



OB32 Settlement Pond Flora and Vegetation Technical memo

BHP Western Australia Iron Ore

25 June 2025

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| 1 | Kaylin Geelhoed, Eva Karikis, Robyn Chesney | Carmel Winton | Jared Leigh | 15/05/2025 |
| 2 | Robyn Chesney | Carmel Winton | Jared Leigh | 28/05/2025 |
| 3 | Robyn Chesney | Carmel Winton | Jared Leigh | 25/06/2025 |

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Executive Summary

BHP Western Australia Iron Ore (BHP WAIO) commissioned Biologic Environmental Survey Pty Ltd (Biologic) to undertake a single-season detailed flora and vegetation and targeted flora survey in the vicinity of the Eastern Ridge mine site for the OB32 Surplus Water Project. This assessment focuses on an area intended for a Settlement Pond, which forms the Survey Area. The Survey Area is located approximately four kilometres northeast of Newman and covers approximately 59.4 hectares.

A total of two quadrats, two relevés and one vegetation mapping note were established for the single-season detailed flora and vegetation survey. Targeted survey for significant and introduced flora species and opportunistic sampling were also undertaken as a systematic grid search of the Survey Area at 50 m spacing.

Four vegetation types were described and delineated in the Survey Area based on two broad landforms (Drainage Area/ Floodplain and Sandy/ Stony Plain). None of these vegetation types represented any of the known Threatened Ecological Communities listed under the *Biodiversity Conservation Act 2016* (Western Australia) or *Environment Protection Biodiversity Conservation Act 1999* (Commonwealth), or Priority Ecological Communities listed by the Department of Biodiversity, Conservation and Attractions.

Three vegetation types potentially hold 'other' significance for providing habitat for significant flora or aligning with published Ecosystems at Risk (valley floor mulga); however, these vegetation types are well-represented throughout the Pilbara bioregion and were thus considered to be of low significance. Vegetation condition ranged from Good to Completely Degraded, with the majority (88.1 %) of vegetation assessed as Good condition.

A total of 75 confirmed vascular flora taxa, representing 44 genera from 21 families, were recorded during the field survey. This comprised 73 native flora taxa and two introduced flora taxa. No Threatened flora, listed under the *Biodiversity Conservation Act 2016* (Western Australia) or *Environment Protection Biodiversity Conservation Act 1999* (Commonwealth), were recorded from the Survey Area. No Priority Flora species listed by the Department of Biodiversity, Conservation and Attractions were recorded during the survey. One taxon recorded in the Survey Area, *Hibiscus aff campanulatus*, was considered flora of other significance due to anomalous features.

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1 Introduction

1.1 Background

BHP Western Australia Iron Ore (BHP WAIO) has commissioned Biologic Environmental Survey Pty Ltd (Biologic) to undertake a single-season detailed flora and vegetation and targeted flora survey in the vicinity of the Eastern Ridge mine site for the OB32 Surplus Water Project. This project area has been previously surveyed; however, a small area was not included in previous assessments. This area is intended for a Settlement Pond, and is henceforth referred to as the Survey Area. The Survey Area is located approximately 4 kilometres (km) northeast of Newman and covers approximately 59.4 hectares (ha) (Figure 1.1).

1.2 Scope and Objectives

The overarching objective of the survey was to assess the flora and vegetation components of the Survey Area by undertaking detailed and targeted flora and vegetation surveys. 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 detailed flora and vegetation survey;
- Vegetation type and condition mapping;
- Targeted flora grid searches; and
- Preparation of a report summarising the methods and results.

1.3 Compliance

The Environmental Protection Authority (EPA) outline guidance for biological surveys in WA. Biologic complies with the Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EIA) (EPA, 2016b) and the Environmental Factor Guideline - Flora and Vegetation (EPA, 2016a). This extends to preparation, survey design, personnel, data analysis, reporting and client data submission. The following guidelines provided by BHP WAIO were also considered during the field survey and report preparation:

- EPA (2023) Statement of environmental principles, factors, objectives and aims of EIA;
- Department of Environment (DoE) (2013) Matters of National Environmental Significance: Significant impact guidelines;
- EPA (2016a) Environmental factor guideline: flora and vegetation;
- EPA (2016b) Technical guidance: Flora and vegetation surveys for EIA;
- BHP (2018b) Vegetation and Flora Surveys Procedure;

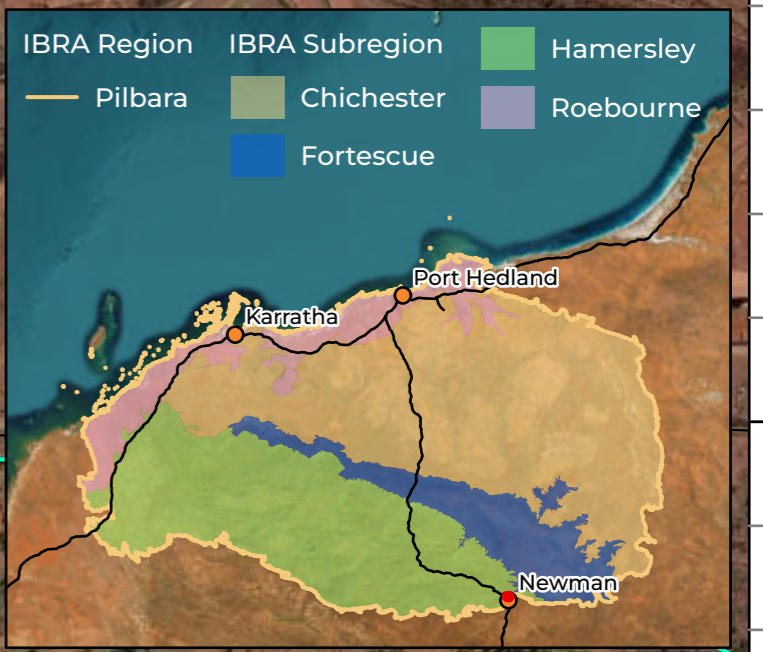
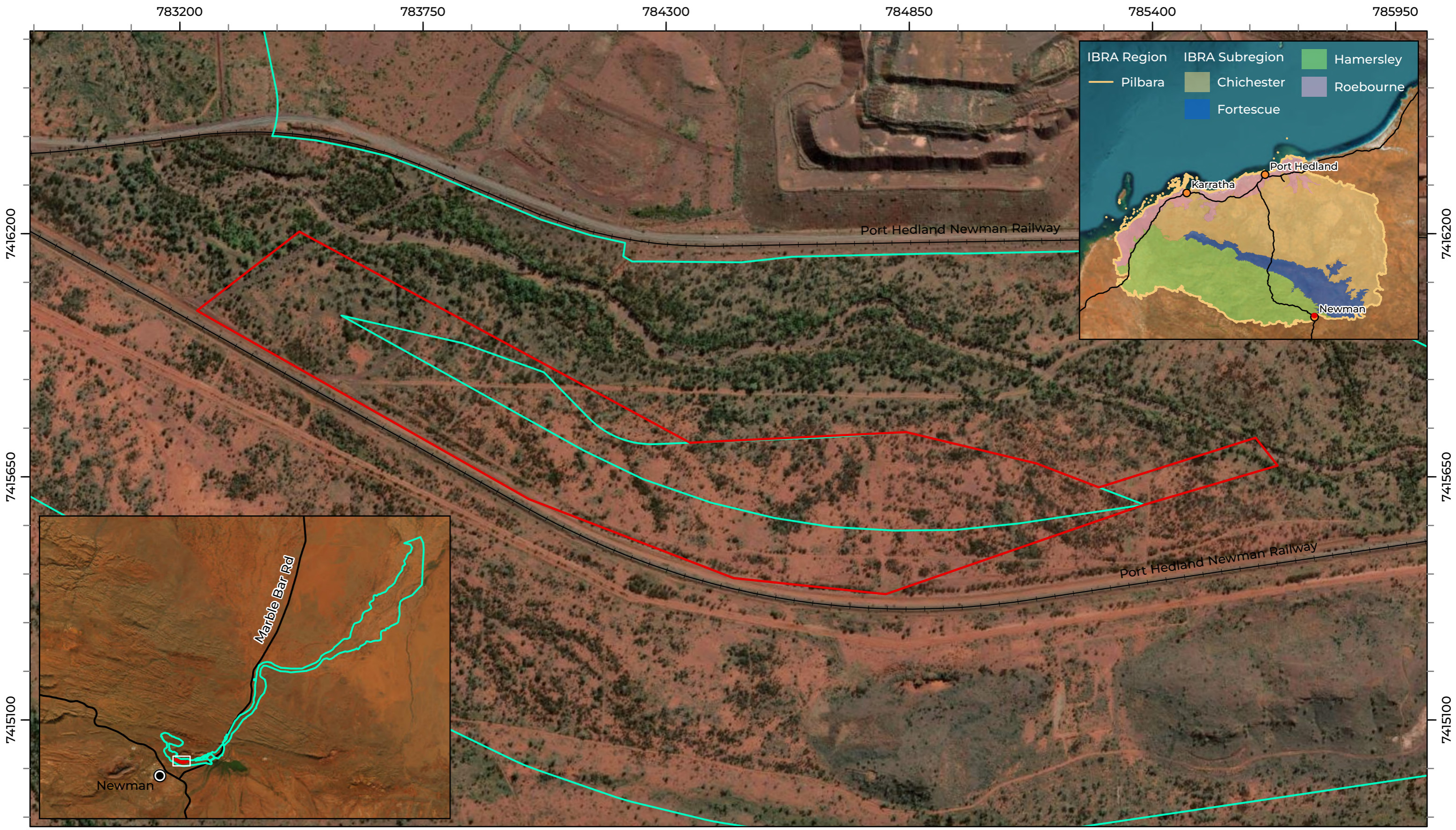
- BHP WAIO (2023) Biodiversity survey spatial data requirements: Procedure; and
- Department of Water and Environmental Regulation (DWER) (2024) Index of Biodiversity Surveys for Assessments (IBSA).

1.3.1 Legislation

Within Western Australia (WA), native flora and vegetation are protected at the State level under the *Biodiversity Conservation Act 2016* (BC Act) and at a national level under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Any action that has the potential to impact on native flora and vegetation needs to be approved by relevant state and/or commonwealth departments as dictated by the state *Environmental Protection Act 1986* (EP Act). These codes, jurisdiction and level of protection are detailed in Appendix A.


1.3.2 Introduced Flora

Introduced flora can pose a threat to native vegetation and biodiversity. The commonwealth, in collaboration with the states and territories, identified 32 Weeds of National Significance (WoNS) assessed according to their invasiveness, potential for spread, and environmental, social and economic impacts (DoEE, 2019). A database of Declared Pests (DPs) is kept by the Department of Primary Industries and Regional Development (DPIRD). This database falls under State jurisdiction, legislated by the *Biosecurity and Agricultural Management Act 2007* (BAM Act). Some introduced flora taxa may be classified within categories that have legal control or management requirements (Appendix A). These requirements must be met by the landholder.



LEGEND

- Survey Area
- Previous Survey Area (Spectrum, 2022)
- Rail

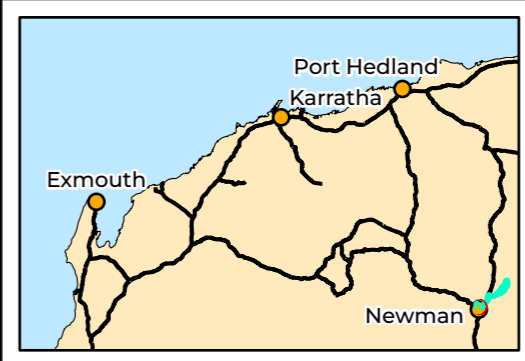


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OB32 Settlement Pond
Flora and Vegetation

Figure 1.1: Survey Area and regional context

2 Existing Environment

2.1 Biogeography and Climate

The Survey Area is located within the Hamersley (PIL03) subregion of the Pilbara bioregion (Figure 1.1), as defined by the Interim Biogeographic Regionalisation of Australia (IBRA; Thackway & Cresswell, 1995). The IBRA regions represent a landscape-based approach to classifying land surface, including attributes of climate, geomorphology, landform, lithology, and characteristic flora and fauna. 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* spp.) low woodlands or snappy gum (*Eucalyptus leucophloia*) over bunch and hummock grasses (Bastin & ACRIS, 2008). The Hamersley subregion is characterised by mountainous areas of Proterozoic sedimentary ranges (ironstone ranges) and plateaux dissected by gullies and gorges (Kendrick, 2003). Vegetation comprises mulga low woodland over bunch grasses on fine-textured soils in valley floors, while skeletal soils of the ranges are dominated by snappy gum (*Eucalyptus leucophloia*) over *Triodia brizoides* (Kendrick, 2003). Drainage is typically into the Fortescue River to the north, the Ashburton River to the south, or the Robe River to the west (Kendrick, 2003).

