon hamersleyensis*

Priority 2

- *Aristida lazaridis*
- *Ipomoea racemigera*

Priority 3

- *Acacia subtiliformis*
- *Amaranthus centralis*
- *Eremophila naaykensii*
- *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727)
- *Isotropis parviflora*
- *Rostellularia adscendens* var. *latifolia*

Priority 4

- *Acacia bromilowiana*
- *Lepidium catapycnon*
- *Sida* sp. Barlee Range (S. van Leeuwen 1642)

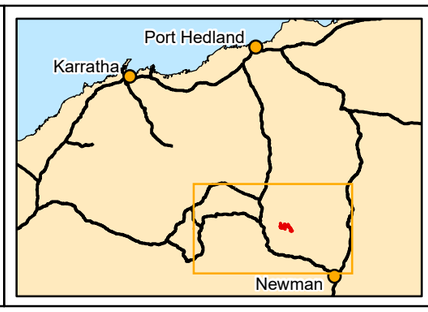
N

biologic Environmental Survey

Scale: 1:580,000

0 10 20 30 Km

Coordinate System: GDA2020 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA2020 Created 21/12/2022



BHP WAIO

Yandi E8 Targeted Flora Survey

Figure 4.1: Significant flora records identified from the desktop assessment

4.1.2 Significant Vegetation

There is only one TEC (listed under the BC Act) relevant to vegetation that occurs in the Pilbara region. This TEC, Themeda Grasslands on Cracking Clays, is restricted to cracking clay alluvial soils near Tom Price, and was not identified by any of the database searches or literature review. The desktop assessment revealed ten PECs occurring within 50 km of the Study Area (Figure 4.2, Table 4.2). Three of these PECs were identified by both the database search and literature review, one was identified from the literature review alone, and the remaining six were identified by the database searches alone. The closest PEC to the Study Area was 7.2 km southeast, along Weeli Wolli Creek ('Weeli Wolli Spring Community' (P1)). This PEC was also recorded by Onshore (2011) approximately 18.2 km to the south within Weeli Wolli Creek, and is consistent with the known occurrence of the PEC (e.g., it does not represent a new, unknown occurrence). Onshore (2012) recorded two subtypes of the 'Coolibah – Lignum Flats' PEC, to the southwest of BHPs Area C mine. ENV (2010a) also recorded this PEC but did not specify which subtype. Biologic (2021) described and mapped vegetation within Yandicoogina Creek that shares affinities with the 'Riparian flora and plant communities of springs and river pools with high water permanence of the Pilbara Region' PEC (P2).

Table 4.2: PECs identified by the desktop assessment

Ecological Community	Description (DBCA, 2021)	Closest occurrence to Study Area
Weeli Wolli Spring Community (P1)	Sedge and herbfield communities that fringe many of the pools and associated water bodies along the main channels of Weeli Wolli Creek have not been recorded from any other wetland site in the Pilbara.	7.2 km southeast
Fortescue Marsh (Marsh Land System) (P1)	Episodically inundated samphire marsh with fringing mulga woodlands, samphire shrublands and groundwater dependant riparian ecosystems. Endemic *Eremophila* species, populations of priority flora and several near endemic and novel samphire's.	18.2 km northeast
Vegetation of sand dunes of the Hamersley Range/Fortescue Valley (P3)	A small number of these dunes are vegetated with *Acacia dictyophleba* scattered tall shrubs over *Crotalaria cunninghamii*, *Trichodesma zeylanicum* var. *grandiflorum* open shrubland.	18.8 km northeast
Coolibah – Lignum Flats: sub type 1 Coolibah and mulga woodland over lignum and tussock grasses on clay plains (Coondewanna Flats and Wanna Munna Flats) (P3)	Woodland or forest of *Eucalyptus victrix* (coolibah) over thicket of *Duma florulenta* (lignum) on red clays in run-on zones. Associated species include *Eriachne benthamii* (swamp wanderrie), *Themeda triandra*, *Aristida latifolia*, *Eulalia aurea* and *Acacia aneura* (mulga).	21.2 km southwest^
Coolibah - Lignum Flats: sub type 2 Coolibah woodlands over lignum (*Duma florulenta*) over swamp wanderrie (Lake Robinson) (P1)		28.1 km southwest
Riparian flora and plant communities of springs and river pools with high water permanence of the Pilbara Region (P2)	The community includes flora with restricted distributions or populations that are highly disjunct or are major range extensions from northern and eastern Australia. These include *Imperata cylindrica*, Cladium *procerum*, *Schoenus falcatus* and *Fimbristylis sieberiana* (P3). In the Pilbara these taxa are almost exclusively restricted to the riparian zones of permanent wetlands with high soil moisture maintained by groundwater flows.	31.6 km southeast

Ecological Community	Description (DBCA, 2021)	Closest occurrence to Study Area
Kumina Land System (P3).	Duricrust plains and plateau remnants support hard spinifex grasslands.	33.8 km southeast
Freshwater claypans of the Fortescue Valley	Freshwater claypans downstream of the Fortescue Marsh - Goodiadarrie Hills, containing restricted elements of Pilbara riparian flora. Important for some poorly collected plants. Unique community with *Eriachne* spp., *Eragrostis* spp. grasslands with a few coolibah (*Eucalyptus victrix*).	35.3 km north-northwest
Brockman Iron cracking clay communities of the Hamersley Range (P1)	Rare tussock grassland dominated by *Astrebla lappacea* in the Hamersley Range, on the Brockman land system. Tussock grassland on cracking clays - derived in valley floors, depositional floors.	42.6 km north
West Angelas Cracking-Clays (P1)	Open tussock grasslands of *Astrebla pectinata*, *A. elymoides*, *Aristida latifolia*, in combination with low scattered shrubs of *Sida fibulifera*, on basalt (Jerrinah formation) derived cracking-clay loam depressions and flowlines.	44.3 km southwest

^Recorded by (Onshore, 2012), not by any of the database searches

650000
700000
750000
800000
7500000
7450000

Nanutarra Munjina Rd
Great Northern Hwy
Karijini Dr
Yandicoogina Rail
West Angelas Rail
Mining Area C Railway
Christmas Creek Extension
Roy Hill Railway
Port Hedland Newman Railway
Marble Bar Rd

Legend

- Study Area
- State Road
- Rail

Threatened and Priority Ecological Community

- Brockman Iron cracking clay communities
- Coolibah - Lignum Flats, sub type 2
- Fortescue Marsh
- Fortescue Valley Sand Dunes
- Freshwater claypans of the Fortescue Valley
- Kumina Land System
- Riparian communities of springs and Pools Pilbara
- Riparian communities of the Pilbara Region
- Weeli Wolli
- West Angelas

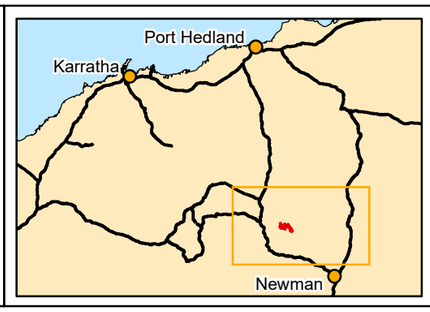
N

biologic Environmental Survey

Scale: 1:500,000

0 10 20 30 Km

Coordinate System: GDA2020 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA2020 Created 21/12/2022



BHP WAIO

Yandi E8 Targeted Flora Survey

Figure 4.2: Threatened and Priority Ecological Communities identified from the desktop assessment

4.1.3 Introduced Flora

The NatureMap (DBCA, 2022a), Protected Matters (DAWE, 2022), ALA (ALA, 2022) and the Western Australian Organism List (WAOL; DPIRD, 2022) database searches identified a list of 93 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 E) was reviewed to identify WoNS and DP.

Weeds of National Significance

Of the list of introduced taxa identified during the desktop assessment as occurring in or near the Study Area, 29 are listed as WoNS (Appendix E). The 29 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 identified any additional WoNS. The 29 taxa include numerous *Opuntia*, *Austrocylindropuntia*, and *Cylindropuntia* species that are grouped together in the WoNS listing.

Declared Pests

The desktop assessment identified 49 DPs (including numerous cacti species that are all listed as DPs, (Appendix E), previously recorded or potentially located within either the Shire of Ashburton or the Shire of East Pilbara. The database searches and literature review did not identify any DPs as occurring within the Study Area.

Weed Prioritisation

Parks and Wildlife have identified 'Priority Alert' weeds for each of their management regions. Fifteen introduced taxa have been identified for the Pilbara region (DBCA, 2014a, 2014b). Nine of these Priority Alert weeds may occur within the Study Area; **Calotropis procera*, **Cylindropuntia fulgida*, **Cylindropuntia imbricata, *Cylindropuntia kleiniae*, **Cylindropuntia pallida*, **Cylindropuntia tunicata*, **Jatropha gossypiifolia*, **Lantana camera*, and **Xanthium strumarium*.

650000 700000 750000 800000

7550000 7500000 7450000

Introduced Species

- *Aerva javanica
- *Alternanthera pungens
- *Argemone ochroleuca
- *Argemone ochroleuca subsp. ochroleuca
- *Bidens bipinnata
- *Cenchrus ciliaris
- *Cenchrus setiger
- *Centaurea melitensis
- *Chloris barbata
- *Chloris virgata
- *Citrullus amarus
- *Citrullus colocynthis
- *Citrullus sp. indet
- *Cucumis myriocarpus
- *Cynodon dactylon
- *Datura leichhardtii
- *Digitaria ciliaris
- *Echinochloa colona
- *Erigeron bonariensis
- *Euphorbia hirta
- *Flaveria trinervia
- *Lactuca serriola
- *Lactuca serriola forma serriola
- *Lysimachia arvensis
- *Malvastrum americanum
- *Melinis repens
- *Phoenix dactylifera
- *Polypogon monspeliensis
- *Rostraria cristata
- *Rumex vesicarius
- *Setaria verticillata
- *Sigesbeckia orientalis
- *Sisymbrium orientale
- *Solanum nigrum
- *Sonchus asper
- *Sonchus oleraceus
- *Stylosanthes hamata
- *Taraxacum khatoonae
- *Tribulus ? terrestris
- *Tribulus terrestris
- *Tridax procumbens
- *Vachellia farnesiana
- *Washingtonia filifera

Great Northern Hwy

Yandicoogina Rail

Yandicoogina Rail

Legend

- Study Area
- State Road
- Rail

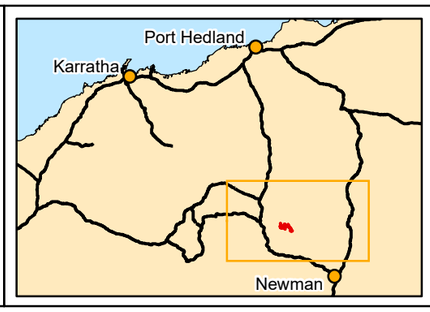
N

biologic Environmental Survey

Scale: 1:520,000

0 10 20 30 Km

Coordinate System: GDA2020 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA2020 Created 21/12/2022



BHP WAIO

Yandi E8 Targeted Flora Survey

Figure 4.3: Introduced flora species identified from the desktop assessment

4.2 Field Assessment

4.2.1 Threatened flora

No threatened flora species listed under the BC Act or the EPBC Act were observed to occur within the Study Area. The desktop review and likelihood of occurrence assessment indicated that no threatened flora are expected to occur in the Study Area.

4.2.2 Priority flora

Three conservation significant taxa were recorded in the Study Area: *Ipomoea racemigera* (P2), *Rostellularia adscendens* var. *latifolia* (P3), and *Sida* sp. Barlee Range (S. van Leeuwen 1642) (P4) (Figure 4.4).

Ipomoea racemigera (P2)

Ipomoea racemigera (P2) is a pilose, creeping annual herb or climber with twining stems and ovate leaves (WAH, 1998-) (Plate 4.1). It has a cymose inflorescence bearing 1-2, funnel-shaped white flowers produced throughout the year (pending favourable conditions), predominantly from March to August. Superficially, it closely resembles the unlisted taxon *Ipomoea plebeia*, differing only in having glabrous to very sparsely hairy upper surfaces and moderately pilose lower surfaces compared to evenly pilose upper and lower surfaces of *I. plebeia* (Keybase, 2020). A total of 482 individuals from 175-point locations were recorded in the Study Area by this survey. Individuals were restricted to the banks and channels of major and medium drainage line landforms (Appendix F; Figure 4.4).

Plate 4.1: *Ipomoea racemigera* showing flowers and tangled, twining stems (Photo: Biologic Database)

705000
710000
715000
720000
7485000
7480000

Yandi Rail Spur Line
Marillana Creek Railway
Marillana Creek
Western 4
Mining Area C Railway
Yandicoogina Rail
Yandicoogina Rail

Legend

- Study Area
- Operating Mine
- Rail

Significant Flora

- *Ipomoea racemigera*
- *Rostellularia adscendens* var. *latifolia*
- *Sida* sp. Barlee Range (S. van Leeuwen 1642)

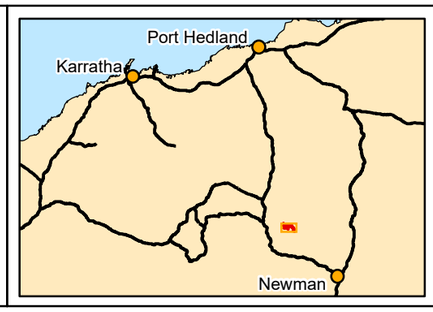
N

biologic Environmental Survey

Scale: 1:55,000

0 1 2 3 Km

Coordinate System: GDA2020 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA2020 Created 21/12/2022



BHP WAIO

Yandi E8 Targeted Flora Survey

Figure 4.4: Significant flora recorded in the Study Area

Rostellularia adscendens var. *latifolia* (P3)

Rostellularia adscendens var. *latifolia* (P3) is a small hairy herb or shrub, growing 0.1-0.3 m high (Plate 4.2), found predominantly in drainage areas or waterways. It produces blue-purple-violet flowers from April to May (WAH, 1998-). Optimal habitat is ironstone soils, near creeks and rocky hills. This survey recorded 267 individuals from 36 point-locations with 249 individuals recorded within the Study Area (Appendix F; Figure 4.4). The remaining individuals were recorded outside of the Study Area while better defining the occurrence and extent of individuals recorded during the survey.