The climate is semi-desert tropical with an average rainfall of 300 millimetres (mm), usually in summer cyclonic or thunderstorm events. Winter rain is not uncommon (Kendrick, 2003).

2.2 Land Systems

Review of land systems mapping by Payne *et al.* (1988) and later refined by van Vreeswyk *et al.* (2004) identified one land system (Elimunna) occurring within in the Survey Area. The Elimunna land system comprises stony plains on basalt supporting sparse *Acacia* and *Senna* shrublands and patchy tussock grasslands (Figure 2.1).

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Port Hedland Newman Railway

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LEGEND

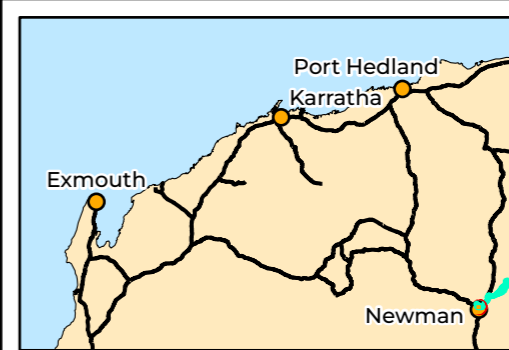
- Survey Area
- Rail
- Land System**
- Elimunna System
- Newman System



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Flora and Vegetation

Figure 2.1: Land systems of the Survey Area

2.3 Hydrology and Hydrogeology

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

The Survey Area occurs within the Fortescue River Basin and the Upper Fortescue River Catchment, the latter of which drains into the Fortescue Marsh (DPIRD, 2018). At a finer scale, the Survey Area is located within an Unnamed sub-catchment. The Survey Area is located approximately 4.5 km west of Ophthalmia Dam and 5.3 km east of the Fortescue River. A minor tributary of Homestead Creek flows through the northwest corner of the Survey Area (DPIRD, 2018).

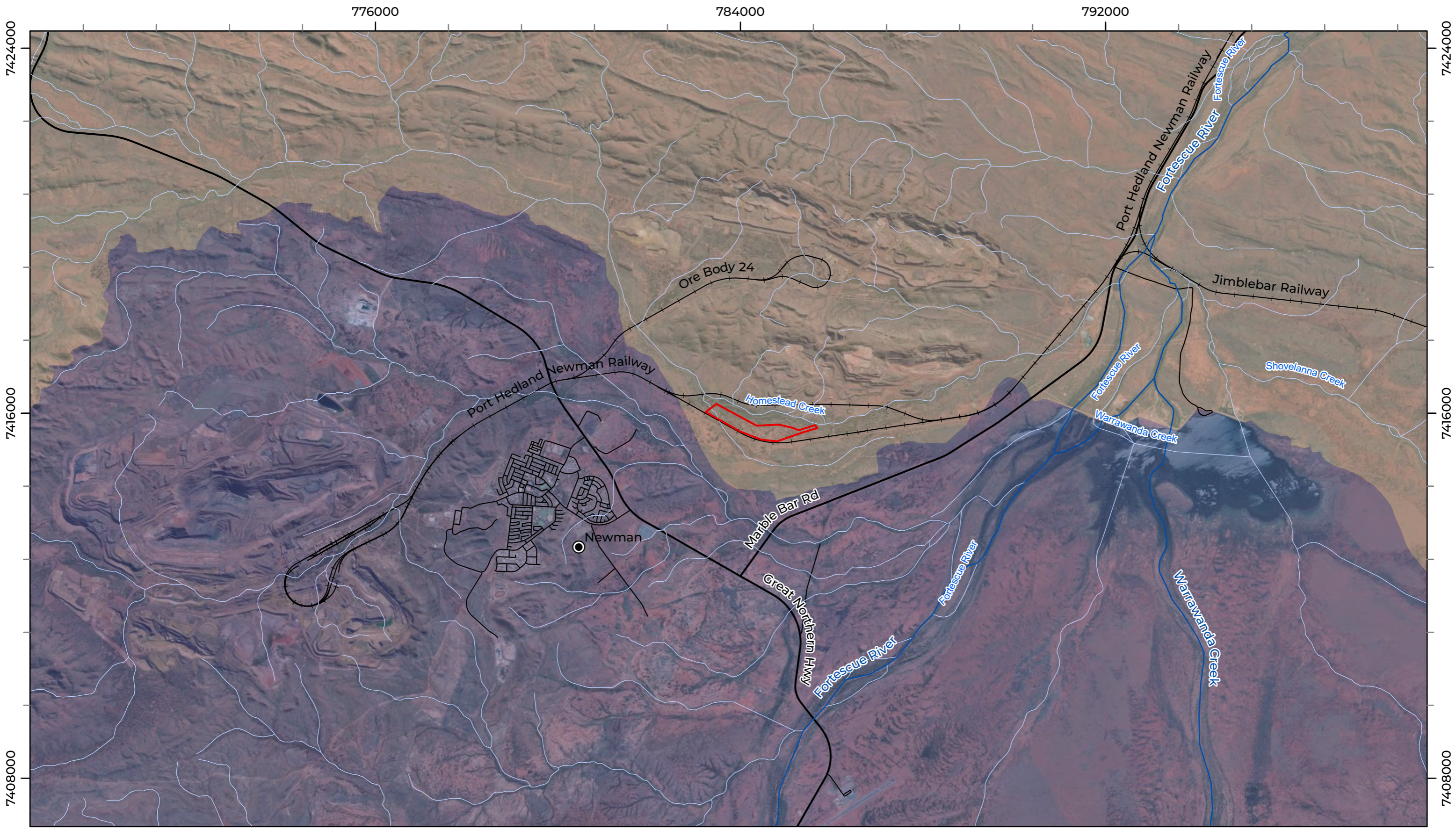
2.4 Pre-European Vegetation

Pre-European vegetation mapping was originally undertaken by Beard (1975) at various scales (predominantly 1:1,000,000) across the state and has since been updated to be consistent with Native Vegetation Information System (NVIS) descriptions at a scale of 1:250,000 (Shepherd *et al.*, 2002). This update also accounts for extensive clearing since the Beard (1975) mapping.

The Survey Area is located within the Hammersley System and under Shepherd *et al.* (2002) comprises two vegetation system associations (Hammersley 18.11 and 82.3) (Table 2.1, Figure 2.3). The most dominant vegetation system association in the Survey Area is Hammersley 18.11 (67.1%) (Table 2.1).


Table 2.1: Vegetation associations occurring within the Survey Area

| Vegetation Association | Code | Description | Extent in Survey Area | |
|------------------------|-------|--|-----------------------|------------|
| | | | ha | % |
| Hammersley | 18.11 | Low woodland of mulga (<i>Acacia aneura</i> & associated species) | 39.8 | 67.1 |
| | 82.3 | Hummock grasslands with scattered bloodwoods and snappy gum over <i>Triodia</i> spp. | 19.5 | 32.9 |
| Totals | | | 59.4 | 100 |



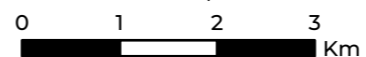
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|-------------|--------------------------|---------------------|
| Survey Area | Surface Hydrology | Subcatchment |
| Local Road | Minor | Ophthalmia Dam |
| State Road | Major | Unnamed |
| Rail | | |

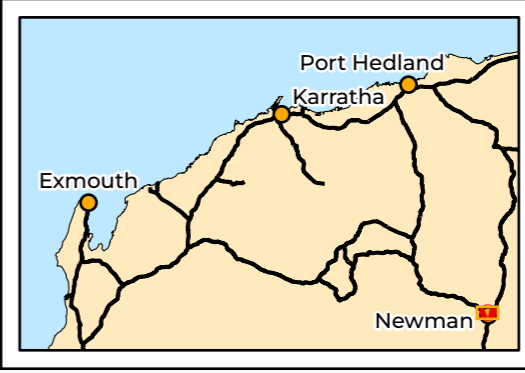


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Figure 2.2: Hydrology
of the Survey Area

The Government of Western Australia historically reported annually on the statistics of the pre-European and current extent for vegetation associations of Western Australia. The state-wide statistics are no longer updated and publicly available and have not been updated since 2018. However, the state-wide statistics are a useful tool to determine if vegetation is rare or otherwise significant (Government of Western Australia, 2019a, 2019b), while understanding that any new clearing from 2019 has not been captured. The statistics provide details on the progress towards achieving a conservation reserve system that is comprehensive, adequate, and representative (CAR Reserve) including how many hectares of each vegetation association is protected for conservation. Lands protected for conservation are defined as lands managed by the Department of Biodiversity, Conservation and Attractions (DBCA) with an IUCN category of I – IV (with a primary purpose of conservation) (Government of Western Australia, 2019a, 2019b).

The 2018 extent of each of the pre-European vegetation system associations exceeds 98% across the four regional scales: State, bioregion (Pilbara), subregion (Hamersley) and Local Government Authority (Shire of East Pilbara) (Government of Western Australia, 2019b) (Table 2.2). As at 2018, the pre-European vegetation system associations 18.11 and 82.3 were represented within the National Reserve System as having greater than 19 % and 12 % of their bioregional and subregional extent within reserves, respectively (Government of Western Australia, 2019b) (Table 2.2).

Table 2.2: Regional and local extent of vegetation system associations

| Vegetation System Association | Code | Scale | Pre-European extent (ha) | Current extent remaining (ha/%) | Current extent remaining within reserves (ha/%) |
|-------------------------------|-------|-----------------------|--------------------------|---------------------------------|---|
| Hamersley | 18.11 | State | 580,556 | 575,851.6 / 99.2 | 113,404.4 / 19.7 |
| | | Pilbara | 580,512.3 | 575,807.9 / 99.2 | 113,404.4 / 19.7 |
| | | Hamersley | 580,512.3 | 575,807.9 / 99.2 | 113,404.4 / 19.7 |
| | | Shire of East Pilbara | 224,292.1 | 220,375.4 / 98.3 | 44.4 / <0.1 |
| | 82.3 | State | 2,169,997 | 2,157,841 / 99.4 | 262,983 / 12.2 |
| | | Pilbara | 2,168,702 | 2,156,547 / 99.4 | 262,983 / 12.2 |
| | | Hamersley | 2,158,862 | 2,146,708 / 99.4 | 262,244 / 12.2 |
| | | Shire of East Pilbara | 573,312.8 | 565,215.1 / 98.6 | n/a |