Plate 4.2: *Rostellularia adscendens* var. *latifolia* showing habit and flower (Photo: Biologic Database)

Sida sp. Barlee Range (S. van Leeuwen 1642) (P4)

Sida sp. Barlee Range (S. van Leeuwen 1642) is a rounded, densely woolly to velvety shrub, which produces yellow flowers from May to September (Rio Tinto & WAH, 2015) (Plate 4.3). It is known to occur in skeletal soils and rocky areas, especially on scree slopes and rock piles that receive full sun (Rio Tinto & WAH, 2015). During the current survey, 40 individuals of *Sida* sp. Barlee Range (S. van Leeuwen 1642) were recorded from 16 point locations (Appendix F; Figure 4.4).

Plate 4.3: *Sida* sp. Barlee Range (S. van Leeuwen 1642) showing habit and substrate (left; Photo: Biologic, 18 May 2022) and yellow flowers (right; Photo: Biologic Database)

4.2.3 Flora of other significance

One species of other significance, *Imperata cylindrica*, was found during the survey. *Imperata cylindrica* (Plate 4.4) more commonly occurs in the wetter Kimberley region and the records in the Pilbara are likely relictual occurrences from a wetter past. *Imperata cylindrica* in the Pilbara almost exclusively occurs in association with persistently wet environments associated with springs or seeps. Occurrences are known from Munjina Gorge, Palm Springs, Mindy Mindy Creek, Weeli Wolli, Yandicoogina Creek (Biologic, 2021), and pools in Karijini National Park and Millstream National Park (WAH, 1998-).

Imperata cylindrica was recorded at 11 locations during the survey, with a total of 1,606 individuals. All these records are located in the far western section of the Study Area.

Plate 4.4: *Imperata cylindrica* occurrence from Marillana Creek (Photo: Biologic 15 May 2022)

4.2.4 Introduced Flora

Twenty-two introduced taxa were recorded from the Study Area (Figure 4.5), **Aerva javanica, *Argemone ochroleuca* subsp*. ochroleuca, *Bidens bipinnata, *Cenchrus ciliaris, *Cenchrus setiger, *Chloris barbata, *Citrullus amarus, *Cynodon dactylon, *Datura leichhardtii* subsp*. leichhardtii, *Distimake dissectus* var*. dissectus, *Echinochloa colona, *Erigeron bonariensis, *Flaveria trinervia, *Lactuca serriola, *Malvastrum Americanum, *Rumex vesicarius *Setaria verticillata, *Sigesbeckia orientalis, *Solanum nigrum, *Sonchus oleraceus, *Tridax procumbens* and **Vachellia farnesiana* were recorded from the Study Area (Figure 4.5).

None of the introduced taxa are listed as WoNS or DPs under the BAM Act or 'Priority Alert' weeds by Parks and Wildlife. The most frequently observed introduced taxa were **Aerva javanica *Bidens bipinnata, *Cenchrus ciliaris*, and **Vachellia farnesiana*, however the most abundant was**Cenchrus ciliaris, *Chloris barbata* and **Cynodon dactylon.*

705000 710000 715000 720000

7490000 7485000 7480000

Introduced Species

- **Aerva javanica*
- **Argemone ochroleuca* subsp. *ochroleuca*
- **Bidens bipinnata*
- **Cenchrus ciliaris*
- **Cenchrus setiger*
- **Chloris barbata*
- **Citrullus amarus*
- **Cynodon dactylon*
- **Datura leichhardtii* subsp. *leichhardtii*
- **Distimake dissectus* var. *dissectus*
- **Echinochloa colona*
- **Erigeron bonariensis*
- **Euphorbia hirta*
- **Flaveria trinervia*
- **Lactuca serriola*
- **Malvastrum americanum*
- **Rumex vesicarius*
- **Setaria verticillata*
- **Sigesbeckia orientalis*
- **Solanum nigrum*
- **Sonchus oleraceus*
- **Tridax procumbens*
- **Vachellia farnesiana*

Western 4

Marillana Creek

Mining Area C Railway

Yandicoogina Rail

Legend

- Study Area
- Operating Mine
- Rail

N

biologic Environmental Survey

Scale: 1:60,000

0 1 2 3 Km

Coordinate System: GDA2020 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA2020 Created 21/12/2022

Port Hedland
Karratha
Newman

BHP WAIO

Yandi E8 Targeted Flora Survey

Figure 4.5: Introduced flora species recorded in the Study Area

4.2.5 Review of Occurrence Assessment

Sixty-two significant taxa were assigned a different classification of occurrence during the review of Occurrence Assessment. A summary of the revised Occurrence Assessment is presented at Appendix D.

Both *Ipomoea racemigera* (P2) and *Rostellularia adscendens* var. *latifolia* (P3) (previously Confirmed in the Study Area) were recorded during the current survey. *Sida* sp. Barlee Range (S. van Leeuwen 1642) (P4) was recorded during the survey so has been updated from Highly Likely to Confirmed. All the other flora species that were considered Highly Likely or Likely pre-survey were assigned to lower classifications ranging from Possible to Highly Unlikely.

Dampiera metallorum and *Eremophila naaykensii* were assigned to Highly Unlikely (previously Unlikely, and Likely, respectively) as there were no suitably steep hills and gorges within the Study Area. *Fimbristylis sieberiana* and *Stylidium weeliwolli* were changed from Highly Likely to Unlikely, and Possible to Unlikely, respectively. Both species require permanent water which was not present in the Study Area. There was also no calcrete found within the Study Area so *Acacia subtiliformis* and *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) were updated from Possible and Unlikely, respectively, to Highly Unlikely.

The remaining taxa that were assigned a different classification of occurrence during the review of Occurrence Assessment were adjusted to Unlikely or Highly Unlikely. The seasonal conditions and timing were suitable for a targeted survey and the area was appropriately traversed so it is expected that perennial species and most annual species were represented.

4.3 Significant Vegetation

Although not specifically sampled for within the Study Area (i.e., with quadrats and statistical analysis), no significant vegetation consistent with known TECs or PECs were observed from within the Study Area. Prior to the field survey, the desktop assessment indicated that it was unlikely that any would occur, with this statement being accurate following the field survey.

Marillana Creek is known to support groundwater dependent vegetation (GDV), with the presence of *Eucalyptus camaldulensis* and *Eucalyptus victrix*, with pockets of mature *Melaleuca argentea* (Biologic, 2022; Onshore, 2015). The presence of GDVs, especially mature *Melaleuca argentea*, indicates that the vegetation along Marillana Creek is locally significant. Furthermore, surface water features were observed across Marillana Creek, with most being ephemeral and present due to the above average rainfall leading into the survey.

The vegetation supporting the Priority flora records is also significant from a local perspective, as it provides suitable habitat for the Priority flora. Most of the Priority flora records were from Marillana Creek, Lamb Creek and associated tributaries and floodplains. Although the vegetation supporting the Priority flora is of local significance, the significance is limited as suitable habitat and records for each of the Priority flora recorded are extensive and not restricted to the Study Area.

4.4 Constraints and Limitations

The EPA (2016b) outlines several potential limitations to flora and vegetation surveys. These aspects are assessed and discussed in Table 4.3. No major limitations or constraints were identified for the survey.

Table 4.3: Survey limitations and constraints.

Potential limitation or constraint	Constraint	Applicability to this survey
Availability of contextual information and data at a regional & local scale	No	Sufficient contextual information was available for the Study Area, including broad information on land systems and vegetation associations due to previous flora and vegetation surveys within and adjacent to, the Study Area.,
Competency / experience of the survey team, including Pilbara experience	No	The flora and vegetation field survey was led by two experienced botanists with over 22 years' combined experience. Principal Botanist and Manager of Botany, Clinton van den Bergh led the survey overall, with support from Senior Botanist, Samuel Coultas. The lead botanist, Clinton van den Bergh, met the minimum requirements to manage a flora and vegetation field survey in the Pilbara bioregion (EPA, 2016b).
Proportion of flora recorded/collected and any identification issues	No	The survey was a targeted flora search, concentrating on significant flora. The survey was undertaken 8-10 weeks after substantial rainfall, which resulted in good conditions for the targeted search. The key target species would have been identifiable at the time of the survey. All flora species collected were identified to at least the species level.
Appropriate area fully surveyed (effort & extent)	No	The area was appropriately surveyed by foot, targeting suitable habitat. However, only priority species were targeted, consistent with the type of targeted survey.
Access restrictions within the Study Area	No	The entire Study Area was accessible by foot. A Section 44 BHP employee provided access to areas around active mining.
Survey timing, weather and seasonality	No	Although there had been below average rainfall in the 12 months prior to the survey, there was substantial rainfall within 10 weeks prior. Due to this rainfall and the presence of annuals and herbs the timing and weather was considered suitable for a targeted flora survey.
Disturbance that may have affected results, e.g. fire, flood	No	Minor cattle grazing and the presence of introduced flora species were the main disturbances recorded within the Study Area. There was no evidence of recent or extensive fires or floods.

5 DISCUSSION AND CONCLUSION

5.1 Discussion

Ipomoea racemigera is a restricted taxon in Western Australia, with 13 known WAH records mainly recorded from sandy soils along medium and major watercourses in the Pilbara region of Western Australia from Jimblebar Mine to Millstream Chichester National Park, However, it is a common taxon through northern-central and eastern central Australia, with hundreds of records known collectively from the Northern Territory, South Australia and Queensland (ALA, 2020; WAH, 1998-). The 176-point locations of *Ipomoea racemigera* recorded in the Study Area are all located to the west in drainage lines. As these records of *Ipomoea racemigera* are within the known range they are not considered to be locally significant. In addition, Biologic's internal database has records of *Ipomoea racemigera* from the south near Newman, throughout the central-eastern Pilbara to Yandi minesite in the north. *Rostellularia adscendens* var. *latifolia* has a wide distribution across northern NSW, SA, QLD, NT and WA (ALA, 2021). The Western Australia distribution is restricted to the Pilbara from the Hamersley Ranges across to the Study Area, with scattered records further northeast around Nullagine and the Oakover River. There are 42 specimens of this species held at the WAH. *Rostellularia adscendens* var. *latifolia* was recorded at 36 point-locations during the current survey, scattered along drainage lines. A majority of these records are to the west and southeast of the Study Area. Previous BHP records show that *Rostellularia adscendens* var. *latifolia* has been observed throughout the Yandi area. Due to distribution and quantity of existing records this is not considered to be locally or regionally significant. In addition, Biologic's internal database has records of *Rostellularia adscendens* var. *latifolia* as occurring across the Pilbara from Tom Price in the west to Newman and Yandi minesite in the east.

Sida sp. Barlee Range (S. van Leeuwen 1642) (P4) occurs extensively across the Hamersley Range with WAH currently holding 58 specimens, while the DBCA have 52 known records (DBCA, 2020; WAH, 1998-). The records extend from the western Pilbara (Bungaroo Valley) to the eastern Pilbara (Hancock Range and beyond). The BHP internal database has numerous occurrences of *Sida* sp. Barlee Range (S. van Leeuwen 1642) within the Ministers North and Ministers North to Yandi Corridor area. All 16-point locations of *Sida* sp. Barlee Range (S. van Leeuwen 1642) recorded within the Study Area (during this survey) were found to the north. These are within one kilometre of existing BHP *Sida* sp. Barlee Range (S. van Leeuwen 1642) records. In addition, Biologic's database has records of *Sida* sp. Barlee Range (S. van Leeuwen 1642) as occurring across the Hamersley ranges in the Pilbara, as well as additional records around the Yandi minesite.

5.2 Conclusion

A single season targeted flora survey was completed in May 2022. Rainfall for the two months preceding the survey was above average which provided suitable conditions for the targeted survey, with the key target species being identifiable at the time of the survey. Work was completed to a level sufficient to meet EPA requirements and there were no major constraints or limitations to the survey.

Key findings of the current survey were:

- Three conservation significant listed flora taxa were recorded by this survey;
  - *Ipomoea racemigera* (P2) – 492 individuals from 176-point locations were recorded, with 482 individuals and 175-point locations from within the Study Area;
  - *Rostellularia adscendens* var. *latifolia* (P3) – 267 individuals from 36-point locations, of which 249 individuals from 34-point locations were from within the Study Area; and
  - *Sida* sp. Barlee Range (S. van Leeuwen 1642) (P4) – 40 individuals from 16-point locations from within the Study Area.
- Twenty-two introduced taxa were recorded from within the Study Area: **Aerva javanica*, **Argemone ochroleuca* subsp. *ochroleuca*, **Bidens bipinnata*, **Cenchrus ciliaris*, **Cenchrus setiger*, **Chloris barbata*, **Citrullus amarus*, **Cynodon dactylon*, **Datura leichhardtii* subsp. *leichhardtii*, **Distimake dissectus* var. *dissectus*, **Echinochloa colona*, **Erigeron bonariensis*, **Flaveria trinervia*, **Lactuca serriola*, **Malvastrum Americanum*, **Rumex vesicarius*, **Setaria verticillata*, **Sigesbeckia orientalis*, **Solanum nigrum*, **Sonchus oleraceus*, **Tridax procumbens* and **Vachellia farnesiana*. None of the recorded introduced taxa are listed as WoNS or DP.

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Appendix A: State and Federal Conservation Codes

Environment Protection and Biodiversity Conservation Act 1999

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

Category	Definition
Threatened Ecological Communities	
Critically Endangered	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.
Endangered	An ecological community is eligible to be included in the endangered category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable	An ecological community is eligible to be included in the vulnerable category at a particular time if, at that time: (a) it is not critically endangered nor endangered; and (b) it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.

Biodiversity Conservation Act 2016

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

Category	Definition
Threatened Ecological Communities	
Critically Endangered (CR)	An ecological community is eligible for listing in the category of critically endangered ecological community at a particular time if, at that time — (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 (b) listing in that category is otherwise in accordance with the ministerial guidelines.
Endangered (EN)	An ecological community is eligible for listing in the category of endangered ecological community at a particular time if, at that time — (a) it is not a critically endangered ecological community; and (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 (c) listing in that category is otherwise in accordance with the ministerial guidelines.
Vulnerable (VU)	An ecological community is eligible for listing in the category of vulnerable ecological community at a particular time if, at that time — (a) it is not a critically endangered ecological community or an endangered ecological community; and (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 (c) listing in that category is otherwise in accordance with the ministerial guidelines.
Collapsed	An ecological community is eligible for listing as a collapsed ecological community at a particular time if, at that time — (a) there is no reasonable doubt that the last occurrence of the ecological community has collapsed; or (b) the ecological community has been so extensively modified throughout its range that no occurrence of it is likely to recover — (i) its species composition or structure; or (ii) its species composition and structure.