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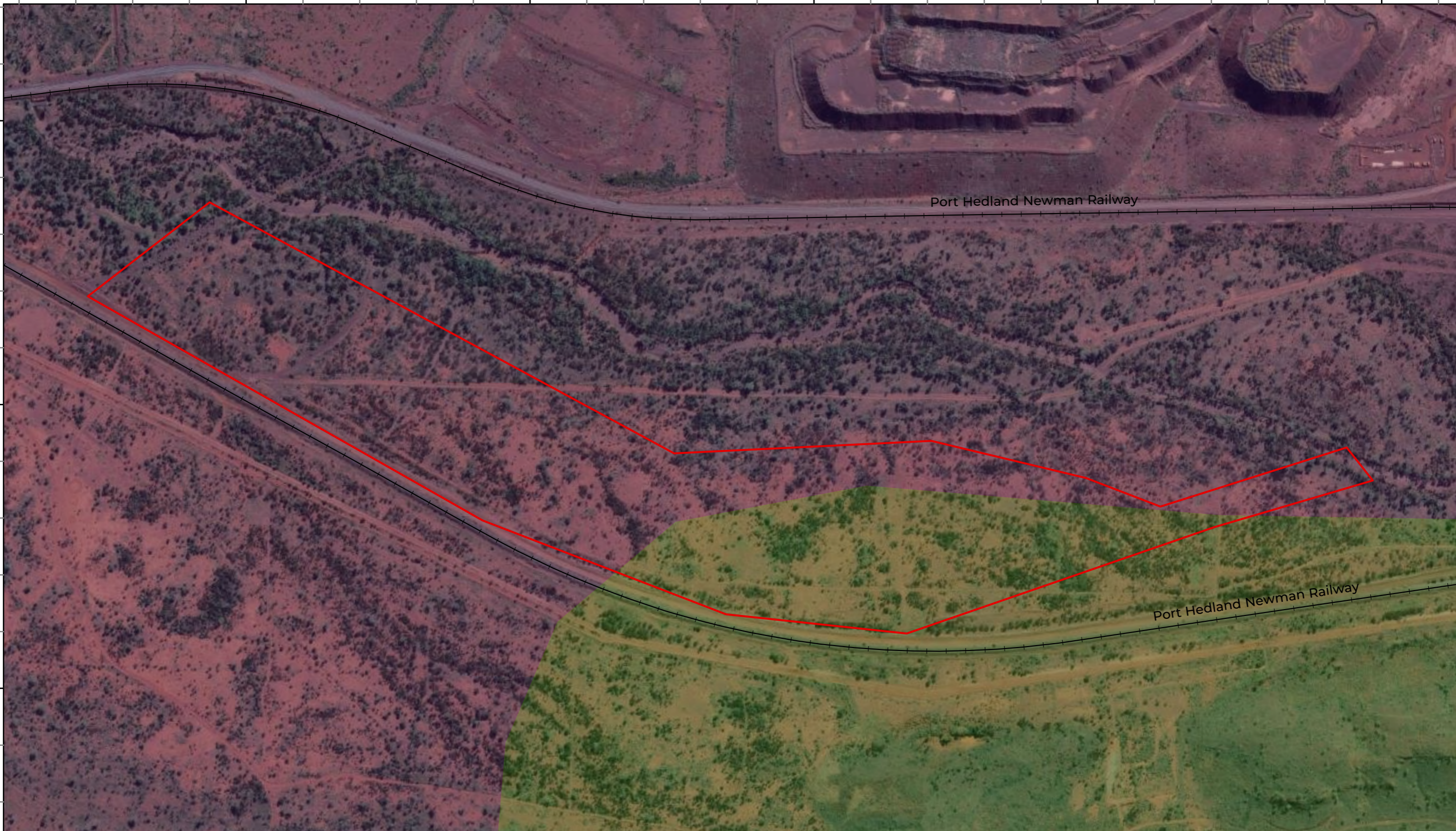
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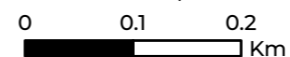


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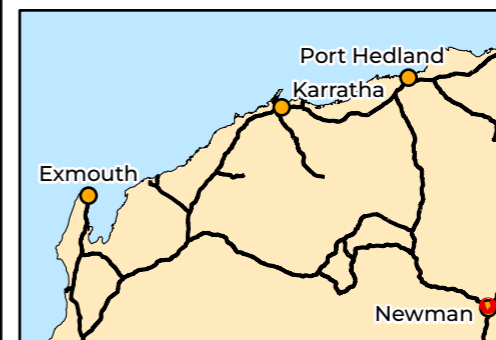
- Survey Area
- Rail
- Pre-European Vegetation Association
 - Hammersley 18
 - Hammersley 82



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Flora and Vegetation

Figure 2.3: Vegetation associations of the Survey Area

3 Desktop Assessment

3.1 Methods

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 significant flora and vegetation values occurring, or potentially occurring, in the Survey Area.

3.1.1 Database Searches

Seven database searches were undertaken to generate a list of vascular flora taxa previously recorded within, and near, the Survey Area; including introduced and significant taxa (Table 3.1). The database searches also identified ecological communities/ vegetation types of significance that occur, or may occur, within and near the Survey Area. These were reviewed against against relevant GIS parameters (e.g. Land Systems, aerial imagery, etc.) to determine any potential for occurrence within or near the Survey Area. The parameters for each of the search areas are presented in Table 3.1.

Table 3.1: Details of database searches conducted

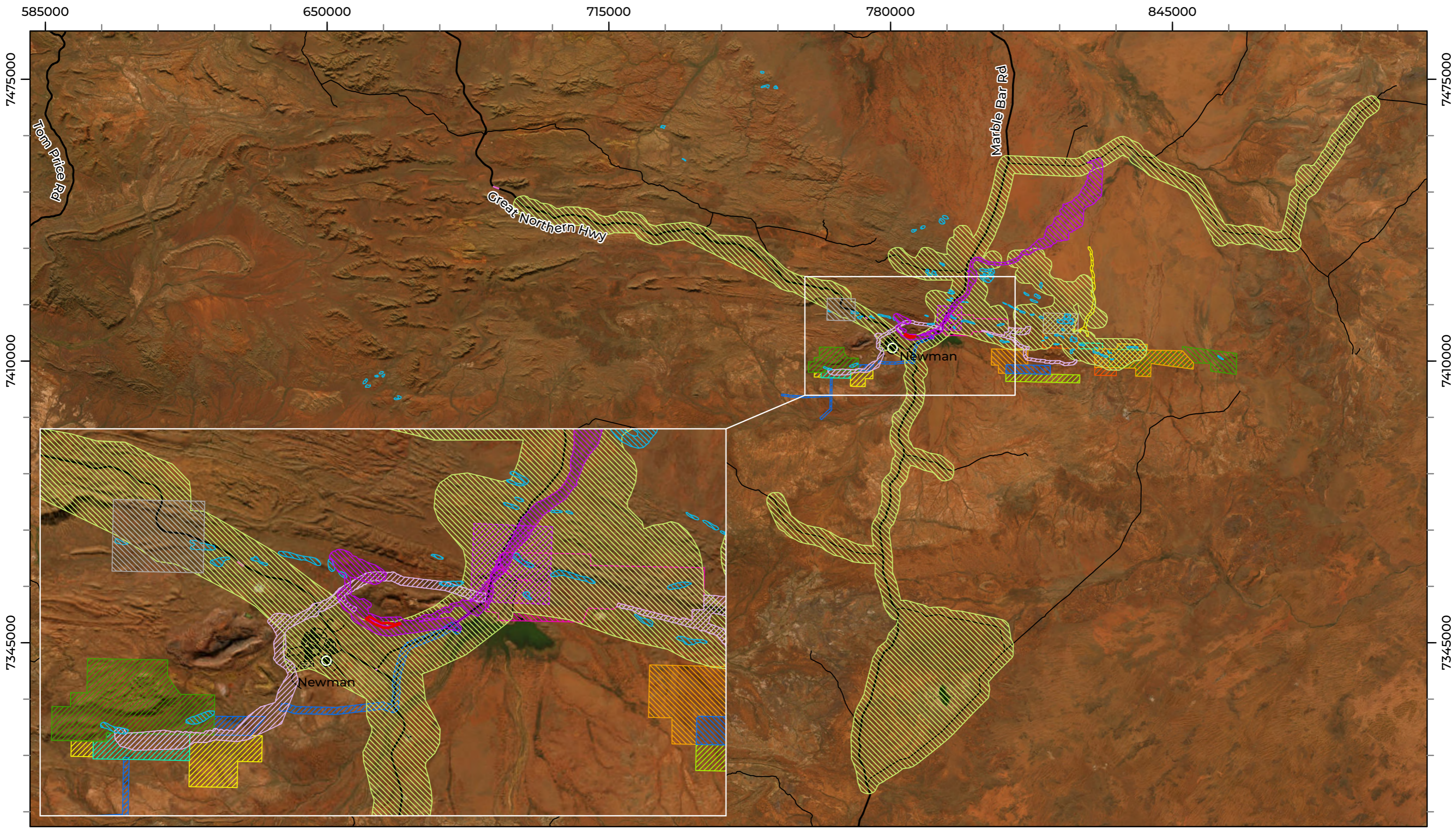
| Purpose | Database | Parameters |
|--|---|--|
| To identify flora species and communities previously recorded within the Survey Area and its vicinity, particularly those of significance. | Threatened and Priority Ecological Communities, Species and Communities Branch #11-0224EC | 70 km radius of the Survey Area |
| | Threatened and Priority Flora Database #18-0224FL | |
| | Western Australian Herbarium (WAH) Specimen Database | |
| | NatureMap – species occurrence search #21-0224NM | 40 km radius of the Survey Area |
| | Atlas of Living Australia (ALA) – species occurrence search | |
| | BHP WAIO database (BHP, 2023) | 10 km radius of the Survey Area |
| To identify potential species and communities listed under the Commonwealth EPBC Act within the Survey Area | EPBC Act Protected Matters Search Tool | 40 km radius of the Survey Area |
| To identify declared pest plants within the Survey Area | Declared Pests Database (WAOL) | Search of the entire Shire of East Pilbara |

3.1.2 Review of Other Reports

A review of available reports relevant to the Survey Area was undertaken to compile a list of significant flora and vegetation communities of interest with the potential to occur within the Survey Area. Twenty-six previous flora and vegetation assessments were reviewed. Two of these intersected the Survey Area (Table 3.2). Surveys with available spatial data are illustrated in Figure 3.1.

Table 3.2: Summary of other reports informing the desktop assessment

| Project Area | Reference | Survey Type |
|---|---------------------|-------------------------------|
| Intersecting Survey Area | | |
| Western Ridge Pipeline | Biologic (2022c) | Reconnaissance |
| OB32 Surplus Water & Homestead Creek Wetting Front | Spectrum (2022b) | Detailed |
| < 10 km from Survey Area | | |
| Western Creek and an Unnamed Creek | Biologic (2022a) | Detailed |
| Great Northern Highway for Jimblebar Mine module transport | Eco Logical (2012) | Reconnaissance |
| Jimblebar Wye rail junction | Ecologia (2005) | Targeted Flora and Vegetation |
| Rapid growth project 5: Repeater 9 access road | ENV (2008) | Detailed |
| North of Jimblebar | Onshore (2015c) | Targeted Flora |
| East Ophthalmia & Ninga | Spectrum (2023) | Detailed |
| Newman and surrounds | Spectrum (2022a) | Targeted Flora |
| Jimblebar | Biologic (in prep.) | Detailed |
| 10 to 30 km from Survey Area | | |
| Western Ridge | Biologic (2021) | Detailed |
| Coombanbunna Well | Biologic (2020a) | Detailed |
| Jumbuck | Biologic (2020b) | Reconnaissance |
| Orebody 31 | Onshore (2014a) | Detailed |
| Orebody 31 | Onshore (2014b) | Targeted Flora |
| Homestead Creek & Cathedral Gorge | Spectrum (2024) | Detailed |
| Southwest Jimblebar | Syrinx (2014) | Detailed |
| > 30 km from Survey Area | | |
| Caramulla Creek | Astron (2019) | Reconnaissance |
| East Jimblebar & Caramulla | Biologic (2019a) | Detailed |
| Shearers East | Biologic (2019b) | Reconnaissance |
| Roy Hill: Southern Borefield Study Area (L47/642 and L47/735) | Maia (2018) | Detailed |
| Jimblebar North | Onshore (2019) | Reconnaissance and Targeted |
| Caramulla | Onshore (2018a) | Reconnaissance and Targeted |
| Shearers West | Onshore (2018b) | Detailed |
| Dynasty and West Jimblebar | Onshore (2015a) | Detailed |
| Jimblebar Creek | Onshore (2015b) | Detailed |