Department of Biodiversity, Conservation and Attractions Priority Definitions

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

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

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

Appendix B: Literature Review

		Yandicoogina Stage II Iron Ore Project: Biological Assessment Survey	Area C to Yandi Flora and Vegetation Survey	Iron Valley Flora and Vegetation Survey	Yandicoogina Expansion Vegetation and Flora Survey	Yandicoogina JSE Project - Conservation Significant Vegetation, Flora, Fauna and Fauna Habitat Assessment
Survey Details	**Reference**	Ecologia (1995)	(Astron, 2010a)	(Astron, 2012a)	(Biota, 2004)	(Biota, 2005)
	Type	Detailed Flora and Vegetation Survey	Detailed Flora and Vegetation Survey	Detailed Flora and Vegetation Survey	Detailed Flora and Vegetation Survey	Detailed Flora and Vegetation Survey
	Client	BHP Iron Ore	BHP Billiton Iron Ore	URS Australia Pty Ltd on behalf of Iron Ore Holdings Ltd	Hamersley Iron Pty Ltd	Hamersley Iron Pty Ltd
	Location	Yandi Stage II	Area C to Yandi	Iron Valley Mining Tenement	Yandi	Yandi JSE
	Size (ha)	n/a	2, 181 ha	1,102 ha	511 ha	n/a
	Timing	May-June 1995	September 2010	April, July & Aug 2011	Aug-Sept 2004	Aug-Oct 2004 & May-June, Sept 2005
Methods	**Desktop Assessment (Yes/No)**	Yes	Yes	Yes	Yes	Yes
	Quadrat #	83	20	69	39	39
	Relevé #	n/a	7	6	n/a	6
	Targeted Searching (Yes/No)	Yes	Yes	No	Yes	Yes
	Other Methods	n/a	n/a	n/a	n/a	n/a
Results	**Taxa**	345	91	238	319	344
	Families	55	20	40	53	52
	Genera	15	43	105	150	140
	Vegetation Types	22	13	6	20	21
	Vegetation Condition	n/a	Excellent- Good	Excellent- Poor	Excellent- Degraded	n/a
	Weeds #	5	0	5	13	13
Significant Findings	**Threatened/ Priority Flora**	• One Priority flora species recorded: • *Goodenia stellata* (P2)[1] – no longer a priority	• One Priority flora species recorded: • *Acacia* bromilowiana (P4)	• None recorded	• Six Priority flora species recorded: ○ *Sida* sp. Barlee Range (S van Leeuwen 1642) (P2)[2] ○ *Themeda* sp. Hamersley Station (M.E. Trudgen 11431) (P4)[3] ○ *Goodenia stellata* (P4)[1] ○ *Olearia fluvialis* (P2), ○ *Abutilon trudgenii* (P3)[4]	• One Threatened and six Priority flora species recorded: ○ *Lepidium catapycnon* (T)[5] ○ *Sida* sp. Barlee Range (S van Leeuwen 1642) (P2)[2] ○ *Themeda* sp. Hamersley Station (M.E. Trudgen 11431) (P4)[3] ○ *Goodenia stellata* (P4)[1], ○ *Olearia fluvialis* (P2),[6] ○ *Abutilon trudgenii* (P3)[4], ○ *Sida* sp. Wittenoom (W.R.Barker 1962) (P3)[7]
	Threatened/ Priority Ecological Communities	n/a	n/a	None recorded	n/a	n/a
	WoNS and DPP Weeds	n/a	n/a	n/a	None recorded	n/a
	Range Extensions	n/a	n/a	Two range extensions: o Aristida hygrometrica o Senna curvistyla	n/a	n/a
	Other significant findings	n/a	n/a	n/a	Six vegetation types represented an ecosystem at risk (Kendrick 2003)	Six vegetation types considered to be of “other” significance - riparian or breakaway vegetation

		Yandicoogina Stage II Iron Ore Project: Biological Assessment Survey	Area C to Yandi Flora and Vegetation Survey	Iron Valley Flora and Vegetation Survey	Yandicoogina Expansion Vegetation and Flora Survey	Yandicoogina JSE Project - Conservation Significant Vegetation, Flora, Fauna and Fauna Habitat Assessment
Other	**Limitations of survey**	None identified	• Poor seasonal conditions	No substantial limitations	• Out-of-season timing • Dry conditions • A third of the study area had been recently burnt	None identified

[1] *Goodenia stellata* is no longer a priority taxon.

[2] *Sida* sp. Barlee Range (S van Leeuwen 1642) is now a priority four taxon.

[3] *Themeda* sp. Hamersley Station (M.E. Trudgen 11431) is now a priority three taxon.

[4] *Abutilon trudgenii* is no longer a priority taxon.

[5] *Lepidium catapycnon* is now a priority four taxon.

[6] *Olearia fluvialis* is no longer a priority taxon.

[7] *Sida* sp. Wittenoom (W.R.Barker 1962) is no longer a priority taxon.

		Vegetation and Flora Surveys of the Oxbow and Junction South West Deposits, near Yandicoogina	Yandicoogina Additional Vegetation Mapping	Area C West to Yandi Level 2 Flora and Vegetation Survey	Marillana Creek Riparian Flora and Vegetation Survey	Upper Marillana and Munjina Flora, Vegetation and Fauna Assessment
Survey Details	**Reference**	(Biota, 2010)	(Biota, 2011)	(Onshore, 2014)	(Onshore, 2015)	(ENV, 2011)
	Type	Vegetation and Flora Surveys	Additional Flora and vegetation survey	Two Season Detailed Flora and Vegetation Survey	Detailed Flora and Vegetation Survey and Riparian Vegetation Monitoring	Detailed Flora and Vegetation Survey
	Client	Rio Tinto Pty Ltd	Rio Tinto Iron Ore	BHP Billiton Iron Ore	BHP Billiton Iron Ore	BHP Billiton Iron Ore
	Location	Yandi Junction South West (JSW) and Oxbow Deposits	Additional areas around Oxbow and JSW Deposits and areas of Weeli Wolli Creek	Area C West to Yandi	Marillana Creek	Munjina and Upper Marillana
	Size (ha)	n/a	n/a	n/a	n/a	25,430 ha
	Timing	June 2007, July and August 2008, June 2009	November and December 2010	May to June 2011, July to August 2012 and August 2013	June 2015	August and September 2010
Methods	**Desktop Assessment (Yes/No)**	Yes	Yes	Yes	Yes	Yes
	Quadrat #	30	n/a	170	40	141
	Relevé #	1	n/a	n/a	237	n/a
	Targeted Searching (Yes/No)	Yes	Yes	Yes	Yes	No
	Other Methods	n/a	Vegetation assessment	n/a	5 riparian monitoring plot locations	Opportunistic collections
Results	**Taxa**	220 (Oxbow) 278 (JSW)	75	428	399 (Detailed) 70 (Riparian)	432
	Families	38 (Oxbow) 43 (JSW)	23	58	58 (Detailed)	48
	Genera	102 (Oxbow) 120 (JSW)	37	174	186 (Detailed)	166
	Vegetation Types	16 (Oxbow) 7 (JSW)	17	23	22 (Detailed)	9
	Vegetation Condition	Excellent- Very Good (Both areas)	Excellent- Completely Degraded	Excellent- Very Good	Excellent- Degraded (Detailed)	Pristine- Completely Degraded
	Weeds #	13 (Both areas)	1	12	22 (Detailed) 11 (Riparian)	9
Significant Findings	**Threatened/ Priority Flora**	One Threatened and one Priority flora taxa recorded: ○ Lepidium catapycnon (T)[1] (Oxbow Deposit) ○ Goodenia nuda (P4)[2] (JSW Deposit)	One Priority flora taxa recorded *Goodenia nuda* (P4)	• 13 Priority flora species recorded: ○ *Acacia subtiliformis* (P3) ○ *Aristida jerichoensis* subsp. *subspinulifera* (P1)[3] ○ *Acacia bromilowiana* (P4) ○ *Acacia effusa* (P3) ○ *Gymnanthera cunninghamii* (P3) ○ *Goodenia nuda* (P4)[1] ○ *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (P3) ○ *Rhynchosia bungarensis* (P4) ○ *Sauropus* sp. Koodaideri detritals (J. Naaykens & J. Hurter JH 11213) (P1)[4] ○ *Vittadinia* sp. Coondewanna Flats (s. Van Leeuwen 4684) (P1) ○ *Rostellularia adscendens* var. *latifolia* (P3) ○ *Sida* sp. Barlee Range (S. van Leeuwen 1642) (P3)[5] ○ *Spartothamnella puberula* (P2)[6]	• Six Priority flora species recorded: ○ *Amaranthus centralis* (P3) ○ *Aristida lazaridis* (P2) ○ *Goodenia nuda* (P4)[1] ○ *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (P3) ○ *Ipomoea racemigera* (P2) ○ *Rostellularia adscendens* var. *latifolia* (P3)	• Four Priority flora species recorded: ○ *Acacia subtiliformis* (P3) ○ *Aristida jerichoensis* var. *subspinulifera* (P1)[3] ○ *Rostellularia adscendens* var. *latifolia* (P3) ○ *Themeda* sp. Hamersley Station (M.E. Trudgen 11431) (P3)
	Threatened/ Priority Ecological Communities	n/a	No TECS or PECs	No TECS or PECs	No TECS or PECs	No TECS or PECs
	WoNS and DPP Weeds	None	None	None	None	None

		Vegetation and Flora Surveys of the Oxbow and Junction South West Deposits, near Yandicoogina	Yandicoogina Additional Vegetation Mapping	Area C West to Yandi Level 2 Flora and Vegetation Survey	Marillana Creek Riparian Flora and Vegetation Survey	Upper Marillana and Munjina Flora, Vegetation and Fauna Assessment
	Range Extensions	n/a	n/a	n/a	n/a	n/a
	Other significant findings	n/a	n/a	n/a	n/a	One community (Triodia Open Hummock Grassland 1b) is considered to be of interest
Other	**Limitations of survey**	•Dry conditions during 2008 surveys	• Poor survey conditions • Recent bushfire	No substantial limitations	No substantial limitations	• Poor seasonal conditions

[1] *Lepidium catapycnon* is now a priority four taxon.

[2] *Goodenia nuda* is no longer a priority taxon.

[3] *Aristida jerichoensis* subsp. *subspinulifera* is now a priority three taxon.

[4] *Sauropus* sp. Koodaideri detritals (J. Naaykens & J. Hurter JH 11213) is not current and is more recently known as *Synostemon hamersleyensis*, a Priority one species.

[5] *Sida* sp. Barlee Range (S van Leeuwen 1642) is now a priority four taxon.

[6] *Spartothamnella puberula* is an excluded name and no longer occurs in Western Australia.

		Yandicoogina Billiards Vegetation and Flora Survey – Phase 1 Interim Report	Yandicoogina Creek Reconnaissance Vegetation Survey	Marillana (E47/1408) Vegetation and Flora Report	Ministers North Miscellaneous License Area Amendment Surveys and Yandicoogina Creek Detailed Flora and Vegetation Assessment	Packsaddle Range Biological Survey
Survey Details	**Reference**	(Biota, 2014b)	(Onshore, 2018)	(ecologia, 2009)	(Biologic, 2020)	(Ecologia, 2004)
	Type	Detailed Flora and Vegetation Survey	Reconnaissance Flora and Vegetation Survey	Detailed Flora and Vegetation Survey	Detailed Flora and Vegetation Survey	Detailed Flora and Vegetation Survey
	Client	Rio Tinto	BHP WAIO	Brockman Resources Limited	BHP Western Australian Iron Ore	BHP Billiton Iron Ore
	Location	Yandi Billiards	Yandi Creek	Marillana tenement (E47/1408)	Minister's North and Yandicoogina Creek	Packsaddle Range
	Size (ha)	n/a	n/a	n/a	1,745 ha	n/a
	Timing	March 2014	June 2018	June and September 2008	Sept 2019 & March/April 2020	April and May 2004
Methods	**Desktop Assessment (Yes/No)**	Yes	Yes	Yes	Yes	Yes
	Quadrat #	118	n/a	137	29 (Yandi Creek) 3 (Minister's North)	53
	Relevé #	28	33	n/a	2 (Yandi Creek) 4 (Minister's North)	n/a
	Targeted Searching (Yes/No)	Yes	n/a	No	Yes (both locations)	Yes
	Other Methods	n/a	Opportunistic collections	n/a	n/a	n/a
Results	**Taxa**	451	n/a	302	248 (Yandi Creek) 128 (Minister's North) 279 (Both locations)	215
	Families	47	n/a	42	51 (Both)	42
	Genera	147	n/a	116	141 (Both)	102
	Vegetation Types	23	10	8	35	7
	Vegetation Condition	Very Good- Poor	Good- Poor	Excellent- Poor	Excellent- Degraded	Pristine- Poor
	Weeds #	18	10	10	17	2
Significant Findings	**Threatened/ Priority Flora**	• One Priority flora taxa recorded: *Goodenia nuda* (P4)[1]	• Five Priority flora species recorded: ○ *Aristida lazaridis* (P2) ○ *Fimbristylis sieberiana* (P3) ○ *Gymnanthera cunninghamii* (P3) ○ *Rostellularia adscendens* var. *latifolia* (P3) ○ *Sida* sp. Barlee Range (S. van Leeuwen 1643) (P3)[2]	• One Priority flora species recorded: ○ *Goodenia nuda* (P3)[1] • One Priority Ecological Community: ○ Vegetation of sand dunes of the Hamersley Range and Fortescue Valley (P3)	• Six Priority flora species recorded: ○ *Aristida lazaridis* (P2) ○ *Fimbristylis sieberiana* (P3) ○ *Gymnanthera cunninghamii* (P3) ○ *Goodenia nuda* (P4) ○ *Sida* sp. Barlee Range (S. van Leeuwen 1642) (P3) ○ *Rostellularia adscendens* var. *latifolia* (P3)	• Three Priority flora species recorded: ○ *Euphorbia drummondii* subsp. Pilbara (B.G. Thomson 3503) (P2)[3] ○ *Themeda sp. Mt. Barricade* (M.E. Trudgen 2471) (P3)[4] ○ *Triumfetta leptacantha* (P3)[5]
	Threatened/ Priority Ecological Communities	None recorded	None recorded	None recorded	None recorded	n/a
	WoNS and DPP Weeds	None recorded	None recorded	None recorded	None recorded	None recorded
	Range Extensions	n/a	n/a	n/a	n/a	n/a

		Yandicoogina Billiards Vegetation and Flora Survey – Phase 1 Interim Report	Yandicoogina Creek Reconnaissance Vegetation Survey	Marillana (E47/1408) Vegetation and Flora Report	Ministers North Miscellaneous License Area Amendment Surveys and Yandicoogina Creek Detailed Flora and Vegetation Assessment	Packsaddle Range Biological Survey
	Other significant findings	n/a	Six vegetation associations supported GDV, of which one supported zones of permanent pooling	n/a	• Three vegetation types considered to have affinities with '*Riparian flora and plant communities of springs and river pools with high water permanence of the Pilbara*' priority ecological community • 12 vegetation types considered to be of "other" significance as they support priority flora taxa.	n/a
Other	**Limitations of survey**	No substantial limitations	• Half of study area was not assessed due to heavy rainfall & distance	No substantial limitations	• Access restrictions within the survey area • Survey effort restricted due to Covid-19 pandemic	No substantial limitations

[1] *Goodenia nuda* is no longer listed as a priority taxon.