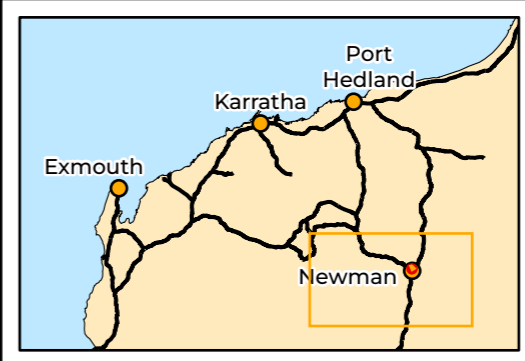
- LEGEND**
- Survey Area
 - Local Road
 - State Road

Biologic

Scale 1:815,900

0 15 30 Km

Coordinate System: GDA 1994 MGA Zone 50
Transverse Mercator Created: 28/05/2025



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Figure 3.1: Previous surveys from the desktop assessment

Previous Surveys

-  Biologic. (2019a). East Jimblebar & Caramulla Detailed Flora and Vegetation Assessment
-  Biologic (2019b). Shearers East Reconnaissance Flora and Vegetation Assessment
-  Biologic. (2020a). Coombanbunna Well Detailed Flora and Vegetation Survey
-  Biologic. (2020b). Jumbuck reconnaissance Flora and Vegetation Assessment
-  Biologic. (2021). Western Ridge: Single Season Detailed Flora and Vegetation Survey
-  Biologic. (2022a). Western Ridge Creeks Detailed Flora and Vegetation Assessment
-  Biologic. (2022c). Western Ridge Pipeline Reconnaissance Flora and Vegetation Survey
-  Biologic. (in prep.). Jimblebar Wind Power 2030 Single Season Flora and Vegetation Report
-  Ecologia. (2005). Jimblebar Wye Rail Junction Priority Flora and Riparian Vegetation Assessment
-  Eco Logical. (2012). Level 1 Flora and Fauna Surveys Along the Great Northern Highway for Jimblebar Mine Module Transport
-  ENV. (2008). Rapid Growth Project 5: Repeater 9 Access Road Flora and Vegetation Assessment
-  Onshore. (2014a). Orebody 31 Level 2 Flora and Vegetation Survey
-  Onshore. (2014b). Orebody 31 Targeted Significant Flora Survey
-  Onshore. (2015a). Dynasty and West Jimblebar Level 2 Flora and Vegetation Survey
-  Onshore. (2015b). Jimblebar Creek Riparian Flora and Vegetation Baseline Survey
-  Onshore. (2015c). Targeted Flora Survey for *Acacia* sp. East Fortescue
-  Onshore. (2018a). Reconnaissance Flora and Vegetation Survey Caramulla
-  Onshore. (2019). Jimblebar North Reconnaissance Flora and Vegetation Survey
-  Spectrum. (2022a). *Acacia corusca* Species Distribution Modelling
-  Spectrum. (2022b). OB32 Surplus Water & Homestead Creek Detailed Flora & Vegetation
-  Spectrum. (2023). East Ophthalmia and Ninga Detailed Flora & Vegetation Survey
-  Spectrum. (2024). Homestead Creek & Cathedral Gorge Detailed Flora & Vegetation Survey
-  Syrinx. (2014). South West Jimblebar Level 2 Flora and Vegetation Survey

3.1.3 Assessment of Occurrence

The significant flora taxa identified from the database searches were assessed and ranked on the likelihood of occurring within the Survey Area. The rankings were assigned using the following definitions presented in the decision matrix (Table 3.3).

Interpretation of likelihood criteria may vary between species due to several factors influencing species occurrence; known distribution, known range, preferred habitat, ecology and/or dispersal capabilities. The assessment of occurrence also takes into consideration how well distributed a species is within known localities. Likelihood rankings will be re-assessed post field survey and may have changed, taking ground truthing into consideration (see Section 4.2.1.2).

Table 3.3: Assessment of Occurrence decision matrix

| | | Habitat Categories (within the Survey Area) | | | |
|--|---|---|---|--|--|
| | | Core/ Critical Habitat Present | Suitable Habitat Present/ Within Known Distribution | Marginal Habitat Present/ Adjacent to Known Distribution | No Suitable Habitat Present/ Outside of Known Distribution |
| Species Records/ Occurrence Categories | Recorded within the Survey 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 |
| | Taxa considered locally/ regionally extinct | Unlikely | Unlikely | Highly Unlikely | Highly Unlikely |

3.2 Results

3.2.1 Flora

A total of 903 vascular flora taxa from 75 families and 271 genera were collated during the review of the database searches (Appendix B). This list included 79 introduced flora taxa from 25 families (Appendix B, Appendix C).

3.2.2 Significant Flora

Fifty-one significant flora taxa (those listed under the EPBC Act, BC Act, or DBCA's Priority List) were identified from the desktop assessment, of which one was identified only in the review of other reports (*Dolichocarpa* sp. Hamersley Station (A.A. Mitchell 1479) (P3); Appendix D). Of these, 46 occurred within a 50 km radius of the Survey Area (Figure 3.2), noting that specific location data of significant species is not supplied by Naturemap, ALA or

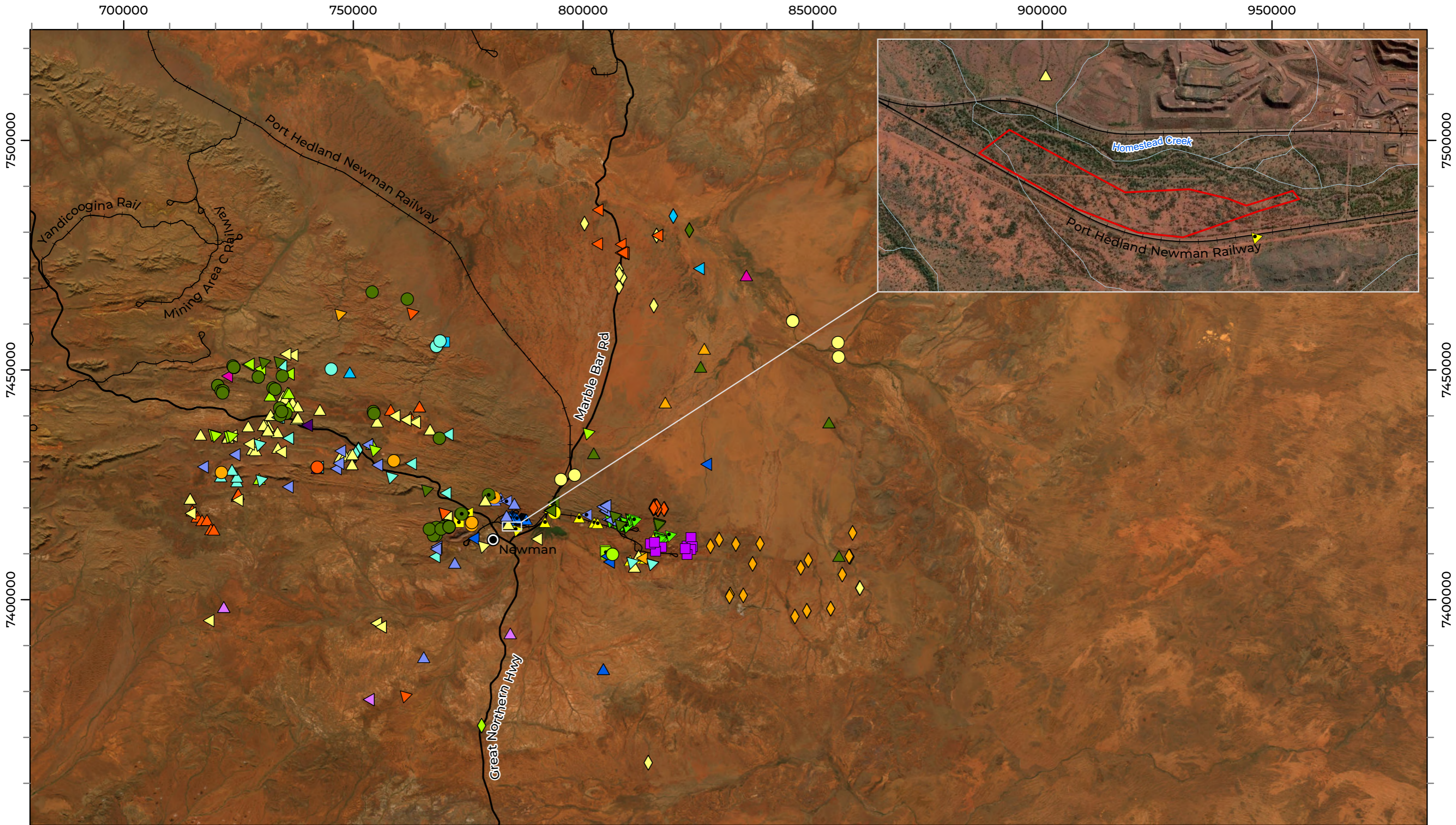
EPBC Act Protected Matters Search Tool and thus these records cannot be mapped. One taxon, *Thryptomene wittweri* (T), is listed as Threatened under the BC Act. The remaining 50 taxa are categorised as follows: eight listed as Priority 1, two as Priority 2, 33 as Priority 3 and seven as Priority 4.

Assessment of Occurrence


The 51 significant taxa identified from the desktop assessment were ranked for likelihood of occurrence in the Survey Area. Table 3.4 displays taxa assessed as Highly Likely to occur (one), Likely to occur (three) and Possible to occur (10) in the Survey Area pre-survey. The remaining taxa were assessed as either Unlikely (16) or Highly Unlikely (21) (Appendix E).

Thryptomene wittweri (T), a species only known from high mountainous peaks, is a spreading conifer-like, aromatic shrub with small, white flowers. Due to suitable habitat not occurring and known locations being over 100 km north-west and south-east of the Survey Area, this taxon was considered Highly Unlikely to occur in the Survey Area pre-survey.

Of the 51 taxa identified by the desktop assessment, two Priority taxa, *Triodia ?birriliburu* (P3) (Astron, 2019) and *Dolichocarpa* sp. Hamersley Station (A.A. Mitchell 1479) (P3) (Spectrum, 2024), were identified from the review of other survey reports only (i.e., not identified by the database searches). The queried taxon, *Triodia ?birriliburu* (P3), recorded by Astron (2019), was unable to be definitively identified due to a lack of diagnostic material at the time of writing. For the purposes of this assessment, Biologic are taking a precautionary approach and treating this taxon as a confirmed Priority species. The approximate distance from the Survey Area boundary was estimated utilising survey maps and aerial imagery and has been included in the overall pre-survey Assessment of Occurrence. This taxon was considered Highly Unlikely pre-survey, while *Dolichocarpa* sp. Hamersley Station (A.A. Mitchell 1479) (P3) was considered Unlikely pre-survey.



- LEGEND**
- Survey Area
 - State Road
 - Rail

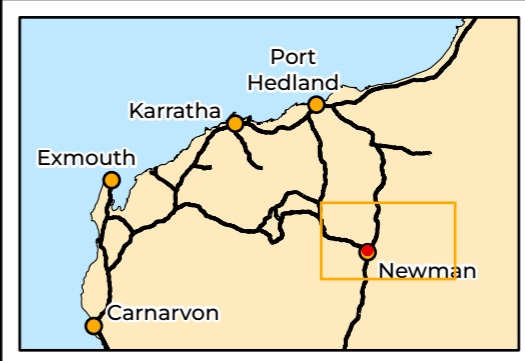


Biologic

Scale 1:770,000

0 15 30 Km

Coordinate System: GDA 1994 MGA Zone 50
Transverse Mercator Created: 28/05/2025



BHP WAI0
OB32 Settlement Pond
Flora and Vegetation

Figure 3.2: Significant
flora records from the
desktop assessment

Significant Flora

DBCA Database & WA Herbarium

Priority 1

- ◆ *Acacia corusca*
- ◆ *Eremophila capricornica*
- ◆ *Eremophila pilosa*
- ◆ *Eremophila rhegos*
- ◆ *Helichrysum oligochaetum*
- ◆ *Paranotis* sp. Pilbara (H. Ajduk HAOP04a)
- ◆ *Stemodia* sp. Battle Hill (A.L. Payne 1006)

Priority 2

- *Goodenia hartiana*
- *Hibiscus* sp. Gurinbiddy Range (M.E. Trudgen MET 15708)

Priority 3

- ▲ *Acacia subtiliformis*
- ▲ *Amaranthus centralis*
- ▲ *Aristida jerichoensis* var. *subspinulifera*
- ▲ *Aristida lazaridis*
- ▲ *Crotalaria smithiana*
- ▲ *Dampiera metallorum*
- ▲ *Eragrostis* sp. Mt Robinson (S. van Leeuwen 4109)
- ▲ *Eremophila magnifica* subsp. *velutina*
- ▲ *Eremophila naaykensis*
- ▲ *Eremophila rigida*
- ▲ *Eremophila* sp. West Angelas (S. van Leeuwen 4068)
- ▲ *Eremophila spongiocarpa*

- ◀ *Eucalyptus rowleyi*
- ◀ *Euphorbia inappendiculata* var. *inappendiculata*
- ◀ *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727)
- ◀ *Grevillea saxicola*
- ◀ *Gymnanthera cunninghamii*
- ◀ *Indigofera gilesii*
- ◀ *Iotasperma sessilifolium*
- ◀ *Ipomoea racemigera*
- ◀ *Isotropis parviflora*
- ◀ *Maireana prosthocochaeta*
- ◀ *Oxalis* sp. Pilbara (M.E. Trudgen 12725)
- ◀ *Rostellularia adscendens* var. *latifolia*
- ◀ *Streptoglossa* sp. Cracking clays (S. van Leeuwen et al. PBS 7353)
- ◀ *Stylidium weeliwollii*
- ◀ *Swainsona thompsoniana*
- ◀ *Themeda* sp. Hamersley Station (M.E. Trudgen 11431)
- ◀ *Triodia* sp. Mt Ella (M.E. Trudgen 12739)
- ◀ *Vittadinia* sp. Coondewanna Flats (S. van Leeuwen 4684)

Priority 4

- *Acacia bromilowiana*
- *Eremophila magnifica* subsp. *magnifica*
- *Eremophila youngii* subsp. *lepidota*
- *Goodenia berringbinensis*
- *Lepidium catapycnon*
- *Sida* sp. Barlee Range (S. van Leeuwen 1642)

BHP Database

Priority 1

- ◆ *Acacia corusca*

Priority 2

- *Euphorbia inappendiculata* var. *inappendiculata*
- *Ipomoea racemigera*

Priority 3

- ▲ *Aristida jerichoensis* var. *subspinulifera*
- ▲ *Eremophila magnifica* subsp. *velutina*
- ▲ *Eremophila naaykensis*
- ▲ *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727)
- ▲ *Gymnanthera cunninghamii*
- ▲ *Isotropis parviflora*
- ▲ *Themeda* sp. Hamersley Station (M.E. Trudgen 11431)
- ▲ *Triodia* sp. Mt Ella (M.E. Trudgen 12739)
- ▲ *Vittadinia* sp. Coondewanna Flats (S. van Leeuwen 4684)

Priority 4

- *Bulbostylis burbridgeae*
- *Eremophila magnifica* subsp. *magnifica*
- *Goodenia berringbinensis*
- *Lepidium catapycnon*

Table 3.4: Summary of pre-survey Assessment of Occurrence

| Taxa | Source | Proximity from Survey Area |
|---|------------------------------|----------------------------|
| Highly Likely | | |
| <i>Aristida jerichoensis</i> var. <i>subspinulifera</i> (P3) | A; B; E; V, W | 0.5 km NNE |
| Likely | | |
| <i>Aristida lazaridis</i> (P3) | A; B; C; I, W | 3.4 km WNW |
| <i>Ipomoea racemigera</i> (P3) | A; B; C; E; I; J; O; Q; U, W | 7.7 km WSW |
| <i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431) (P3) | A; B; E; U | 0.2 km S |
| Possible | | |
| <i>Eremophila magnifica</i> subsp. <i>velutina</i> (P3) | A; B; E | 0.9 km N |
| <i>Eremophila naaykensis</i> (P3) | A; B; E; H, W | 2.3 km N |
| <i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i> (P3) | A; B; E; V | 10.3 km W |
| <i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727) (P3) | A; B; E; I | 3.5 km ESE |
| <i>Gymnanthera cunninghamii</i> (P3) | A; B; C; E; H; I; K; S; T | 7.9 km NE |
| <i>Isotropis parviflora</i> (P3) | A; B; C; E; H, W | 5.2 km N |
| <i>Streptoglossa</i> sp. Cracking clays (S. van Leeuwen et al. PBS 7353) (P3) | A; C | 14.2 km W |
| <i>Swainsona thompsoniana</i> (P3) | A; C, W | 6.7 km SW |
| <i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwen 4684) (P3) | A; B; E; V | 25.6 km E |
| <i>Eremophila youngii</i> subsp. <i>lepidota</i> (P4) | A; B; S | 14.1 km NE |

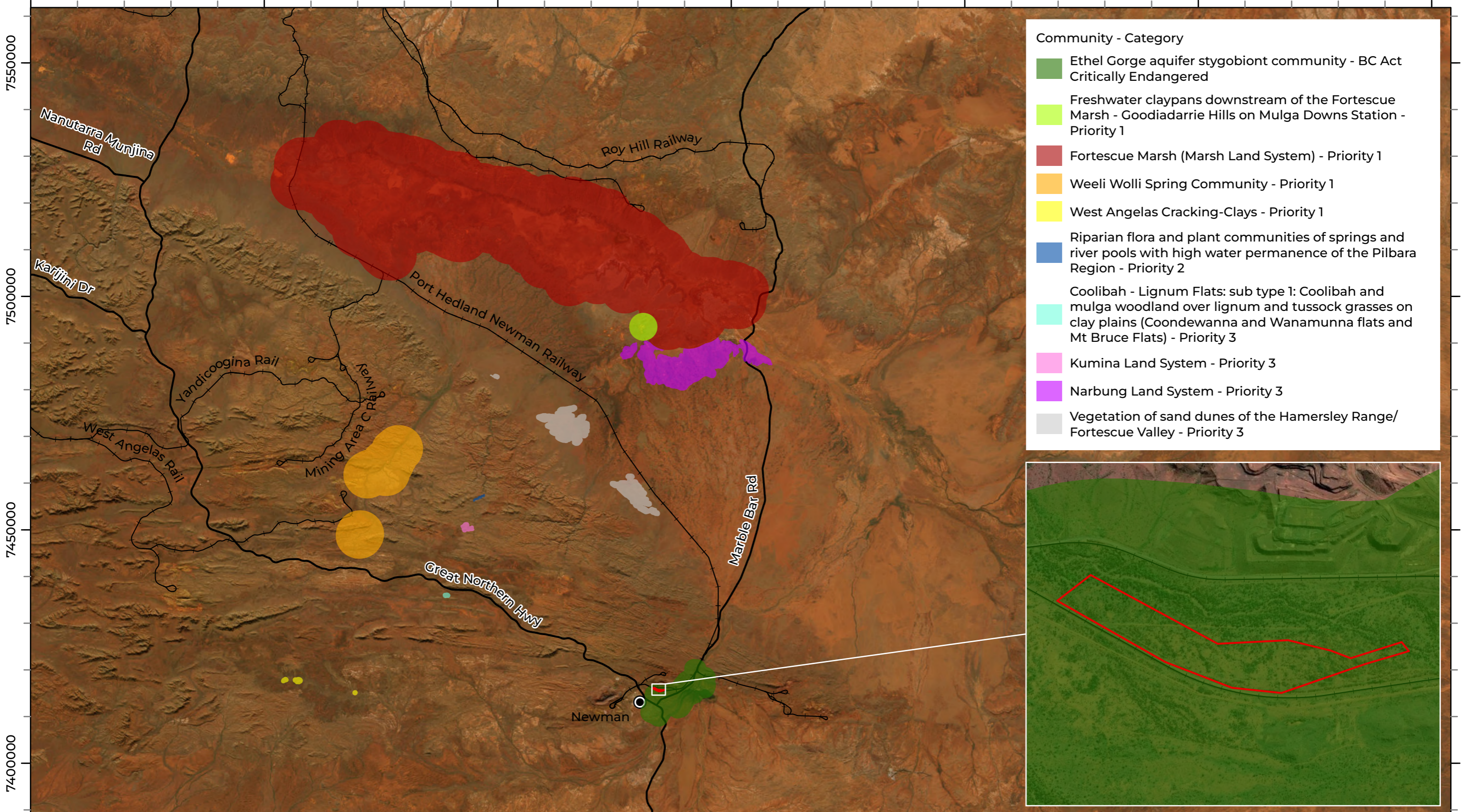
Source key: A = DBCA (WAH &/or TPFL) (DBCA, 2025b), B = NatureMap (DBCA, 2025a), C = Atlas of Living Australia (ALA) (ALA, 2025), D = Protected Matters Search Tool (EPBC) (DCCEEW, 2025), E = BHP WAIO (2025), F = Astron (2019), G = Biologic (2019a), H = Biologic (2021), I = Biologic (2022b), J = Biologic (2022c), K = Ecologia (2005), L = ENV (2008), M = Maia (2018), N = Onshore (2014b), O = Onshore (2015a), P = Onshore (2015c), Q = Onshore (2018a), R = Onshore (2019), S = Spectrum (2022b), T = Spectrum (2023), U = Spectrum (2024), V = Syrinx (2014), W = Biologic (in prep.)

3.2.3 Significant Vegetation

Two Threatened Ecological Communities (TECs) listed under the BC Act are recognised for the Pilbara region of Western Australia (DBCA, 2018). Of these, only one occurs within 50 km of the Survey Area; namely, 'Ethel Gorge aquifer stygobiont community' (Endangered (BC Act); not listed under EPBC Act) (Table 3.5). This community overlaps the Survey Area (Figure 3.3). however, as it does not relate to terrestrial vegetation, it is not considered further in this report.

A total of 43 PECs are recognised in the Pilbara region, of which 34 are relevant to terrestrial vegetation (DBCA, 2022). Nine PECs with potential to occur within the Survey Area were identified from the desktop assessment (Table 3.5). Review of vegetation mapping from the desktop assessment suggested that there was low potential for any of these nine PECs to occur in the Survey Area.

650000 700000 750000 800000 850000 900000 950000




- Community - Category**
- Ethel Gorge aquifer stygobiont community - BC Act Critically Endangered
 - Freshwater claypans downstream of the Fortescue Marsh - Goodiadarrie Hills on Mulga Downs Station - Priority 1
 - Fortescue Marsh (Marsh Land System) - Priority 1
 - Weeli Wolli Spring Community - Priority 1
 - West Angelas Cracking-Clays - Priority 1
 - Riparian flora and plant communities of springs and river pools with high water permanence of the Pilbara Region - Priority 2
 - Coolibah - Lignum Flats: sub type 1: Coolibah and mulga woodland over lignum and tussock grasses on clay plains (Coondewanna and Wanamunna flats and Mt Bruce Flats) - Priority 3
 - Kumina Land System - Priority 3
 - Narbung Land System - Priority 3
 - Vegetation of sand dunes of the Hamersley Range/ Fortescue Valley - Priority 3



LEGEND

- Survey Area
- State Road
- Rail



Biologic

Scale 1:770,000

0 15 30 Km

Coordinate System: GDA 1994 MGA Zone 50 Transverse Mercator Created: 23/05/2025



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OB32 Settlement Pond
Flora and Vegetation