[2] *Sida* sp. Barlee Range (S van Leeuwen 1642) is now a priority four taxon.

[3] *Euphorbia drummondii* subsp. Pilbara (B.G. Thomson 3503) is not a current species name and is more recently known as *Euphorbia inappendiculata,* which now has two varieties; *Euphorbia inappendiculata* var. *inappendiculata* (P2)*, and Euphorbia inappendiculata* var. *queenslandica* (P2).

[4] *Themeda* sp. Mt. Barricade (M.E. Trudgen 2471) is no longer a priority taxon.

[5] *Triumfetta leptacantha* is no longer a priority taxon.

		Area C and Surrounds Flora and Vegetation Survey	Area C Biological Survey	Flora, Vegetation and Fauna Habitat Assessment at Koodaideri NVCP Supporting Report	MAC4 Pipeline Reconnaissance Flora and Vegetation Assessment	A Vegetation and Flora Survey of the Koodaideri Study Area
Survey Details	**Reference**	**(Onshore, 2011)**	(Ecologia, 1998)	(Rio Tinto, 2016)	(Biologic, 2019)	(Biota, 2012)
	Type	Detailed Flora and Vegetation Survey	Detailed Flora and Vegetation Survey	Reconnaissance Flora and Vegetation Survey	Reconnaissance Flora and Vegetation Assessment	Detailed Flora and Vegetation Survey
	Client	BHP Billiton Iron Ore	BHP Billiton Iron Ore	Rio Tinto	BHP WAIO	Rio Tinto
	Location	Area C and Surrounds	Mining Area C	Koodaideri	Mining Area C	Koodaideri
	Size (ha)	n/a	n/a	n/a	n/a	11,991 ha
	Timing	Nov to Dec 2009, Feb 2010, and June 2010	April & May 1997	May 2016	November 2018	July 2010, and March and May 2011
Methods	**Desktop Assessment (Yes/No)**	Yes	No (other studies mentioned)	n/a	Yes	Yes
	Quadrat #	510	132	n/a	n/a	62
	Relevé #	n/a	n/a	52	52	2
	Targeted Searching (Yes/No)	Yes	No	No	n/a	n/a
	Other Methods	Weed searching	29 transects	Opportunistic sampling	Opportunistic sampling	Opportunistic sampling
Results	**Taxa**	479 (Area C) 206 (Northern Survey Area) 219 (Southern Survey Area)	459	204	117	384
	Families	53 (Area C) 45 (Northern Survey Area) 36 (Southern Survey Area)	53	34	28	43
	Genera	166 (Area C) 97 (Northern Survey Area) 99 (Southern Survey Area)	161	69	66	130
	Vegetation Types	37 (Area C and surrounds)	15	12	17	25
	Vegetation Condition	Excellent- Very Good	n/a	Excellent- Poor	Excellent- Completely Degraded	Excellent- Completely Degraded
	Weeds #	11 (Area C) 2 (Southern Survey Area)	6	1	4	13

		Area C and Surrounds Flora and Vegetation Survey	Area C Biological Survey	Flora, Vegetation and Fauna Habitat Assessment at Koodaideri NVCP Supporting Report	MAC4 Pipeline Reconnaissance Flora and Vegetation Assessment	A Vegetation and Flora Survey of the Koodaideri Study Area
Significant Findings	**Threatened/ Priority Flora**	• One Declared Rare flora and 12 Priority flora species recorded: ○ *Lepidium catapycnon* (T)[1] ○ *Acacia subtiliformis* (P3) ○ *Aristida jerichoensis* subsp. *subspinulifera* (P1)[2] ○ *Aristida lazaridis* (P2) ○ *Eremophila magnifica* subsp. *magnifica* (P4) ○ *Fimbristylis sieberiana* (P3) ○ *Goodenia nuda* (P4)[3] ○ *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (P3) ○ *Nicotiana umbratica* (P3) ○ *Rhagodia* sp. Hamersley (M. Trudgen 17794) (P3) ○ *Rostellularia adscendens* var. *latifolia* (P3) ○ *Sida* sp. Barlee Range (S. van Leeuwen 1642) (P3)[4] ○ *Spartothamnella puberula* (P2)[5] • 12 Range extensions • One Priority Ecological Community: Weeli Wolli Spring Community (P1)	• Four Priority flora species recorded: ○ *Eremophila magnifica* subsp. *magnifica* (P3)[6] ○ *Triumfetta leptacantha* (P3)[7] ○ *Triumfetta maconochieana* (P3)[8] ○ *Brachychiton acuminatus* (P4)[9]	• Two Priority flora taxa recorded: ○ Synostemon hamersleyensis (P1) ○ Acacia bromilowiana (P4)	• Two Priority flora taxa recorded: ○ *Eremophila* sp. Hamersley Range (K. Walker KW 136) (P3)[10] ○ *Aristida lazaridis* (P4)[11]	• One Threatened and seven Priority flora taxa recorded: ○ *Lepidium catapycnon* (T)[1] ○ *Sida* sp. Hamersley Range (K. Newbey 10692) (P1)[12] ○ *Vigna* sp. central (M.E. Trudgen 1626) (P2)[13] ○ *Nicotiana umbratica* (P3) ○ *Sida* sp. Barlee Range (S van Leeuwen 1642) (P3) ○ *Themeda* sp. Hamersley Station (M.E. Trudgen 11431) (P3) ○ *Eremophila magnifica* subsp. *magnifica* (P4)[6] ○ *Rhynchosia bungarensis* (P4) • One newly recognised species: ◦ *Sauropus* sp. Koodaideri detritals (J. Naaykens & J. Hurter JH 11213)[14]
	Threatened/ Priority Ecological Communities	Eastern fringe of the Area C and Surrounds Study area; Weeli Wolli Spring Community, listed as Priority 1	n/a	None recorded	None recorded	None recorded
	WoNS and DPP Weeds	None recorded	None recorded	None recorded	None recorded	None recorded
	Range Extensions	n/a	n/a	n/a	n/a	n/a
	Other significant findings	n/a	n/a	n/a	• Four vegetation associations supported priority flora	n/a
Other	**Limitations of survey**	No substantial limitations	• Minor access issues	No substantial limitations	• Sub-optimal survey timing, dry conditions	• Poor accessibility in some sections

[1] *Lepidium catapycnon* is now a priority four taxon.
[2] *Aristida jerichoensis* subsp. *subspinulifera* is now a priority three taxon.
[3] *Goodenia nuda* is no longer a priority taxon.
[4] *Sida* sp. Barlee Range (S. van Leeuwen 1642) is now a priority four taxon.
[5] *Spartothamnella puberula* is an excluded name and no longer occurs in Western Australia.
[6] *Eremophila magnifica* subsp. *magnifica* is now a priority four taxon.
[7] *Triumfetta leptacantha* is no longer a priority taxon.
[8] *Triumfetta maconochieana* is no longer a priority taxon.
[9] *Brachychiton acuminatus* is no longer a priority taxon.
[10] *Eremophila* sp. Hamersley Range (K. Walker KW 136) is now *Eremophila naaykensii*.
[11] *Aristida Lazaridis* is now a priority two taxon.
[12] *Sida* sp. Hamersley Range (K. Newbey 10692) is now a priority three taxon.
[13] *Vigna* sp. central (M.E. Trudgen 1626) is not current and is more recently known as *Vigna* sp. Hamersley Clay (A.A. Mitchell PRP 113), which is not listed as a Priority flora taxon.
[14] *Sauropus* sp. Koodaideri detritals (J. Naaykens & J. Hurter JH 11213) is not current and is more recently known as *Synostemon hamersleyensis*, which is listed as a Priority one flora taxon.

		Level 2 Flora and Vegetation Survey South Flank	Packsaddle West Vegetation and Flora Survey and Fauna Assessment	Koodaideri Biological Assessment	Baby Hope Downs Flora and Vegetation Survey	Koodaideri Spring Gorge Ecological Monitoring - Phase 4 Baseline Report
Survey Details	**Reference**	(Onshore, 2012)	(Astron, 2010b)	(Eco Logical, 2014)	(Biota, 2014a)	(Biota, 2019)
	Type	Detailed Flora and Vegetation Survey	Detailed Flora and Vegetation Survey	Detailed Flora and Vegetation Survey	Detailed Flora and Vegetation Survey	Ecological Monitoring
	Client	BHP Billiton Iron Ore	BHP Billiton Iron Ore	Rio Tinto	Rio Tinto Iron Ore	Mount Bruce Mining Pty Ltd
	Location	South Flank	Packsaddle West	Koodaideri	Baby Hope Downs	Koodaideri Spring Gorge
	Size (ha)	n/a	20,000 ha	314 ha	1, 652 ha	n/a
	Timing	March, May and September 2010	April and May 2010	May-June 2014	Oct to Nov 2014	June 2019
Methods	**Desktop Assessment (Yes/No)**	Yes	Yes	Yes	Yes	No
	Quadrat #	220	120	27	17	24
	Relevé #	n/a	8	n/a	8	n/a
	Targeted Searching (Yes/No)	Yes	Yes	Yes	Yes	n/a
	Other Methods	n/a	n/a	28 mapping notes	n/a	16 transects, 78 riparian tree health monitoring points
Results	**Taxa**	386	283	131	354	120
	Families	50	48	32	53	36
	Genera	160	106	67	150	76
	Vegetation Types	34	27	4 broad vegetation communities	12	4
	Vegetation Condition	Pristine- Degraded	Pristine- Degraded	Excellent- Very Good	Excellent	Very Good- good
	Weeds #	8	4	1	10	5

		Level 2 Flora and Vegetation Survey South Flank	Packsaddle West Vegetation and Flora Survey and Fauna Assessment	Koodaideri Biological Assessment	Baby Hope Downs Flora and Vegetation Survey	Koodaideri Spring Gorge Ecological Monitoring - Phase 4 Baseline Report
Significant Findings	**Threatened/ Priority Flora**	• One Threatened and 13 Priority flora species recorded: ○ *Lepidium catapycnon* (T)[1] ○ *Acacia bromilowiana* (P4) ○ *Aristida jerichoensis* var. *subspinulifera* (P1)[2] ○ *Aristida lazaridis* (P2) ○ *Dampiera metallorum* (P3) ○ *Eremophila magnifica* subsp. *magnifica* (P4) ○ *Pilbara trudgenii* (P2)[3] ○ *Ptilotus mollis* (P4) ○ *Rhagodia* sp. Hamersley (M. Trudgen 17794) (P3) ○ *Rostellularia adscendens* var. *latifolia* (P3) ○ *Sida* sp. Barlee Range (S. van Leeuwen 1642) (P3)[4] ○ *Spartothamnella puberula* (P2)[5] ○ *Themeda* sp. Hamersley Station (M.E. Trudgen 11431) (P3) ○ *Triodia* sp. Mt Ella (M.E. Trudgen 12739) (P3) • Two Priority Ecological Community: ○ Coolibah woodland over Lignum over Swamp Wandiree (P1) ○ Coolibah and Mulga woodland over Lignum and tussock grasses on clay plains (P3)	• Three Priority flora species recorded: ○ *Eremophila magnifica* subsp. *magnifica* (P4) ○ *Rhagodia* sp. Hamersley (M. Trudgen 17794) (P3) ○ *Aristida jerichoensis* var. *subspinulifera* (P1)[2]	• One Priority flora species recorded: ○ *Rhynchosia bungarensis* (P4)	• Five Priority flora taxa recorded: ○ *Eremophila* sp. Hamersley Range (K. Walker KW 136) (P1)[6] ○ *Hibiscus* sp. Gurinbiddy Range (M.E. Trudgen MET 15708) (P2) ○ *Eremophila magnifica* subsp. *velutina* (P3) ○ *Goodenia lyrata* (P3) ○ *Eremophila magnifica* subsp. *magnifica* (P4)	• Two Priority flora taxa recorded: ○ *Sida* sp. Barlee Range (S. van Leeuwen 1642) (P3)[4] ○ *Rhynchosia bungarensis* (P4)
	Threatened/ Priority Ecological Communities	• two sub-types of the PEC Coolibah-lignum flats: Eucalyptus victrix over Muehlenbeckia florulenta, occur along the western fringe of the Study area ○ Coolibah (Eucalyptus victrix) woodland over Lignum (Muehlenbeckia florulenta) over Swamp Wandiree (Eriachne benthamii) (Priority 1) – Lake Robinson being the only known occurrence; and ○ Coolibah (Eucalyptus victrix) and Mulga (Acacia aneura) woodland over Lignum (Muehlenbeckia florulenta) and tussock grasses on clay plains (Priority 3) - Coondewanna Flats being one of two known occurrences (the other being Wanna Munna Flats).	None recorded within the Survey Area	Study area lies within the buffer of one Priority Ecological Community (PEC), the Priority 1 PEC „Fortescue Marsh"	None recorded	None recorded
	WoNS and DPP Weeds	None recorded	None recorded	None recorded	None recorded	None recorded
	Range Extensions	*Stylosanthes hamata	n/a	n/a	n/a	n/a

		Level 2 Flora and Vegetation Survey South Flank	Packsaddle West Vegetation and Flora Survey and Fauna Assessment	Koodaideri Biological Assessment	Baby Hope Downs Flora and Vegetation Survey	Koodaideri Spring Gorge Ecological Monitoring - Phase 4 Baseline Report
	Other significant findings	n/a	n/a	n/a	n/a	n/a
Other	**Limitations of survey**	No substantial limitations	• Poor seasonal conditions • Limited access	No substantial limitations	• Poor survey conditions • Some difficulty mapping vegetation from aerial images due to varying fire regimes. • Existing drilling disturbance made site selection difficult in some cases	Recent bushfire

[1] *Lepidium catapycnon* is now a priority four taxon.
[2] *Aristida jerichoensis* subsp. *subspinulifera* is now a priority three taxon.
[3] *Pilbara trudgenii* is now a priority three taxon.
[4] *Sida* sp. Barlee Range (S. van Leeuwen 1642) is now a priority four taxon.
[5] *Spartothamnella puberula* is an excluded name and no longer occurs in Western Australia.
[6] *Eremophila* sp. Hamersley Range (K. Walker KW 136) is now known as *Eremophila naaykensii* and is a priority three taxon.