Figure 3.3: Significant ecological communities from the desktop assessment

Table 3.5: Significant ecological communities from the desktop assessment

| Community name | Description | Proximity to Survey Area |
|--|--|--------------------------|
| Critically endangered TEC (BC Act) | | |
| Ethel Gorge aquifer stygobiont community | The community is known from the Ethel Gorge (Ophthalmia Basin) alluvium calcrete aquifer on the Fortescue River in the vicinity of the town of Newman. It comprises a diverse assemblage of stygofaunal species. It includes Oligochaeta and the crustaceans Bathynellacea (Syncarida), cyclopoid and harpacticoid copepods, Candonidae: Candoninae C (Ostracoda: Podocopida), Candonidae: Candoninae D (Ostracoda: Podocopida), Limnocytheridae (Ostracoda: Podocopida), flabelliferan Isopod (Tainisopidae) and one new genus of Crangonyctoid amphipoda (Chydaekata, family Paramelitidae), in which 14 species (13 in this aquifer) have been described on morphological characters. At least one species of Chydaekata is known only from this community. | Overlaps Survey Area |
| Priority 1 PEC | | |
| West Angelas Cracking-Clays | Open tussock grasslands of <i>Astrebla pectinata</i> , <i>A. elymoides</i> , <i>Aristida latifolia</i> , in combination with low scattered shrubs of <i>Sida fibulifera</i> , on basalt (Jerrinah formation) derived cracking-clay loam depressions and flowlines. Occurs throughout the central and eastern Hamersley Range from near Tom Price east to Newman. | 63.2 km W |
| Weeli Wolli Spring Community | Weeli Wolli Spring's riparian woodland and forest associations are unusual because of composition of the understorey. The sedge and herb field 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. The spring and creek line are also noted for their relatively high diversity of stygofauna, and this is probably attributed to the large-scale calcrete and alluvial aquifer system associated with the creek. The valley of Weeli Wolli Spring also supports a very rich microbat assemblage including a threatened species. | 65.8 km NW |
| Fortescue Marsh (Marsh Land System) | Fortescue Marsh is an extensive, episodically inundated samphire marsh at the upper terminus of the Fortescue River and the western end of Goodiadarrie Hills. It is regarded as the largest ephemeral wetland in the Pilbara. It is a highly diverse ecosystem with fringing mulga woodlands (on the northern side), samphire shrublands and groundwater dependant riparian ecosystems. It is an arid wetland utilized by waterbirds and supports a rich diversity of restricted aquatic and terrestrial invertebrates. Recorded locality for night parrot and bilby and several other threatened vertebrate faunae. Endemic Eremophila species, populations of priority flora and several near-endemic and novel samphire's. | 72.3 km N |
| Freshwater claypans downstream of the Fortescue Marsh - Goodiadarrie Hills on Mulga Downs Station. | Freshwater claypans downstream of the Fortescue Marsh - Goodiadarrie Hills on Mulga Downs Station. Larger claypans contain the highest number of invertebrate species and most of the restricted elements of the Pilbara riparian flora | 75 km N |

| Community name | Description | Proximity to Survey Area |
|--|---|--------------------------|
| Priority 2 PEC | | |
| Riparian flora and plant communities of springs and river pools with high water permanence of the Pilbara Region | 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 <i>Imperata cylindrica</i> , <i>Cladium procerum</i> , <i>Schoenus falcatus</i> and <i>Fimbristylis sieberiana</i> (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. Occurrences are disjunct with sites typically associated with groundwater discharge in gorge and valley wetlands that are often coupled with significant shading. | 54.6 km NNW |
| Priority 3 PEC | | |
| Vegetation of sand dunes of the Hamersley Range/Fortescue Valley | These red linear iron-rich sand dunes lie on the Divide Land system at the junction of the Hamersley Range and Fortescue Valley, between Kalgan Creek and the low hills to the west. A small number are vegetated with <i>Acacia dictyophleba</i> scattered tall shrubs over <i>Crotalaria cunninghamii</i> , <i>Trichodesma zeylanicum</i> var. <i>grandiflorum</i> open shrubland. They are regionally rare, small and fragile and highly susceptible to threatening processes. | 36.8 km N |
| Coolibah - Lignum Flats (sub type 1) | Woodland or forest of <i>Eucalyptus victrix</i> (Coolibah) over thicket of <i>Duma florulenta</i> (lignum) on red clays in run-on zones. Associated species include <i>Eriachne benthamii</i> , <i>Themeda triandra</i> , <i>Aristida latifolia</i> , <i>Eulalia aurea</i> and <i>Acacia aneura</i> . Sub-type 1 (Coondewanna, Wannamunna and Mt Bruce flats): coolibah and mulga woodland over lignum (<i>Duma florulenta</i>) and tussock grasses on clay pans. | 47.7 km NW |
| Kumina Land System | Ferricrete duricrust plains, uplands and plateaux remnants, relief up to 15 m. Duricrust plains and plateau remnants support hard spinifex grasslands. | 51.8 km NW |
| Narbung Land System | Alluvial wash plains with prominent internal drainage foci supporting snakewood and mulga shrublands with halophytic low shrubs. | 64.8 km N |

4 Field Survey

4.1 Methods

4.1.1 Survey Timing and Personnel

The field survey consisted of a single-season detailed flora and vegetation survey, undertaken on the 17th to 19th of March 2025 by four botanists (three person days; one half day with four personnel and one half day with two personnel). The field survey was completed during March, the survey period recommended for the Pilbara (EPA, 2016b). All personnel held the current and relevant licencing and had adequate experience for the bioregion. All field team leads had at least 5 years' experience, as recommended by the technical guidance (EPA, 2016b). Project roles and licences are listed in Table 4.1.

Table 4.1: Project team and licences

| Biologic Personnel | Quals and Project role | Licensing | Experience |
|-----------------------------|--|-------------------------------|------------|
| Principal Botanist | | | |
| Clinton van den Bergh | <ul style="list-style-type: none"> Project management support, reviewer for quality assurance | FB62000453 TFL 2223-0030 | 18 years |
| Carmel Winton | <ul style="list-style-type: none"> Project management, Overall field survey lead/ field team lead Vegetation mapping Reporting support Plant identification support | FB62000134 TFL 134B-2021 | 15 yrs |
| Senior Botanist | | | |
| Dr. Rachel Meissner | <ul style="list-style-type: none"> Specimen identification | - | 28 years |
| Robyn Chesney | <ul style="list-style-type: none"> Reporting lead | - | 15 years |
| Botanist / Ecologist | | | |
| Eva Karikis | <ul style="list-style-type: none"> Field survey/ field team lead Desktop assessment | FB62000324-2 TFL 2324-0177 | 7 years |
| Kaylin Geelhoed | <ul style="list-style-type: none"> Field survey/ field team lead Data management Reporting support Plant identification support | FB62000238-2 | 6 years |
| Field Technician | | | |
| Alba Muratore | <ul style="list-style-type: none"> Undergraduate botanist Field survey support | Collects under Biologic | 1 year |

4.1.2 Climate and Weather

Long-term climatic data is not available for the Survey Area. However, long-term climatic data (from 1971 for rainfall and from 1996 for temperature) is available from the BoM weather

station at Newman Airport (station #007176), approximately 8 km south of the Survey Area (BoM, 2025). Newman Airport is expected to provide the most accurate dataset for historic and current climatic conditions experienced within the Survey Area.

In the 12 months prior to the survey, mean temperatures were comparable to long-term averages (1996 to 2025) and mean rainfall was above average for the long-term averages (1971 to 2025) in the six months prior to the survey (Figure 4.1). Rainfall was well above the monthly mean for November and December 2024 (136.2 mm above long-term average (LTA) for both months collectively), while January and March 2025 recorded well below average (Figure 4.1). The rainfall in December and February is considered critical in regard to optimal survey timing, occurring in the four months preceding this wet-season survey as per the guidance (EPA, 2016b). On-ground observations confirmed adequate survey timing, with favourable ground conditions noted as well as good representation of annual and ephemeral taxa. Weather conditions during the survey did not present any limitations, with temperature maximums ranging from 35–38°C.

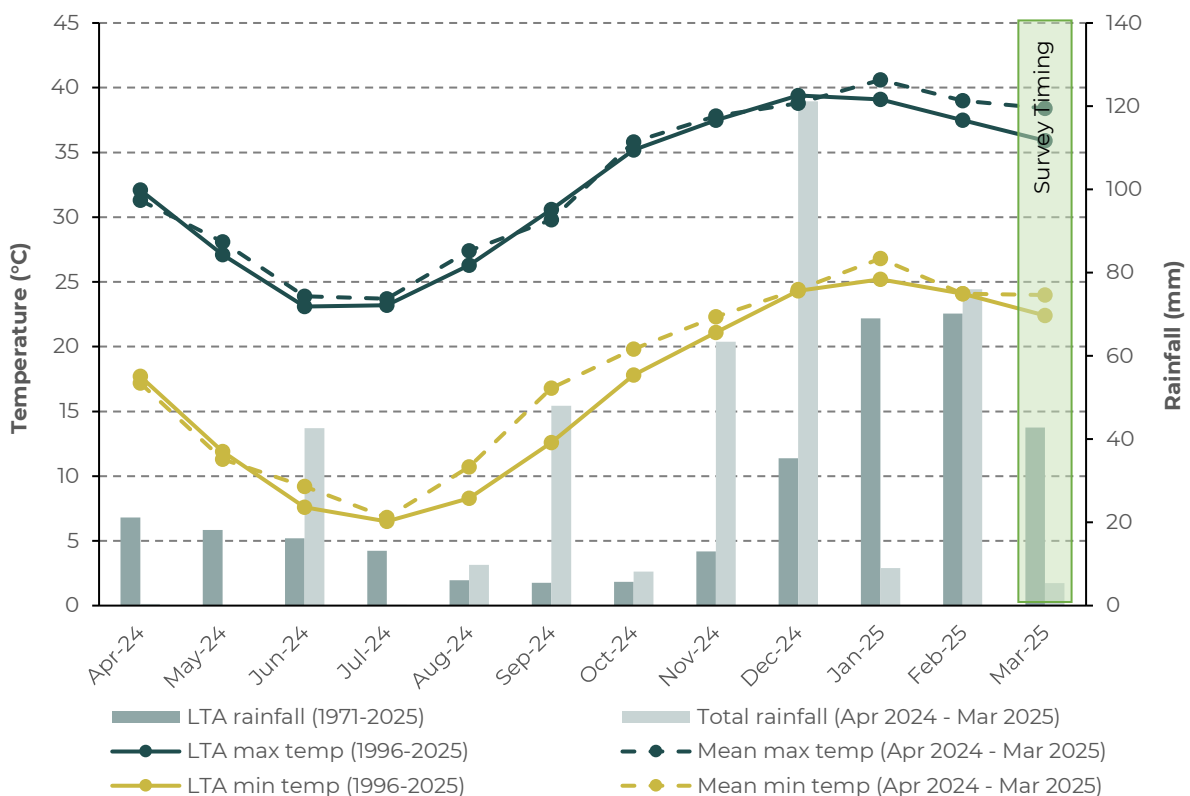


Figure 4.1: Long term and current climatic data for the Survey Area (BoM Station #007176) (BoM, 2025) with approximate survey timing shaded

4.1.3 Detailed Flora and Vegetation Assessment

A single-season detailed flora and vegetation survey was carried out across the Survey Area. A combination of quadrats, relevés, vegetation mapping notes, grid traverses, and opportunistic sampling were used (EPA, 2016b) and are described in Table 4.2. A total of five

sites were sampled across the Survey Area (two quadrats, two relevés, and one vegetation mapping note) (Figure 4.2, Appendix F). In addition to the quadrat sampling, targeted searches for significant flora were also undertaken as a grid search with 50 m spacing (Section 4.1.4).