		Fibre Optic Cable Flora and Fauna Assessment	Field Survey for Priority and Rare Flora – Area C South Flank	Area C West NVCP Flora, Vegetation and Fauna Assessment	Koodaideri Hydrological Drilling Vegetation, Flora and Fauna Survey	Level 1 flora and fauna surveys along the Great Northern Highway for Jimblebar mine module transport
Survey Details	**Reference**	(AECOM, 2020)	(Pilbara Flora, 2008)	(ENV, 2010b)	(Astron, 2012b)	(Eco Logical, 2012)
	Type	Reconnaissance Flora and Vegetation Assessment	Targeted Flora Survey	Detailed Flora and Vegetation Survey	Reconnaissance flora and vegetation survey	Reconnaissance flora and vegetation survey
	Client	Pilbara Iron	BHP Billiton Iron Ore	BHP Billiton Iron Ore	Rio Tinto Iron Ore Ltd	BHP Billiton Iron Ore
	Location	North of West Angelas	Area C South Flank	Area C West	Koodaideri Iron Ore Deposit	Great Northern Highway
	Size (ha)	21.7 ha	5610 ha	11,330 ha	23.5 ha	n/a
	Timing	November 2019	May 2008	August 2007 and March 2010	August 2007 and March 2010	August 2011
Methods	**Desktop Assessment (Yes/No)**	Yes	Yes	Yes	No	Yes
	Quadrat #	n/a	n/a	248	n/a	8
	Relevé #	8	n/a	n/a	9	n/a
	Targeted Searching (Yes/No)	No	Yes	n/a	n/a	Opportunistic sightings
	Other Methods	Opportunistic sampling	n/a	Opportunistic records	25 mapping notes	n/a
Results	**Taxa**	52	n/a	522	118	52
	Families	18	n/a	53	29	14
	Genera	30	n/a	169	60	26
	Vegetation Types	4	4 broad landscape units	10	8	7
	Vegetation Condition	Excellent	n/a	Pristine- Completely Degraded	Excellent- Degraded	Excellent- Degraded
	Weeds #	0	1	8	3	1
Significant Findings	**Threatened/ Priority Flora**	• One Priority flora species recorded: *Rhagodia* sp. Hamersley (M. Trudgen 17794) (P3)	• Two Priority flora species recorded: ○ *Triumfetta leptacantha* (P3)[1] ○ *Eremophila magnifica* subsp. *magnifica* (P4)	• Five priority flora species recorded: ○ *Eremophila magnifica* subsp. *magnifica* (P4) ○ *Eremophila magnifica* subsp. *velutina* (P3) ○ *Rhagodia* sp. Hamersley (M. Trudgen 17794) (P3) ○ *Sida* sp. Barlee Range (S. van Leeuwen 1642) (P3) ○ *Triodia* sp. Mt. Ella (ME Trudgen 12739) (P3)	None recorded	None recorded
	Threatened/ Priority Ecological Communities	None recorded	n/a	• One Priority Ecological Community: Coolibah-lignum Flats (P3)	None recorded	None recorded
	WoNS and DPP Weeds	n/a	None recorded	None recorded	None recorded	None recorded
	Range Extensions	n/a	n/a	n/a	n/a	n/a

		Fibre Optic Cable Flora and Fauna Assessment	Field Survey for Priority and Rare Flora – Area C South Flank	Area C West NVCP Flora, Vegetation and Fauna Assessment	Koodaideri Hydrological Drilling Vegetation, Flora and Fauna Survey	Level 1 flora and fauna surveys along the Great Northern Highway for Jimblebar mine module transport
	Other significant findings	n/a	n/a	n/a	n/a	n/a
Other	**Limitations of survey**	No substantial limitations	• No substantial limitations	• Poor seasonal conditions prior to the survey • Some identification issues due to poor material	• Unfavourable seasonal conditions	No substantial limitations

[1]*Triumfetta leptacantha* is no longer a priority taxon.

Appendix C: Database search results

Family	Taxon	Source							Conservation Status			Introduced
		NM	ALA	WAH	TPFL	EPBC	WAOL	BHP	DBCA	BC Act	EPBC Act	
Acanthaceae	*Rostellularia adscendens* var. *latifolia*	x		x				x	P3			
Alismataceae	*Sagittaria platyphylla*						x					Y
Amaranthaceae	*Aerva javanica*	x	x					x				Y
	Alternanthera pungens		x					x				Y
	Amaranthus centralis	x	x	x				x	P3			
	Ptilotus mollis	x	x	x				x	P4			
Apiaceae	*Cyclospermum leptophyllum*	x	x									Y
Apocynaceae	*Calotropis procera*						x					Y
	Cryptostegia madagascariensis						x					Y
	Gymnanthera cunninghamii	x	x	x				x	P3			
Araceae	*Pistia stratiotes*						x					Y
	Zantedeschia aethiopica						x					Y
Araliaceae	*Hydrocotyle ranunculoides*						x					Y
Arecaceae	*Phoenix dactylifera*							x				Y
	Washingtonia filifera							x				Y
Asparagaceae	*Arthropodium vanleeuwenii*			x								
	Asparagus asparagoides						x					Y
Asteraceae	*Bidens bipinnata*	x	x					x				Y
	Bidens subalternans		x									Y
	Bidens subalternans var. *simulans*	x										Y
	Calotis squamigera	x	x	x				x	P1			
	Centaurea melitensis							x				Y
	Chondrilla juncea						x					Y
	Erigeron bonariensis		x					x				Y
	Flaveria trinervia	x	x					x				Y
	Iotasperma sessilifolium	x		x					P3			
	Lactuca saligna	x	x									Y
	Lactuca serriola	x	x					x				Y

Family	Taxon	Source							Conservation Status			Introduced
		NM	ALA	WAH	TPFL	EPBC	WAOL	BHP	DBCA	BC Act	EPBC Act	
	Onopordum acaulon						x					Y
	Pilbara trudgenii	x	x	x	x			x	P3			
	Sigesbeckia orientalis	x	x					x				Y
	Silybum marianum						x					Y
	Sonchus asper							x				Y
	Sonchus oleraceus	x						x				Y
	Streptoglossa sp. Cracking clays (S. van Leeuwen et al. PBS 7353)			x								
	Symphyotrichum squamatum	x	x									Y
	Taraxacum khatoonae	x	x					x				Y
	Tridax procumbens	x	x					x				Y
	Vittadinia sp. Coondewanna Flats (S. van Leeuwen 4684)	x		x	x			x	P1			
	Xanthium spinosum						x					Y
	Xanthium strumarium						x					Y
	Xerochrysum boreale			x								
Boraginaceae	*Echium plantagineum*						x					Y
Brassicaceae	*Lepidium catapycnon*	x	x	x	x			x	P4			
	Sisymbrium orientale							x				Y
Cactaceae	*Austrocylindropuntia cylindrica*						x					Y
	Austrocylindropuntia subulata						x					Y
	Cylindropuntia fulgida						x					Y
	Cylindropuntia imbricata						x					Y
	Cylindropuntia kleiniae						x					Y
	Cylindropuntia pallida						x					Y
	Cylindropuntia tunicata						x					Y
	Opuntia elata						x					Y
	Opuntia elatior						x					Y
	Opuntia engelmannii						x					Y

Family	Taxon	Source							Conservation Status			Introduced
		NM	ALA	WAH	TPFL	EPBC	WAOL	BHP	DBCA	BC Act	EPBC Act	
	Opuntia ficus-indica						x					Y
	Opuntia microdasys						x					Y
	Opuntia monacantha						x					Y
	Opuntia puberula						x					Y
	Opuntia stricta						x					Y
	Opuntia tomentosa						x					Y
Celastraceae	*Stackhousia clementii*			x								
Chenopodiaceae	*Atriplex flabelliformis*	x		x				x	P3			
	Dysphania congestiflora	x		x					P3			
	Rhagodia sp. Hamersley (M. Trudgen 17794)	x		x	x			x	P3			
	Tecticornia globulifera	x		x	x			x	P1			
	Tecticornia medusa	x		x					P3			
	Tecticornia sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)	x		x				x	P1			
Convolvulaceae	*Ipomoea racemigera*	x	x	x				x	P2			
	Polymeria distigma		x						P3			
Cucurbitaceae	*Citrullus amarus*	x	x					x				Y
	Citrullus colocynthis							x				Y
	Coccinia grandis						x					Y
Cyperaceae	*Bulbostylis burbidgeae*							x	P4			
	Cladium procerum	x	x	x					P2			
	Eleocharis papillosa	x		x					P3			
	Fimbristylis sieberiana	x	x	x	x			x	P3			
Euphorbiaceae	*Euphorbia australis* var. *glabra*	x		x				x	P3			
	Euphorbia inappendiculata var. *inappendiculata*			x								
	Euphorbia inappendiculata var. *queenslandica*			x								
	Jatropha gossypiifolia						x					Y
Fabaceae	*Acacia bromilowiana*	x	x	x	x			x	P4			

Family	Taxon	Source							Conservation Status			Introduced
		NM	ALA	WAH	TPFL	EPBC	WAOL	BHP	DBCA	BC Act	EPBC Act	
	Acacia effusa	x	x	x	x			x	P3			
	Acacia subtiliformis	x	x	x	x			x	P3			
	Alhagi maurorum						x					Y
	Glycine falcata	x	x	x	x			x	P3			
	Indigofera gilesii	x	x	x	x			x	P3			
	Isotropis forrestii		x						P1			
	Isotropis parviflora	x	x	x				x	P3			
	Neltuma glandulosa × *velutina*						x					Y
	Parkinsonia aculeata						x					Y
	Rhynchosia bungarensis	x	x	x				x	P4			
	Senna alata						x					Y
	Senna obtusifolia						x					Y
	Stylosanthes hamata	x						x				Y
	Swainsona thompsoniana			x								
	Ulex europaeus						x					Y
	Vachellia farnesiana	x	x					x				Y
Goodeniaceae	*Dampiera metallorum*	x	x	x	x			x	P3			
	Goodenia lyrata	x	x	x	x			x	P3			
	Goodenia nuda	x	x	x	x			x				
	Goodenia sp. East Pilbara (A.A. Mitchell PRP 727)	x		x	x			x	P3			
Iridaceae	*Moraea flaccida*						x					Y
	Moraea miniata						x					Y
Lamiaceae	*Teucrium pilbaranum*			x								
Linderniaceae	*Lindernia* sp. Pilbara (M.N. Lyons & L. Lewis FV 1069)	x		x					P1			
Malvaceae	*Abutilon* sp. Pritzelianum (S. van Leeuwen 5095)							x	P3			
	Hibiscus sp. Gurinbiddy Range (M.E. Trudgen MET 15708)	x		x				x	P2			
	Malvastrum americanum	x	x					x				Y
	Seringia exastia	x	x	x								

Family	Taxon	Source							Conservation Status			Introduced
		NM	ALA	WAH	TPFL	EPBC	WAOL	BHP	DBCA	BC Act	EPBC Act	
	Sida sp. Barlee Range (S. van Leeuwen 1642)	x		x				x	P4			
	Sida sp. Hamersley Range (K. Newbey 10692)							x	P3			
Oxalidaceae	*Oxalis* sp. Pilbara (M.E. Trudgen 12725)	x		x					P2			
Papaveraceae	*Argemone ochroleuca*	x	x					x				Y
Phyllanthaceae	*Synostemon hamersleyensis*	x	x	x				x	P1			
Poaceae	*Aristida jerichoensis* var. subspinulifera	x		x	x			x	P3			
	Aristida lazaridis	x	x	x				x	P2			
	Cenchrus ciliaris	x	x					x				Y
	Cenchrus echinatus	x	x									Y
	Cenchrus setiger	x	x					x				Y
	Chloris barbata	x	x					x				Y
	Chloris virgata	x	x					x				Y
	Cynodon dactylon							x				Y
	Digitaria ciliaris	x	x					x				Y
	Echinochloa colona	x	x					x				Y
	Eragrostis crateriformis		x	x				x	P3			
	Eragrostis sp. Erect spikelets (P.K. Latz 2122)	x		x					P3			
	Eragrostis sp. Mt Robinson (S. van Leeuwen 4109)	x		x	x			x	P2			
	Melinis repens	x	x					x				Y
	Paspalum dilatatum	x	x									Y
	Polypogon monspeliensis							x				Y
	Rostraria cristata							x				Y
	Setaria verticillata	x	x					x				Y
	Themeda sp. Hamersley Station (M.E. Trudgen 11431)	x		x				x	P3			
	Triodia basitricha		x	x					P3			
	Triodia sp. Karijini (S. van Leeuwen 4111)	x		x				x	P1			
	Triodia sp. Mt Ella (M.E. Trudgen 12739)	x		x				x	P3			
Polygonaceae	*Rumex vesicarius*	x	x					x				Y