Table 4.2: Field survey techniques

| Approach | Description |
|--|---|
| Quadrat | <p>A comprehensive and replicable survey technique for gathering information during the single-season detailed flora and vegetation survey. A clearly defined area of set proportions, giving a consistent assessment of flora and vegetation across the Survey Area.</p> <p>Each quadrat represents a vegetation type. Vegetation types are represented by a minimum of three quadrat sites where practicable. Information collected at each quadrat includes:</p> <ul style="list-style-type: none"> • Site code, date, location, botanist • One photograph (as a minimum), from the northwest corner of the site • Vegetation condition and disturbances (including fire) • Landform including slope, soil, rock type; aspect • Flora and vegetation information; dominant cover, structure and species count where necessary • Comprehensive recording of every species within the quadrat boundary (50 x 50 m for a Pilbara botanical survey). |
| Relevé | <p>Relevé sites used to support the vegetation mapping and survey effort. They are a lower intensity survey technique or sampled where quadrats are too dangerous to set up (such as steep slopes), or too small/disturbed to sample effectively (i.e. drill lines close together). Information collected at each relevé is the same as that of a quadrat site, excluding the comprehensive collection of every species.</p> |
| Vegetation Mapping Note | <p>Vegetation mapping notes were used to ground-truth existing vegetation mapping and significant flora locations. They are a lower intensity, unbounded, survey technique. Information collected at each mapping note may vary in detail depending upon what is present and needed for that site. The following was recorded as a minimum: location co-ordinates, representative photograph and brief description of the vegetation mapping note focus.</p> |
| Traverse/ Meandering Traverse | <p>A traverse is an unmarked route along which data is collected. Traverses are useful for identifying the boundaries and characteristics of vegetation types, selecting sites for detailed survey, and targeting significant flora or vegetation.</p> <p>Information recorded along a traverse during this assessment was the same as a mapping note, with the addition of noting vegetation changes and relationships between vegetation and substrate.</p> |
| Opportunistic (Supplementary) Sampling | <p>Flora and vegetation not recorded through other sampling methods were opportunistically sampled as encountered in the survey. Opportunistic sampling also included recording locations of significant, introduced (weed) and unknown species.</p> |

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784080

784620

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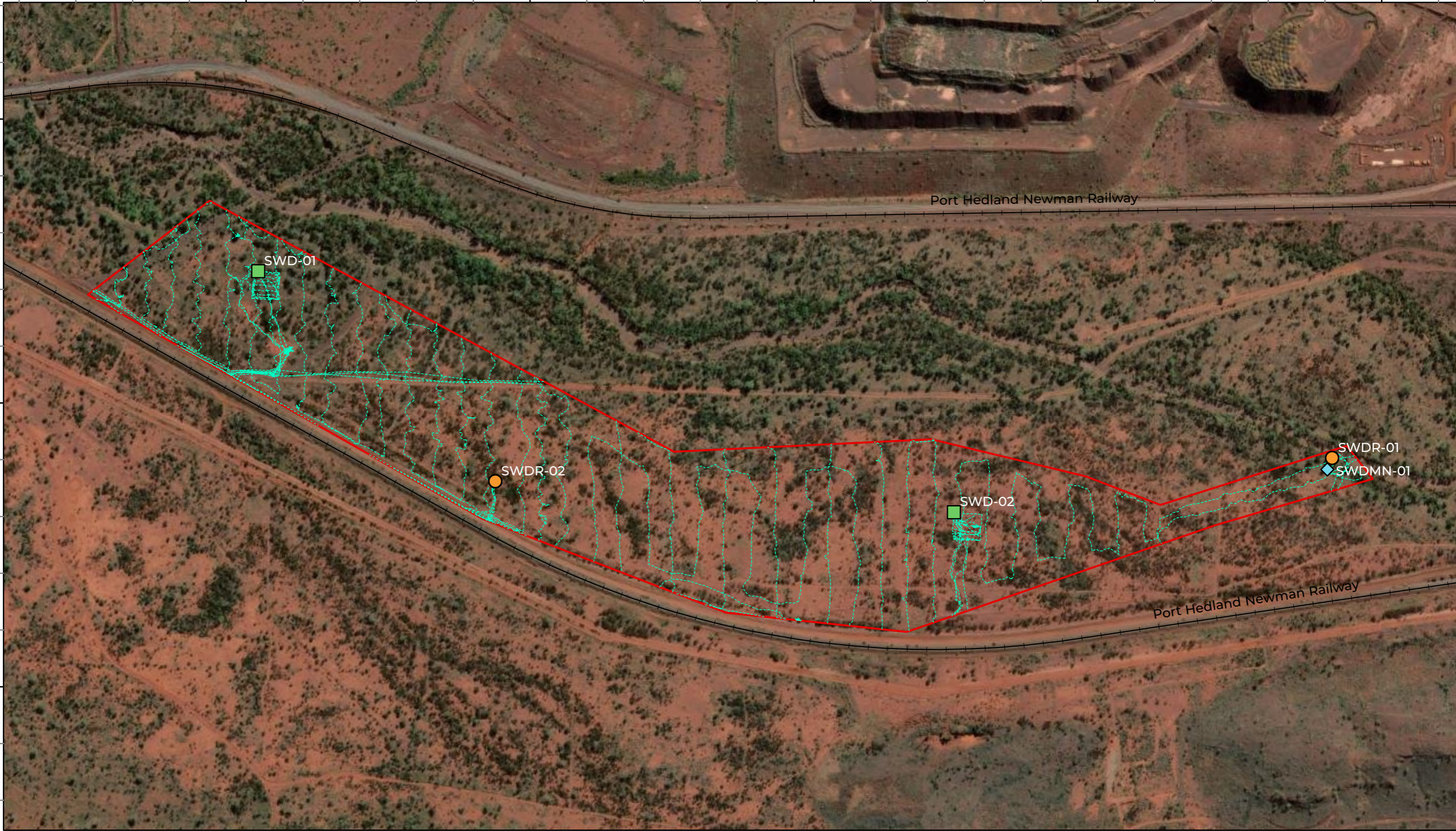
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LEGEND

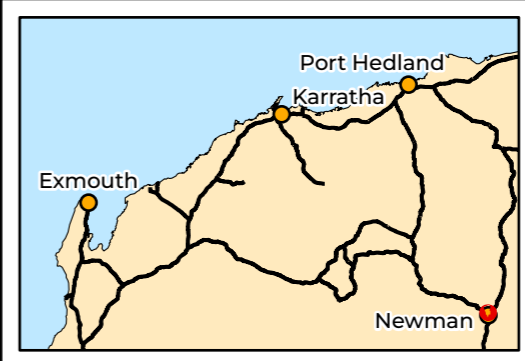
- | | |
|-------------|-------------------------|
| Survey Area | Sampling Type |
| State Road | Quadrat |
| Rail | Relevé |
| Traverse | Vegetation mapping note |

Biologic

Scale 1:7,000

0 0.1 0.2 Km

Coordinate System: GDA 1994 MGA Zone 50
Transverse Mercator Created: 23/05/2025



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Figure 4.2: Sample sites and traverses

Prior to field mobilisation, site locations were preliminarily selected using a combination of aerial imagery, surface geology layers, contour mapping and specialist knowledge of Pilbara vegetation communities. Sites were selected to be representative of the vegetation in the Survey Area, with a focus on areas with undisturbed vegetation that had no recent previous surveys. Parts of the Survey Area that looked unusual from the aerial imagery or appeared to represent potential habitat for significant flora and vegetation were also targeted. A minimum of three quadrats was not possible due to the small size of the Survey Area. Personnel attempted to place sampling sites within each vegetation unit. Survey effort is presented in Figure 4.2, supplemented by quadrat site data (Appendix F).

4.1.4 Targeted Flora Survey

The targeted flora survey involved botanists walking grid lines approximately 50 m apart, searching for significant flora, weeds and significant vegetation within the Survey Area (Figure 4.2). The key species that were targeted included those that are known to occur in the Survey Area, and those that are considered to be Highly Likely, Likely or Possible to occur following the Assessment of Occurrence (Table 3.4).

The list of significant flora from the Assessment of Occurrence was compiled, with field personnel familiarising themselves with photographs, reference samples and descriptions of these taxa before conducting the survey. Analysis of aerial photography and significant flora locations was also conducted prior to the survey to identify any areas of suitable habitat for targeted survey.

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
- Coordinates of each plant (if few) or the extent of the population (if many) using a GPS.

The Survey Area was searched comprehensively on a 50 m grid and vegetation was very open, enabling good visibility between traverses to observe target taxa. Teams informed each other via two-way radio when a taxon of interest was observed.

Threatened and Priority Flora Report Forms are provided to the Parks and Wildlife Service (Parks and Wildlife) of DBCA, as required under flora collecting permits. Significant flora

specimens are vouchered with the Western Australian Herbarium (WAH), where required and appropriate.

4.1.5 Flora

4.1.5.1 Nomenclature and Specimen Identification

Flora nomenclature used in this report is consistent with the WAH's plant census, provided on Florabase (WAH, 1998 -). All species names are current at the time of report preparation. All unconfirmed taxa are displayed as 'Genus sp. indet' (e.g. *Maireana ?georgei* is *Maireana* sp. indet), in the spatial data in line with BHP data standards and naming registers (BHP WAIO, 2023).

Specimens were identified by Biologic's identification botanists, Dr. Rachel Meissner and Rachel Butler (Table 4.1), using the appropriate taxonomic keys and Western Australian reference herbarium. Where required, relevant taxonomic experts at the WAH (WAH, 2015) were consulted. Specimens identified as being of significance (i.e. flora of other significance), were submitted to the WAH for authoritative identification (ACC/11,633/E).

4.1.5.2 Introduced Flora

Whilst completing the field survey, any observations of introduced flora taxa were recorded, with a particular focus on substantial infestations and significant environmental weeds. Significant environmental weeds refer to any plant listed as WoNS or DPs listed under Section 12 and Section 22 of the BAM Act. When introduced flora taxa were identified, a GPS coordinate of the individual was taken when occurring in isolation, or a central GPS coordinate was taken for an infestation (central coordinate with an approximate 20 m radius). Weed classification definitions are provided in Appendix A). Information collected at each location comprised:

- Number of individuals (count or estimate), including an approximate area of infestation (if applicable)
- Photographs
- Any comments regarding vegetation condition.

4.1.5.3 Review of Assessment of Occurrence and Significance

Following the field assessment, ground-truthing of existing significant flora records and presence of potential habitat is reviewed to revise the likelihood of occurrence for each taxon. A summary of the revised occurrence assessment is provided in Section 4.2.1.3. The overall Assessment of Occurrence is provided in Appendix E.

4.1.5.4 Vegetation mapping

Site photographs and full descriptions were taken at each sampling site to support vegetation mapping. Aerial imagery from various sources assisted in delineating vegetation unit boundaries, including regional imagery (Landgate, 2021), and Google Earth imagery (Google Earth, 2023). Vegetation types were aligned with vegetation mapping undertaken in proximity to the Survey Area by Biologic (in prep.) and (Spectrum, 2022b).

The current nationally adopted classification system for vegetation descriptions is the National Vegetation Information System (NVIS) (NVIS Technical Working Group, 2017) (definition in Appendix G). NVIS seeks to manage national vegetation data to help improve vegetation planning and management within Australia including standardising scale and technical wording for vegetation associations. The vegetation types in the Survey Area have been described to Level 5 (vegetation association), where possible, in the NVIS hierarchical structure (NVIS Technical Working Group, 2017). The vegetation structure information collected was used to describe the vegetation type based on the dominant taxa, foliage cover and height of the three traditional strata (upper, mid and lower/ground) which followed BHP guidance (BHP, 2018a).

As the Survey Area overlapped with vegetation mapping completed by Spectrum (2022b), this work was referred to in the development of vegetation types.

4.1.5.5 Vegetation condition

Vegetation condition was defined within the Survey Area using the vegetation condition scale for the Eremaean Botanical Province in EPA (2016b), which has been adapted from Keighery (1994) (Appendix H). The vegetation condition was recorded at each quadrat and relevé, while additional notes and observation records (e.g., vegetation mapping notes) were taken while traversing the Survey Area to broadly map vegetation condition boundaries. Disturbance layers from BHP were used to further inform condition mapping and areas of rehabilitation and clearing. The vegetation condition mapping was then digitised using GIS software. As the Survey Area overlapped with condition mapping completed by Spectrum (2022b), this work was referred to in the development of the condition mapping.

4.2 Results

4.2.1 Flora

4.2.1.1 Flora Composition

A total of 76 confirmed vascular flora taxa, representing 44 genera from 21 families were recorded within the Survey Area during the field survey. Of the 76 confirmed taxa, 73 were native flora taxa and three introduced (Appendix I). Two additional native taxa were unable

to be identified to species (*Maireana* sp. indet. and *Sida* sp. indet.) due to lack of identifiable material available at the time of survey.