Family	Taxon	Source							Conservation Status			Introduced
		NM	ALA	WAH	TPFL	EPBC	WAOL	BHP	DBCA	BC Act	EPBC Act	
Primulaceae	*Lysimachia arvensis*							x				Y
	Samolus sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702)	x		x					P1			
Proteaceae	*Grevillea saxicola*	x	x	x				x	P3			
Pteridaceae	*Adiantum capillus-veneris*			x								
Rhamnaceae	*Ziziphus mauritiana*						x					Y
Rosaceae	*Rubus anglocandicans*						x					Y
	Rubus laudatus						x					Y
	Rubus rugosus						x					Y
	Rubus ulmifolius						x					Y
Rubiaceae	*Dolichocarpa* sp. Hamersley Station (A.A. Mitchell PRP 1479)			x				x	P3			
	Kohautia australiensis	x	x	x				x	P2			
Scrophulariaceae	*Eremophila magnifica* subsp. *magnifica*	x		x				x	P4			
	Eremophila magnifica subsp. *velutina*			x								
	Eremophila naaykensii	x		x				x	P3			
	Eremophila pusilliflora	x		x					P2			
	Eremophila sp. West Angelas (S. van Leeuwen 4068)	x		x				x	P2			
	Eremophila spongiocarpa	x	x	x	x			x	P3			
	Eremophila youngii subsp. *lepidota*	x		x				x	P4			
Solanaceae	*Datura leichhardtii* subsp. *leichhardtii*	x	x					x				Y
	Nicotiana umbratica							x	P3			
	Solanum elaeagnifolium						x					Y
	Solanum kentrocaule	x	x	x				x	P3			
	Solanum linnaeanum						x					Y
	Solanum nigrum	x	x					x				Y
Stylidiaceae	*Stylidium weeliwolli*	x	x	x	x			x	P3			
Tamaricaceae	*Tamarix aphylla*						x					Y
Thelypteridaceae	*Ampelopteris prolifera*			x								

Family	Taxon	Source							Conservation Status			Introduced
		NM	ALA	WAH	TPFL	EPBC	WAOL	BHP	DBCA	BC Act	EPBC Act	
Verbenaceae	*Lantana camara*						x					Y
Zygophyllaceae	*Tribulus terrestris*	x	x					x				Y

Appendix D: Likelihood of occurrence assessment

Taxon	Conservation Status			Habitat & Habit	Habitat within the Study Area	Within Current Known Distribution	Distance to Nearest Records	Likelihood Pre-Survey	Likelihood Post-Survey
	DBCA	BC Act	EPBC Act						
Ipomoea racemigera	P2			Creeping annual, herb or climber. Fl. white.	Yes	Yes	Within Survey Area	Confirmed	Confirmed
Rostellularia adscendens var. *latifolia*	P3			Herb or shrub, 0.1-0.3 m high. Fl. blue-purple-violet, Apr to May. Ironstone soils. Near creeks, rocky hills.	Yes	Yes	Within Survey Area	Confirmed	Confirmed
Amaranthus centralis	P3			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	Yes	Yes	1.1 Km NW	Highly Likely	Possible
Aristida lazaridis	P2			Tufted perennial, grass-like or herb, 0.4-1.5 m high. Fl. green/purple, Apr. Sand or loam.	Yes	Yes	0.4 Km SSE	Highly Likely	Possible
Fimbristylis sieberiana	P3			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	Yes	Yes	4.2 Km S	Highly Likely	Unlikely
Lepidium catapycnon	P4			Open, woody perennial, herb or shrub, 0.2-0.3 m high, stems zigzag. Fl. white, Oct. Skeletal soils. Hillsides.	Yes	Yes	0.9 Km SSW	Highly Likely	Unlikely
Sida sp. Barlee Range (S. van Leeuwen 1642)	P4			Spreading shrub, to 0.5 m high. Fl. yellow, Aug. Skeletal red soils pockets. Steep slope.	Yes	Yes	0.5 Km NNE	Highly Likely	Confirmed

Taxon	Conservation Status			Habitat & Habit	Habitat within the Study Area	Within Current Known Distribution	Distance to Nearest Records	Likelihood Pre-Survey	Likelihood Post-Survey
	DBCA	BC Act	EPBC Act						
Acacia bromilowiana	P4			Tree or shrub, to 12 m high, bark dark grey, fibrous; 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.	Yes	Yes	5.4 Km S	Likely	Unlikely
Eremophila naaykensii	P3			Erect shrub, 1-3 m high. Fl. White/pale blue. Red brown sandy clay loam. Upper slopes, gullies, gorges.	Yes	Yes	4.8 Km SE	Likely	Highly Unlikely
Euphorbia australis var. *glabra*	P3			Annual prostrate herb, leaves green with a red tinged margins. Drainage lines on clay loam and river sand	Yes	Yes	7.7 Km W	Likely	Unlikely
Gymnanthera cunninghamii	P3			Erect shrub, 1-2 m high. Fl. cream-yellow-green, Jan to Dec. Sandy soils.	Yes	Yes	7 Km NNE	Likely	Unlikely
Isotropis parviflora	P3			Shrub, 0.1 m high. Fl. white/pink, Mar. Valley slope of ironstone plateau.	Yes	Yes	0.7 Km W	Likely	Possible
Rhagodia sp. Hamersley (M. Trudgen 17794)	P3			Tall spindly shrub, 1.5-4 m high. Fl. yellow. Red brown sandy loam or clay, ironstone plain. Undulating plains, floodplain.	Yes	Yes	14.9 Km SSE	Likely	Unlikely
Synostemon hamersleyensis	P1			Shrub to 1 m high. Steep slopes, scree, cliffs, gorges. Ironstone	Yes	Yes	6.9 Km N	Likely	Unlikely
Themeda 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.	Yes	Yes	9.2 Km E	Likely	Highly Unlikely

Taxon	Conservation Status			Habitat & Habit	Habitat within the Study Area	Within Current Known Distribution	Distance to Nearest Records	Likelihood Pre-Survey	Likelihood Post-Survey
	DBCA	BC Act	EPBC Act						
Vittadinia sp. Coondewanna Flats (S. van Leeuwen 4684)	P1			Erect annual herb, 0.3-1 m high. Fl. cream, Mar-May, Jul-Sept. Red-brown sandy loam. Drainage areas, floodplains, flat and/or stony plains.	Yes	Yes	10.9 Km W	Likely	Unlikely
Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	P3			Shrub to 2m. Fl yellow. Sand plain, floodplain, plains. Red brown sand/ sandy loam.	Yes	Yes	32.1 Km N	Possible	Highly Unlikely
Acacia effusa	P3			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	Yes	Yes	18.4 Km WSW	Possible	Unlikely
Acacia subtiliformis	P3			Spindly, slender, erect shrub, to 3.5 m high, phyllodes green; inflorescence in heads to 6 mm diameter; peduncles red. Fl. yellow, Jun. On rocky calcrete plateau.	No	Yes	1.7 Km W	Possible	Highly Unlikely
Aristida jerichoensis var. subspinulifera	P3			Compactly tufted perennial, grass-like or herb, 0.3-0.8 m high, lemma groove muricate. Hardpan plains.	Yes	Yes	18.7 Km NW	Possible	Unlikely
Calotis squamigera	P1			Procumbent annual, herb, to 0.21 m high. Fl. yellow, Jul. Pebbly loam	Yes	Yes	22.7 Km NE	Possible	Unlikely
Dolichocarpa sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3			Spreading annual, herb, 0.05-0.1 m high. Fl. blue, Mar. Cracking clay, basalt. Gently undulating plain with large surface rocks, flat crabholed plain	Some	Yes	11.2 Km W	Possible	Unlikely
Eleocharis papillosa	P3			Tufted perennial herb, to 5 cm. Flowers brown. Clay pans, wetlands, flats. Variety of soils	Yes	Yes	36.9 Km N	Possible	Unlikely

Taxon	Conservation Status			Habitat & Habit	Habitat within the Study Area	Within Current Known Distribution	Distance to Nearest Records	Likelihood Pre-Survey	Likelihood Post-Survey
	DBCA	BC Act	EPBC Act						
Eragrostis crateriformis	P3			Annual, grass-like or herb, 0.1-0.5 m high. Fl. Jan to May or Jul. Clayey loam or clay. Creek banks, depressions.	Yes	Yes	23.6 Km WNW	Possible	Unlikely
Eremophila magnifica subsp. *magnifica*	P4			Shrub, 0.5-1.5 m high. Fl. blue, Aug to Nov. Skeletal soils over ironstone. Rocky screes.	Yes	Yes	15.2 Km N	Possible	Highly Unlikely
Eremophila youngii subsp. *lepidota*	P4			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.	Yes	Yes	37.9 Km NE	Possible	Highly Unlikely
Euphorbia inappendiculata var. *inappendiculata*	P2			Prostrate annual herb, to 0.1 m high. Red brown clay loam. Flat plain, cracking clay floodplain, gentle slopes.	Yes	Yes	29.4 Km NE	Possible	Unlikely
Euphorbia inappendiculata var. *queenslandica*	P2			Spreading, procumbent herb, to 0.4 m high. Fl. pink, Aug. Clay soils. Among broken rocky screes	Yes	Yes	23.4 Km WNW	Possible	Unlikely
Glycine falcata	P3			Mat-forming perennial, herb, to 0.2 m high. Fl. blue-purple, May or Jul. Black clayey sand. Along drainage depressions in crabhole plains on river floodplains.	Limited	Yes	11.2 Km W	Possible	Unlikely
Goodenia lyrata	P3			Prostrate herb, with lyrate leaves. Fl. yellow, Aug. Red sandy loam. Near claypan	Yes	Yes	26.4 Km SW	Possible	Unlikely

Taxon	Conservation Status			Habitat & Habit	Habitat within the Study Area	Within Current Known Distribution	Distance to Nearest Records	Likelihood Pre-Survey	Likelihood Post-Survey
	DBCA	BC Act	EPBC Act						
Grevillea saxicola	P3			Tree or shrub, to 8 m high, rough bark on trunks and stems. Fl. creamy white. Skeletal red brown sandy loam with ironstone pebble cover. Rocky gully, drainage lines, steep cliff, low rocky hills.	Yes	Yes	27.2 Km SSE	Possible	Unlikely
Hibiscus sp. Gurinbiddy Range (M.E. Trudgen MET 15708)	P2			Erect slender shrub, 1-3 m high. Fl. pale purple. Loamy skeletal soils. Gorge with ironstone outcropping, gullies, drainage line.	Yes	Yes	28.3 Km S	Possible	Unlikely
Indigofera gilesii	P3			Shrub, to 1.5 m high. Fl. purple-pink, May or Aug. Pebbly loam. Amongst boulders & outcrops, hills.	Yes	Yes	29.9 Km SSE	Possible	Unlikely
Iotasperma sessilifolium	P3			Erect herb. Fl. pink. Cracking clay, black loam. Edges of waterholes, plains	Yes	Yes	25.2 Km WNW	Possible	Possible
Nicotiana umbratica	P3			Erect, short-lived annual or perennial, herb, 0.3-0.7 m high. Fl. white, Apr to Jun. Shallow soils. Rocky outcrops.	Yes	Yes	25.0 Km SW	Possible	Highly Unlikely
Pilbara trudgenii	P3			Gnarled, aromatic shrub, to 1 m high. Fl. Sep. Skeletal, red stony soil over ironstone. Hill summits, steep slopes, screes, cliff faces.	Yes	Adjacent	32.7 Km SSW	Possible	Highly Unlikely
Ptilotus mollis	P4			Compact, perennial shrub, to 0.5 m high, soft grey foliage. Fl. white/pink, May or Sep. Stony hills and screes.	Yes	Yes	32.7 Km SSW	Possible	Highly Unlikely
Rhynchosia bungarensis	P4			Compact, prostrate shrub, to 0.5 m high. Fl. yellow. Pebbly, shingly coarse sand amongst boulders. Banks of flow line in the mouth of a gully in a valley wall. Granite	Some	Yes	6.7 Km NNW	Possible	Unlikely

Taxon	Conservation Status			Habitat & Habit	Habitat within the Study Area	Within Current Known Distribution	Distance to Nearest Records	Likelihood Pre-Survey	Likelihood Post-Survey
	DBCA	BC Act	EPBC Act						
Sida sp. Hamersley Range (K. Newbey 10692)	P3			Shrub to 2m. Fl yellow. Gully, breakaway, slope. Ironstone. Red brown loam.	Yes	Yes	17.6 Km N	Possible	Highly Unlikely
Stackhousia clementii	P3			Dense broom-like perennial, herb, to 0.45 m high. Fl. green/yellow/brown. Skeletal soils. Sandstone hills.	Yes	Yes	38.8 Km N	Possible	Unlikely
Stylidium weeliwolli	P3			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	Yes	Yes	13.4 Km SSE	Possible	Unlikely
Swainsona thompsoniana	P3			Prostrate annual herb, to 0.2m high, Fl. blue, Mar-Sep, Nov-Dec. Higher altitude floodplains, top of hilltops and cracking clays on red-brown clay.	Yes	Yes	42.9 Km WSW	Possible	Highly Unlikely
Triodia basitricha	P3			Hummock grass to 0.8 m high, non-resinous. Red/brown clay loam over ironstone. Floodplains, flat hill crest, lower slopes.	Yes	Yes	21.9 Km SSW	Possible	Highly Unlikely
Triodia sp. Karijini (S. van Leeuwen 4111)	P1			Hummock grass to 0.9 m high. Steep hillslopes, hillcrests, ironstone outcrops on grey-brown silty loam	Yes	Yes	29.1 Km SW	Possible	Highly Unlikely
Triodia 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.	Yes	Yes	27.2 Km SSE	Possible	Highly Unlikely
Atriplex flabelliformis	P3			Herb, 0.5 m high. Gilgai plains and marshes	Limited	Yes	27.1 Km N	Unlikely	Highly Unlikely

Taxon	Conservation Status			Habitat & Habit	Habitat within the Study Area	Within Current Known Distribution	Distance to Nearest Records	Likelihood Pre-Survey	Likelihood Post-Survey
	DBCA	BC Act	EPBC Act						
Bulbostylis burbidgeae	P4			Tufted, erect to spreading annual, grass-like or herb (sedge), 0.03-0.25 m high, spikelets in a simple umbel or rarely solitary; stamens 3; involucral bracts long, hairy. Fl. brown, Mar or Jun to Aug. Granitic soils. Granite outcrops, cliff bases. Sand/ sandy clay, clay loam.	No	Adjacent	25.8 Km NE	Unlikely	Highly Unlikely
Dampiera metallorum	P3			Rounded, multi-stemmed perennial, herb, to 0.5 m high. Fl. blue, Apr or Jun to Oct. Skeletal red-brown gravelly soil over banded ironstone. Steep slopes, summits of hills.	Yes	Yes	10.4 Km SSW	Unlikely	Highly Unlikely
Dysphania congestiflora	P3			Erect annual herb 3 - 9 cm tall. Deep red-brown clay on saline floodplains, salt lakes, lake beds, clay flats	Limited	Adjacent	31.6 Km N	Unlikely	Highly Unlikely
Eragrostis sp. Erect spikelets (P.K. Latz 2122)	P3			Tufted, erect perennial grass, to 0.3 m high. Calcrete rise, near samphire flats.	No	Adjacent	37.5 Km N	Unlikely	Highly Unlikely
Eragrostis sp. Mt Robinson (S. van Leeuwen 4109)	P2			Tussock-forming perennial, grass-like or herb, to 0.3 m high. Fl. Sep. Red-brown skeletal soils, ironstone. Steep slopes, summits.	Yes	Adjacent	34.5 Km SSW	Unlikely	Highly Unlikely
Eremophila magnifica subsp. *velutina*	P3			Shrub, 0.5-1.5 m high. Fl. blue-purple, Aug to Sep. Skeletal soils over ironstone. Summits.	Yes	No	40.1 Km SSW	Unlikely	Highly Unlikely
Eremophila pusilliflora	P2			Low spreading shrub, to 0.8 m high. Drainage lines, broad depressions, flood plains. Red sandy loam	Yes	Adjacent	39 Km SW	Unlikely	Highly Unlikely
Eremophila sp. West Angelas (S. van Leeuwen 4068)	P2			Spindly shrub, 0.4-3 m high. Skeletal brown-red soil or loam. Hill slopes and summits.	Yes	Adjacent	35 Km SSW	Unlikely	Highly Unlikely

Taxon	Conservation Status			Habitat & Habit	Habitat within the Study Area	Within Current Known Distribution	Distance to Nearest Records	Likelihood Pre-Survey	Likelihood Post-Survey
	DBCA	BC Act	EPBC Act						
Eremophila spongiocarpa	P3			Compact, succulent-leaved shrub, to 1 m high. Fl. white, May or Sep. Weakly saline alluvial plain on margins of marsh.	Limited	Adjacent	20.8 Km N	Unlikely	Highly Unlikely
Goodenia 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.	No	Yes	1.7 Km W	Unlikely	Highly Unlikely
Kohautia australiensis	P2			Erect sparsely or much-branched annual, herb, 0.1-0.5 m high. Fl. blue. Low calcrete outcrops.	No	No	9.7 Km W	Unlikely	Highly Unlikely
Lindernia sp. Pilbara (M.N. Lyons & L. Lewis FV 1069)	P1			Erect, annual herb. Claypans, low dunes/slopes, waters edge.	Yes	Adjacent	36.9 Km N	Unlikely	Highly Unlikely
Samolus sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702)	P1			Shrub or perennial herb to 1.5m high. Fl. white, Mar, May, Jul-Oct. Red clay loam, red sand, heavy clay, calcrete. Floodplain, edge of lakes/marshes, salt flats.	Yes	Adjacent	37.7 Km N	Unlikely	Highly Unlikely
Solanum kentrocaule	P3			Spiny, erect perennial shrub, to 0.7 m high. Fl. purple. Steep rocky gullies, gorges, outcrops, cliffs.	Some	Adjacent	35.1 Km SSW	Unlikely	Highly Unlikely
Streptoglossa sp. Cracking clays (S. van Leeuwen et al. PBS 7353)	P3			Annual herb. Fl. Pink. Floodplain, claypan. Cracking clays, clay loam.	Some	Yes	26.6 Km N	Unlikely	Highly Unlikely
Tecticornia globulifera	P1			Low compact shrub, to 0.5m high. Fl. red, green, May-June. Clay loam, sandy loam. Salt flats, lake beds, floodplain.	Yes	Adjacent	37.1 Km N	Unlikely	Highly Unlikely

Taxon	Conservation Status			Habitat & Habit	Habitat within the Study Area	Within Current Known Distribution	Distance to Nearest Records	Likelihood Pre-Survey	Likelihood Post-Survey
	DBCA	BC Act	EPBC Act						
Tecticornia medusa	P3			Erect shrub to 0.7 m. Articles bright green. Flat saline floodplain. Red clay. Samphire flats	No	No	40 Km N	Unlikely	Highly Unlikely
Tecticornia sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)	P1			Low shrub, 0.5m high. Fl. Jul-Aug, Oct. Red-orange/white sandy clay/sandy loam/brown loam. Gilgai/undulating plains, dry flats, saline flats, floodplain.	No	Adjacent	31.7 Km N	Unlikely	Highly Unlikely
Teucrium pilbaranum	P2			Upright shrub, 0.2 m high. Fl. white, May or Sep. Clay. Crab hole plain in a river floodplain, margin of calcrete table.	No	Yes	40 Km SSW	Unlikely	Highly Unlikely
Adiantum capillus-veneris	P2			Rhizomatous, perennial, herb or (fern), 0.1-0.2 m high, frond 1-2-pinnate; stipe blackish-brown, hard, glossy; sori marginal between sinuses, oblong. Moist, sheltered sites in gorges and on cliff walls.	Limited	No	44.5 Km WNW	Highly Unlikely	Highly Unlikely
Ampelopteris prolifera	P3			Rhizomatous, perennial, herb or (fern), to 4 m high, fronds 1-pinnate, pinnae shallowly lobed; buds on pinnae can form new plants; sori lacking indusia. Near water or in wet ground.	Some	No	44.5 Km WNW	Highly Unlikely	Highly Unlikely
Arthropodium vanleeuwenii	P2			Perennial herb, 0.3-0.9 m high. Fl. mauve. Red-brown loam soil. Moderately steep, south facing slopes of banded and Brockman iron formations.	Yes	No	42.9 Km WSW	Highly Unlikely	Highly Unlikely
Cladium procerum	P2			Densely tufted perennial, grass-like or herb (sedge), 2 m high. Fl. Nov (?). Perennial pools.	Limited	Yes	13.1 Km SE	Highly Unlikely	Highly Unlikely

Taxon	Conservation Status			Habitat & Habit	Habitat within the Study Area	Within Current Known Distribution	Distance to Nearest Records	Likelihood Pre-Survey	Likelihood Post-Survey
	DBCA	BC Act	EPBC Act						
Isotropis forrestii	P1			Erect shrub, 0.4-1.5 m high. Fl. yellow/orange & red, Apr to Sep or Dec. Stony clay loam, sandy alluvium. Along drainage lines.	Yes	Yes	5.3 Km NE	Highly Unlikely	Highly Unlikely
Oxalis sp. Pilbara (M.E. Trudgen 12725)	P2			Annual herb, 0.1-0.3 m high. Fl. Yellow. Brown sandy loam or clay. Gorge, ironstone outcrops, gully, shaded areas, creeklines.	Some	No	39.4 Km W	Highly Unlikely	Highly Unlikely
Polymeria distigma	P3			Prostrate trailing herb. Fl. pink, Apr to Jul. Sandy soils.	Yes	No	>40 Km NE	Highly Unlikely	Highly Unlikely
Xerochrysum boreale	P3			Perennial, erect shrub, 0.15-1 m high. Flowers yellow. Red-brown clay loam. Stony plain.	Yes	No	43.3 Km SE	Highly Unlikely	Highly Unlikely

Appendix E: Introduced flora database search results

Family	Taxon	Source					Declared Plant Pests (DPP)	Weed of National Significance (WoNS)	Ecological Impact	Invasiveness
		NM	ALA	EPBC	WAOL	BHP				
Alismataceae	*Sagittaria platyphylla*				x		Y	Y		
Amaranthaceae	*Aerva javanica*	x	x			x			High	Rapid
	Alternanthera pungens		x			x			Low	Slow
Apiaceae	*Cyclospermum leptophyllum*	x	x							
Apocynaceae	*Calotropis procera*				x		Y			
	Cryptostegia madagascariensis				x		Y			
Araceae	*Pistia stratiotes*				x		Y			
	Zantedeschia aethiopica				x		Y			
Araliaceae	*Hydrocotyle ranunculoides*				x		Y			
Arecaceae	*Phoenix dactylifera*					x			High	Rapid
	Washingtonia filifera					x			High	Rapid
Asparagaceae	*Asparagus asparagoides*				x		Y	Y		
Asteraceae	*Bidens bipinnata*	x	x			x			Unknown	Rapid
	Bidens subalternans		x							
	Bidens subalternans var. *simulans*	x								
	Centaurea melitensis					x				
	Chondrilla juncea				x		Y			
	Erigeron bonariensis		x			x				
	Flaveria trinervia	x	x			x				
	Lactuca saligna	x	x							
	Lactuca serriola	x	x			x				
	Onopordum acaulon				x		Y			
	Sigesbeckia orientalis	x	x			x			Unknown	Rapid
	Silybum marianum				x		Y			
	Sonchus asper					x				
	Sonchus oleraceus	x				x			Low	Rapid
	Symphyotrichum squamatum	x	x							

Family	Taxon	Source					Declared Plant Pests (DPP)	Weed of National Significance (WoNS)	Ecological Impact	Invasiveness
		NM	ALA	EPBC	WAOL	BHP				
	Taraxacum khatoonae	x	x			x				
	Tridax procumbens	x	x			x				
	Xanthium spinosum				x		Y			
	Xanthium strumarium				x		Y			
Boraginaceae	*Echium plantagineum*				x		Y			
Brassicaceae	*Sisymbrium orientale*					x			Low	Unknown
Cactaceae	*Austrocylindropuntia cylindrica*				x		Y	Y		
	Austrocylindropuntia subulata				x		Y	Y		
	Cylindropuntia fulgida				x		Y	Y	High	Slow
	Cylindropuntia imbricata				x		Y	Y		
	Cylindropuntia kleiniae				x		Y	Y		
	Cylindropuntia pallida				x		Y	Y		
	Cylindropuntia tunicata				x		Y	Y		
	Opuntia elata				x		Y	Y		
	Opuntia elatior				x		Y	Y		
	Opuntia engelmannii				x		Y	Y		
	Opuntia ficus-indica				x		Y	Y		
	Opuntia microdasys				x		Y	Y		
	Opuntia monacantha				x		Y	Y		
	Opuntia polyacantha				x		Y	Y		
	Opuntia puberula				x		Y	Y		
	Opuntia stricta				x		Y	Y	High	Rapid
	Opuntia tomentosa				x		Y	Y		
Cucurbitaceae	*Citrullus amarus*	x	x			x				
	Citrullus colocynthis					x			Unknown	Moderate
	Coccinia grandis				x		Y			
Euphorbiaceae	*Jatropha gossypiifolia*				x		Y			
Fabaceae	*Alhagi maurorum*				x		Y			
	Neltuma glandulosa × velutina				x		Y	Y	High	Rapid
	Parkinsonia aculeata				x		Y	Y		

Family	Taxon	Source					Declared Plant Pests (DPP)	Weed of National Significance (WoNS)	Ecological Impact	Invasiveness
		NM	ALA	EPBC	WAOL	BHP				
	Senna alata				x		Y			
	Senna obtusifolia				x		Y			
	Stylosanthes hamata	x				x				
	Ulex europaeus				x		Y	Y		
	Vachellia farnesiana	x	x			x			High	Rapid
Iridaceae	*Moraea flaccida*				x		Y			
Iridaceae	*Moraea miniata*				x		Y			
Malvaceae	*Malvastrum americanum*	x	x			x			High	Rapid
Papaveraceae	*Argemone ochroleuca*	x	x			x				
Poaceae	*Cenchrus ciliaris*	x	x			x			High	Rapid
	Cenchrus echinatus	x	x						Medium	Rapid
	Cenchrus setiger	x	x			x			High	Rapid
	Chloris barbata	x	x			x			High	Rapid
	Chloris virgata	x	x			x			High	Rapid
	Cynodon dactylon					x			High	Rapid
	Digitaria ciliaris	x	x			x			Low	Slow
	Echinochloa colona	x	x			x			High	Rapid
	Melinis repens	x	x			x				
	Paspalum dilatatum	x	x							
	Polypogon monspeliensis					x				
	Rostraria cristata					x				
	Setaria verticillata	x	x			x			High	Rapid
Polygonaceae	*Rumex vesicarius*	x	x			x				
Primulaceae	*Lysimachia arvensis*					x				
Rhamnaceae	*Ziziphus mauritiana*				x		Y			
Rosaceae	*Rubus anglocandicans*				x		Y	Y		
	Rubus laudatus				x		Y	Y		
	Rubus rugosus				x		Y	Y		
	Rubus ulmifolius				x		Y	Y		
Solanaceae	*Datura leichhardtii* subsp. *leichhardtii*	x	x			x				
	Solanum elaeagnifolium				x		Y	Y		
	Solanum linnaeanum				x		Y			
	Solanum nigrum	x	x			x			Low	Rapid

Family	Taxon	Source					Declared Plant Pests (DPP)	Weed of National Significance (WoNS)	Ecological Impact	Invasiveness
		NM	ALA	EPBC	WAOL	BHP				
Tamaricaceae	*Tamarix aphylla*				x		Y	Y	High	Rapid
Verbenaceae	*Lantana camara*				x		Y	Y		
Zygophyllaceae	*Tribulus terrestris*	x	x			x			Unknown	Moderate

Appendix F: Significant flora locations from the Study Area

Taxon	Latitude	Longitude	Individuals	Taxon	Latitude	Longitude	Individuals
Ipomoea racemigera	-22.7440701	119.0143405	15	*Ipomoea racemigera*	-22.7298	118.9907	1
Ipomoea racemigera	-22.7438938	119.014448	1	*Ipomoea racemigera*	-22.7298	118.9907	1
Ipomoea racemigera	-22.7431542	119.0152648	3	*Ipomoea racemigera*	-22.7298	118.9907	1
Ipomoea racemigera	-22.7430842	119.0153101	2	*Ipomoea racemigera*	-22.7297	119.0545	5
Ipomoea racemigera	-22.7417291	119.0157793	5	*Ipomoea racemigera*	-22.7296	118.9906	1
Ipomoea racemigera	-22.74154891	119.0090635	1	*Ipomoea racemigera*	-22.7296	118.9906	4
Ipomoea racemigera	-22.7415244	119.0150639	1	*Ipomoea racemigera*	-22.7296	118.9906	1
Ipomoea racemigera	-22.74126663	119.0069249	1	*Ipomoea racemigera*	-22.7296	118.9906	1
Ipomoea racemigera	-22.74124299	119.0070635	1	*Ipomoea racemigera*	-22.7295	118.9906	5
Ipomoea racemigera	-22.741148	119.0151954	5	*Ipomoea racemigera*	-22.7295	118.9905	4
Ipomoea racemigera	-22.74108977	119.0067676	4	*Ipomoea racemigera*	-22.7291	118.9901	1
Ipomoea racemigera	-22.7410365	119.0152588	2	*Ipomoea racemigera*	-22.7291	118.9901	2
Ipomoea racemigera	-22.74088449	119.0064027	5	*Ipomoea racemigera*	-22.7291	118.9901	4
Ipomoea racemigera	-22.74084393	119.0063781	2	*Ipomoea racemigera*	-22.729	118.9901	1
Ipomoea racemigera	-22.74084103	119.0063883	3	*Ipomoea racemigera*	-22.729	118.9901	1
Ipomoea racemigera	-22.74082456	119.0063677	1	*Ipomoea racemigera*	-22.729	118.9901	1
Ipomoea racemigera	-22.7407878	119.0378397	1	*Ipomoea racemigera*	-22.729	118.9901	1
Ipomoea racemigera	-22.7407624	119.0376848	4	*Ipomoea racemigera*	-22.729	118.99	4
Ipomoea racemigera	-22.7407229	119.0396284	3	*Ipomoea racemigera*	-22.7289	118.99	1
Ipomoea racemigera	-22.74072152	119.0062406	1	*Ipomoea racemigera*	-22.7289	119.0553	10
Ipomoea racemigera	-22.74069217	119.0374325	1	*Ipomoea racemigera*	-22.7288	118.9899	1
Ipomoea racemigera	-22.7406849	119.0373606	3	*Ipomoea racemigera*	-22.7288	119.0562	1
Ipomoea racemigera	-22.740678	119.0428408	3	*Ipomoea racemigera*	-22.7284	118.9885	5
Ipomoea racemigera	-22.7405238	119.0155462	1	*Ipomoea racemigera*	-22.7284	118.9893	1
Ipomoea racemigera	-22.74050379	119.0068283	3	*Ipomoea racemigera*	-22.7284	118.9881	1
Ipomoea racemigera	-22.7405013	119.0370397	4	*Ipomoea racemigera*	-22.728	118.9877	1
Ipomoea racemigera	-22.74040199	119.0067839	2	*Ipomoea racemigera*	-22.728	118.9876	1

Taxon	Latitude	Longitude	Individuals	Taxon	Latitude	Longitude	Individuals
Ipomoea racemigera	-22.74038967	119.0067684	4	*Ipomoea racemigera*	-22.728	118.988	1
Ipomoea racemigera	-22.7403608	119.0066435	2	*Ipomoea racemigera*	-22.7279	118.988	1
Ipomoea racemigera	-22.7402883	119.0365504	3	*Ipomoea racemigera*	-22.7279	118.988	1
Ipomoea racemigera	-22.7402676	119.0365656	2	*Ipomoea racemigera*	-22.7279	118.9879	1
Ipomoea racemigera	-22.7402453	119.036479	4	*Ipomoea racemigera*	-22.7279	118.9881	1
Ipomoea racemigera	-22.74014542	119.0063734	2	*Ipomoea racemigera*	-22.7279	118.988	2
Ipomoea racemigera	-22.7400359	119.0359653	4	*Ipomoea racemigera*	-22.7279	118.9881	1
Ipomoea racemigera	-22.74001705	119.0015515	7	*Ipomoea racemigera*	-22.7279	118.9881	1
Ipomoea racemigera	-22.7399996	118.999181	4	*Ipomoea racemigera*	-22.7279	118.9873	1
Ipomoea racemigera	-22.73998252	119.0061648	3	*Ipomoea racemigera*	-22.7279	118.9882	2
Ipomoea racemigera	-22.73997854	119.0061258	2	*Ipomoea racemigera*	-22.7278	118.9865	1
Ipomoea racemigera	-22.7399581	119.0357099	7	*Ipomoea racemigera*	-22.7278	118.9864	1
Ipomoea racemigera	-22.7399211	119.0359594	2	*Ipomoea racemigera*	-22.7277	118.9862	1
Ipomoea racemigera	-22.73990164	119.0029536	1	*Ipomoea racemigera*	-22.7277	118.9868	1
Ipomoea racemigera	-22.73982191	118.9999735	1	*Ipomoea racemigera*	-22.7276	118.9867	1
Ipomoea racemigera	-22.7398141	118.9998897	3	*Ipomoea racemigera*	-22.7275	118.9868	3
Ipomoea racemigera	-22.73980536	118.9998109	3	*Ipomoea racemigera*	-22.7275	118.9867	1
Ipomoea racemigera	-22.73974938	118.9997369	4	*Ipomoea racemigera*	-22.7275	118.9867	1
Ipomoea racemigera	-22.7397443	119.0293843	12	*Ipomoea racemigera*	-22.7274	118.9866	2
Ipomoea racemigera	-22.73965865	119.0036544	1	*Ipomoea racemigera*	-22.7274	118.9867	4
Ipomoea racemigera	-22.73964885	119.00378	1	*Ipomoea racemigera*	-22.7274	118.9866	1
Ipomoea racemigera	-22.73962792	119.003733	3	*Ipomoea racemigera*	-22.7274	118.9866	1
Ipomoea racemigera	-22.7396262	119.0422286	3	*Ipomoea racemigera*	-22.7274	118.9866	1
Ipomoea racemigera	-22.73962297	119.0037496	1	*Ipomoea racemigera*	-22.7274	118.9866	1
Ipomoea racemigera	-22.73962194	119.0038921	3	*Ipomoea racemigera*	-22.7273	118.9866	1
Ipomoea racemigera	-22.7395294	119.0048632	3	*Ipomoea racemigera*	-22.7273	118.9865	1
Ipomoea racemigera	-22.7394294	119.001095	2	*Ipomoea racemigera*	-22.7272	118.9865	2

Taxon	Latitude	Longitude	Individuals	Taxon	Latitude	Longitude	Individuals
Ipomoea racemigera	-22.739427	119.0164102	2	*Ipomoea racemigera*	-22.7271	118.9865	1
Ipomoea racemigera	-22.73942697	119.0009639	2	*Ipomoea racemigera*	-22.727	118.9864	1
Ipomoea racemigera	-22.73927917	119.0041266	2	*Ipomoea racemigera*	-22.7262	119.0712	3
Ipomoea racemigera	-22.73927848	119.0041367	1	*Ipomoea racemigera*	-22.7249	119.0601	8
Ipomoea racemigera	-22.7387328	119.0189536	5	*Ipomoea racemigera*	-22.724	119.0625	12
Ipomoea racemigera	-22.7387252	118.9970461	2	*Ipomoea racemigera*	-22.724	119.0622	3
Ipomoea racemigera	-22.7382728	118.9970342	4	*Ipomoea racemigera*	-22.724	119.0621	3
Ipomoea racemigera	-22.73785222	119.0334341	3	*Ipomoea racemigera*	-22.7239	119.0615	1
Ipomoea racemigera	-22.73773575	119.0242412	5	*Rostellularia adscendens* var. *latifolia*	-22.7878	119.1514	5
Ipomoea racemigera	-22.7375226	118.997537	3	*Rostellularia adscendens* var. *latifolia*	-22.7876	119.1493	1
Ipomoea racemigera	-22.7375007	118.9985562	4	*Rostellularia adscendens* var. *latifolia*	-22.7871	119.1572	3
Ipomoea racemigera	-22.7373789	119.0450462	1	*Rostellularia adscendens* var. *latifolia*	-22.7866	119.1468	5
Ipomoea racemigera	-22.73712811	119.0457917	5	*Rostellularia adscendens* var. *latifolia*	-22.7864	119.1458	6
Ipomoea racemigera	-22.7366145	119.0455537	5	*Rostellularia adscendens* var. *latifolia*	-22.7857	119.1465	1
Ipomoea racemigera	-22.7365496	118.9966243	10	*Rostellularia adscendens* var. *latifolia*	-22.7853	119.1428	4
Ipomoea racemigera	-22.7363515	119.0457469	10	*Rostellularia adscendens* var. *latifolia*	-22.7834	119.1403	6
Ipomoea racemigera	-22.7359971	119.0459959	10	*Rostellularia adscendens* var. *latifolia*	-22.7832	119.1402	7
Ipomoea racemigera	-22.7359703	119.028368	5	*Rostellularia adscendens* var. *latifolia*	-22.7831	119.1401	4
Ipomoea racemigera	-22.73549453	118.9945435	10	*Rostellularia adscendens* var. *latifolia*	-22.7818	119.1358	4
Ipomoea racemigera	-22.7354437	118.9947577	5	*Rostellularia adscendens* var. *latifolia*	-22.7412	119.015	4
Ipomoea racemigera	-22.734062	118.9898343	1	*Rostellularia adscendens* var. *latifolia*	-22.7412	119.0149	4
Ipomoea racemigera	-22.7338247	118.9924677	10	*Rostellularia adscendens* var. *latifolia*	-22.7412	119.015	1
Ipomoea racemigera	-22.7337615	118.9924607	5	*Rostellularia adscendens* var. *latifolia*	-22.7407	119.0352	3
Ipomoea racemigera	-22.7336724	118.9922097	1	*Rostellularia adscendens* var. *latifolia*	-22.7392	119.0228	6
Ipomoea racemigera	-22.7336545	118.9921954	1	*Rostellularia adscendens* var. *latifolia*	-22.7392	119.0227	2
Ipomoea racemigera	-22.733638	118.9930041	1	*Rostellularia adscendens* var. *latifolia*	-22.739	119.0314	7
Ipomoea racemigera	-22.7336141	118.9921468	1	*Rostellularia adscendens* var. *latifolia*	-22.7385	119.0281	3

Taxon	Latitude	Longitude	Individuals	Taxon	Latitude	Longitude	Individuals
Ipomoea racemigera	-22.73360493	118.9925978	3	*Rostellularia adscendens* var. *latifolia*	-22.7385	119.0339	3
Ipomoea racemigera	-22.73360347	118.9925801	2	*Rostellularia adscendens* var. *latifolia*	-22.7362	119.0304	6
Ipomoea racemigera	-22.733471	118.9925164	2	*Rostellularia adscendens* var. *latifolia*	-22.7361	119.032	6
Ipomoea racemigera	-22.7327766	118.9929764	1	*Rostellularia adscendens* var. *latifolia*	-22.7358	119.0313	12
Ipomoea racemigera	-22.7327619	118.99296	3	*Rostellularia adscendens* var. *latifolia*	-22.7287	119.0733	8
Ipomoea racemigera	-22.7327376	118.9929464	1	*Rostellularia adscendens* var. *latifolia*	-22.7265	119.0661	12
Ipomoea racemigera	-22.7326929	118.9929137	1	*Rostellularia adscendens* var. *latifolia*	-22.7264	119.0661	3
Ipomoea racemigera	-22.7323919	119.0500441	1	*Rostellularia adscendens* var. *latifolia*	-22.7254	119.0595	2
Ipomoea racemigera	-22.7322297	118.9909564	1	*Rostellularia adscendens* var. *latifolia*	-22.7242	119.062	3
Ipomoea racemigera	-22.7322036	119.0511087	1	*Rostellularia adscendens* var. *latifolia*	-22.713	119.0999	3
Ipomoea racemigera	-22.7321741	118.9909991	1	*Rostellularia adscendens* var. *latifolia*	-22.7022	119.0973	4
Ipomoea racemigera	-22.7320669	118.990688	1	*Rostellularia adscendens* var. *latifolia*	-22.7022	119.0973	3
Ipomoea racemigera	-22.7320507	118.9924759	1	*Rostellularia adscendens* var. *latifolia*	-22.702	119.0974	1
Ipomoea racemigera	-22.7320376	118.9924906	1	*Rostellularia adscendens* var. *latifolia*	-22.702	119.0974	25
Ipomoea racemigera	-22.731969	118.9925335	4	*Rostellularia adscendens* var. *latifolia*	-22.7019	119.0975	50
Ipomoea racemigera	-22.7319551	118.9925419	1	*Rostellularia adscendens* var. *latifolia*	-22.7018	119.0975	20
Ipomoea racemigera	-22.731921	118.9925336	5	*Rostellularia adscendens* var. *latifolia*	-22.7017	119.0975	29
Ipomoea racemigera	-22.7317134	118.9925831	1	*Sida* sp. Barlee Range (S. van Leeuwen 1642)	-22.7036	119.096	2
Ipomoea racemigera	-22.7314768	118.9925612	1	*Sida* sp. Barlee Range (S. van Leeuwen 1642)	-22.7036	119.096	1
Ipomoea racemigera	-22.7314671	118.9926017	20	*Sida* sp. Barlee Range (S. van Leeuwen 1642)	-22.7034	119.0959	5
Ipomoea racemigera	-22.7313869	118.9926895	1	*Sida* sp. Barlee Range (S. van Leeuwen 1642)	-22.7034	119.0959	1
Ipomoea racemigera	-22.7311635	118.9927876	1	*Sida* sp. Barlee Range (S. van Leeuwen 1642)	-22.7033	119.0958	1
Ipomoea racemigera	-22.7310132	118.9930668	2	*Sida* sp. Barlee Range (S. van Leeuwen 1642)	-22.7032	119.0958	3
Ipomoea racemigera	-22.7306199	119.0514808	2	*Sida* sp. Barlee Range (S. van Leeuwen 1642)	-22.7031	119.0958	5
Ipomoea racemigera	-22.7304711	118.9926121	5	*Sida* sp. Barlee Range (S. van Leeuwen 1642)	-22.7031	119.0958	1
Ipomoea racemigera	-22.7304584	118.992806	5	*Sida* sp. Barlee Range (S. van Leeuwen 1642)	-22.703	119.0957	1
Ipomoea racemigera	-22.7304338	118.9926879	1	*Sida* sp. Barlee Range (S. van Leeuwen 1642)	-22.703	119.0957	3

Taxon	Latitude	Longitude	Individuals	Taxon	Latitude	Longitude	Individuals
Ipomoea racemigera	-22.7303734	119.0532602	3	*Sida* sp. Barlee Range (S. van Leeuwen 1642)	-22.703	119.0958	2
Ipomoea racemigera	-22.7302835	118.9903917	1	*Sida* sp. Barlee Range (S. van Leeuwen 1642)	-22.7029	119.0958	1
Ipomoea racemigera	-22.7301986	118.9923573	4	*Sida* sp. Barlee Range (S. van Leeuwen 1642)	-22.7029	119.0958	6
Ipomoea racemigera	-22.7300389	118.9910712	1	*Sida* sp. Barlee Range (S. van Leeuwen 1642)	-22.7029	119.0958	2
Ipomoea racemigera	-22.72985938	118.9907405	6	*Sida* sp. Barlee Range (S. van Leeuwen 1642)	-22.7029	119.0958	1
Ipomoea racemigera	-22.72984402	118.9907355	1	*Sida* sp. Barlee Range (S. van Leeuwen 1642)	-22.7028	119.0958	5