The most species diverse families were Fabaceae, Poaceae, Malvaceae, and Chenopodiaceae, together making up 60.3% of the total flora (24.4%, 17.9%, 10.3%, and 7.7% respectively) (Table 4.3). The most represented genera were *Acacia* (12.8%), followed by *Ptilotus* (5.1%) and *Senna* (5.1%), with a combined 23.1% of the total flora (Table 4.3).

Table 4.3: Species diversity in the Survey Area

| Classification | Taxa Count | Classification | Taxa Count |
|-----------------------------------|------------------------|---------------------------------|------------|
| Most species rich families | | Most species rich genera | |
| Fabaceae | 19 taxa from 5 genera | <i>Acacia</i> | 10 taxa |
| Poaceae | 14 taxa from 11 genera | <i>Ptilotus</i> | 4 taxa |
| Malvaceae | 8 taxa from 3 genera | <i>Senna</i> | 4 taxa |
| Chenopodiaceae | 5 taxa from 4 genera | | |

4.2.1.2 Significant Flora

Threatened Flora

No Threatened flora listed under the BC Act or EPBC Act were recorded from the Survey Area.

Priority Flora

No Priority flora were recorded from the Survey Area.

4.2.1.3 Review of Assessment of Occurrence

The pre-survey Assessment of Occurrence was reviewed post-survey (Table 4.4, Appendix E). No records of significant flora taxa were known to occur within the Survey Area prior to the survey. One taxon, *Aristida jerichoensis* var. *subspinulifera* (P3), was assessed as Highly Likely to occur in the Survey Area pre-survey. This was re-assessed post-survey as Highly Unlikely due to absence of suitable habitat. All taxa assessed as Likely and Possible pre-survey were downgraded to either Unlikely or Highly Unlikely due to absence of preferred habitat or limited remaining potential for occurrence given the comprehensive survey of the entire Survey Area.

Table 4.4: Assessment of Occurrence review post-survey

| Taxon | Likelihood post-survey | Reasoning for change/ no change in post-survey likelihood |
|--|------------------------|---|
| Pre-survey likelihood – Highly Likely | | |
| <ul style="list-style-type: none"> <i>Aristida jerichoensis</i> var. <i>subspinulifera</i> (P3) | Highly Unlikely | Suitable habitat for this species (hardpan plains) not observed in the Survey Area. |
| Pre-survey likelihood – Likely | | |
| <ul style="list-style-type: none"> <i>Aristida lazaridis</i> (P3) | Unlikely | Suitable habitat for this species was present in the Survey Area but was not observed during comprehensive targeted survey across the entire Survey Area. Condition of the Survey Area was Good to Poor mainly due to weed presence of <i>*Cenchrus ciliaris</i> in closed density. This invasive taxa is allelopathic and makes germination of native grasses difficult. |
| <ul style="list-style-type: none"> <i>Ipomoea racemigera</i> (P3) | | Suitable habitat for this species was present in the Survey Area but was not observed during comprehensive targeted survey across the entire Survey Area. |
| <ul style="list-style-type: none"> <i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431) (P3) | Highly Unlikely | Suitable habitat for this species was present in the Survey Area but the taxon is approximately 1 – 2 m tall and would likely have been observed if present during comprehensive targeted survey across the entire Survey Area. Condition of the Survey Area was Good to Poor mainly due to weed presence of <i>*Cenchrus ciliaris</i> in closed density. This invasive taxa is allelopathic and makes germination of native grasses difficult. |

| Taxon | Likelihood post-survey | Reasoning for change/ no change in post-survey likelihood |
|---|------------------------|--|
| Pre-survey likelihood – Possible | | |
| <ul style="list-style-type: none"> <i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i> (P3) <i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727) (P3) <i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwen 4684) (P3) <i>Eremophila youngii</i> subsp. <i>lepidota</i> (P4) | Unlikely | Preferred habitat for these species was present in the Survey Area. Species were not observed during comprehensive targeted survey of the entire Survey Area using transects 50 m apart. |
| <ul style="list-style-type: none"> <i>Eremophila magnifica</i> subsp. <i>velutina</i> (P3) <i>Eremophila naaykensis</i> (P3) <i>Gymnanthera cunninghamii</i> (P3) <i>Isotropis parviflora</i> (P3) <i>Streptoglossa</i> sp. Cracking clays (S. van Leeuwen et al. PBS 7353) (P3) <i>Swainsona thompsoniana</i> (P3) | Highly Unlikely | Preferred habitat for these species was not observed in the Survey Area. |

4.2.1.4 Flora of Other Significance

The EPA (2016b) advises that flora species, subspecies, varieties, hybrids and ecotypes may be considered significant for reasons other than listing as a Threatened or Priority Flora taxa. These reasons may include, but are not limited to, range extensions, new locations, potentially undescribed species, keystone species, relic status, local endemism and anomalous features. For the purposes of this report, flora of 'other' significance has been broken up into two separate categories of significance:

1. Taxa with anomalous features; and
2. Taxa representing new locations.

Taxa with Anomalous Features

Hibiscus aff. *campanulatus* was recorded from the Survey Area. A species affinis ('aff.') indicates a potentially new and undescribed species has an affinity to, but is not identical to, the named species. *Hibiscus* aff. *campanulatus* is a known entity from this area, differing from *H. campanulatus* (P1) in having mauve flowers with a dark spot at the base of each petal (in comparison to white to pale mauve with no spot at the petal base). It also differs from *H. sp.* Gurinbiddy Range in having broader obovate epicalyx lobes, stellate hairs with a smaller diameter, and a larger corolla that has stellate and glandular hairs near the margins on the outer surface, as opposed to being glabrous (S. Dillon, WAH, pers. comm., 23 February 2023). One specimen was submitted to the WAH (ACC/11,633/E) and confirmed as *H. aff. campanulatus* (M. Hislop (WAH Identification Botanist) pers. comm., 24 June 2025). Three individuals were recorded at one location (Plate 4.1).

Range Extensions and Locality Holes

Four flora taxa recorded in the Survey Area by this survey represent either range extensions in current known distribution (one taxon) or fill gaps in current known distribution when considering the WAH database (over 50 km from the Survey Area; three taxa) (Table 4.5) (WAH, 1998 -). This is likely a result of several factors, including those listed below:

- A low number of previous specimen lodgements to the WAH from previous surveys occurring in the Survey Area;
- A high diversity of vascular flora taxa in the area; and
- Good seasonal conditions prior to the survey.

Table 4.5: Taxa representing range extensions and locality holes

| Taxon | Comments |
|--|---|
| Records represent extension of known range of the taxon | |
| <i>Polymeria mollis</i> | Range extension to the SE of its known distribution, closest record 90.1 km from the Survey Area. |

| Taxon | Comments |
|---|--|
| Records fill gap in known distribution for the taxon | |
| <i>Gomphrena affinis</i> subsp. <i>pilbarensis</i> | Closest WAH record is 110.5 km W from the Survey Area. Also recorded 11.1 km SW of the Survey Area by Biologic (2020a). |
| <i>Rhynchosia minima</i> | Closest WAH record is 72.2 km N from the Survey Area. Also recorded 3.4 km E from the Survey Area Biologic (2022c) and 4.5 NE from the Survey Area by Spectrum (2022b). |
| <i>Indigofera linnaei</i> | Closest previous record 90.3 km NNE from the Survey Area; however, five individuals at five locations were recently recorded by Biologic (in prep.) within the Jimblebar Wind Power 2030 survey area, with the closest record approximately 1.5 km from the Survey Area. This taxon was also recorded 13.5 km NW of the Survey Area by Spectrum (2022b). |

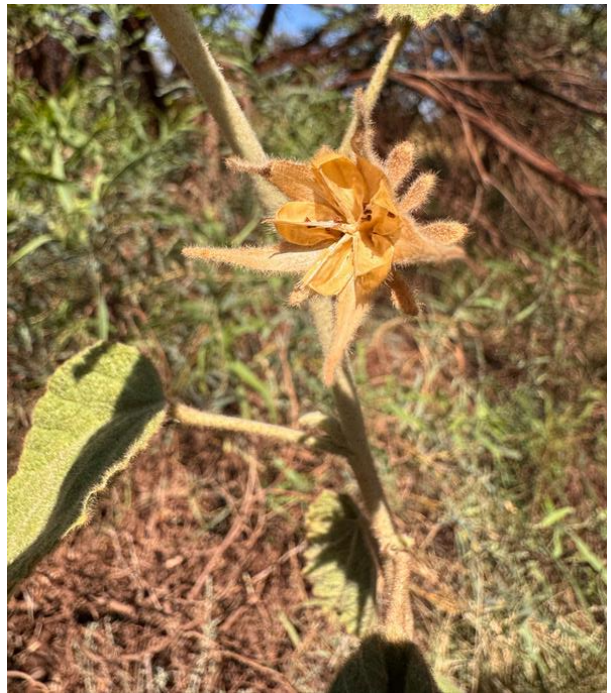


Plate 4.1: *Hibiscus* aff. *campanulatus*. Source: Biologic

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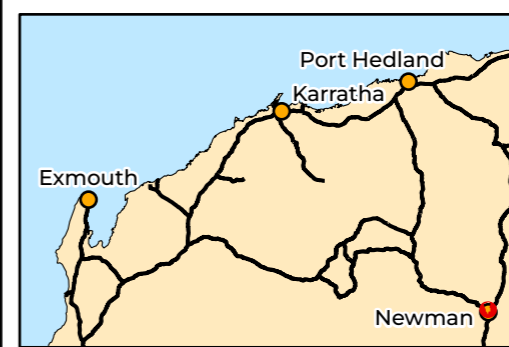


LEGEND

- Survey Area
- ⬠ *Hibiscus* aff. *campanulatus*
- State Road
- + Rail



Scale 1:7,000
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 Coordinate System: GDA 1994 MGA Zone 50
 Transverse Mercator Created: 23/05/2025



BHP WAIO
OB32 Settlement Pond
Flora and Vegetation

Figure 4.3: Flora of other significance recorded in the Survey Area

4.2.1.5 Introduced Flora

Three introduced taxa, representing three families, were recorded from the Survey Area (Table 4.6). None of the introduced flora are listed as WoNS, or as ‘Priority Alert’ weeds by the DCBA Parks and Wildlife Service.

Table 4.6: Introduced flora recorded in the Survey Area

| Family | Taxon | Lifeform/ Habit | Density and extent |
|------------|----------------------------|-----------------|--|
| Asteraceae | * <i>Bidens bipinnata</i> | Annual herb | 40 individuals at one location |
| Moraceae | * <i>Ficus religiosa</i> | Tree | One individual at one location |
| Poaceae | * <i>Cenchrus ciliaris</i> | Perennial grass | 256 individuals from four locations [^] |

[^] It should be noted that **C. ciliaris* was abundant throughout the entire Survey Area and was only counted where it occurred in sample sites; as such, the counts provided in the table underrepresent the actual abundance of the taxon.

**Cenchrus ciliaris* is rated as having a high ecological rating and rapid invasiveness (DPIRD, 2022). **Ficus religiosa* has not been assessed for ecological impact and invasiveness (DPIRD, 2022), while the ecological impact of **Bidens bipinnata* is unknown, but has been rated as having rapid invasiveness (DPIRD, 2022).

Introduced flora were distributed primarily within Drainage Line, Drainage Area/Floodplain, and Sandy/Stony Plain vegetation types. These landforms are known to present more optimal habitat, due to dispersal of seeds by water movement as well as higher water availability for germination and growth (Hill *et al.*, 2005; van der Meulen & Sindel, 2008). Furthermore, infestations of weeds spread via cattle is more prevalent on the lower landforms, compared to rocky, breakaway country and large hills and ranges.

The extent of the invasive grass **Cenchrus ciliaris* is likely to be underestimated across the Survey Area. This grass species can create monocultures in suitable areas, as it did throughout the Survey Area (disturbed water gaining areas, i.e., drainage lines, floodplains), where it can be difficult to distinguish individuals.

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LEGEND

- Survey Area
- Rail

- Introduced Flora
- ✱ *Bidens bipinnata*
 - ✱ *Cenchrus ciliaris*
 - ✱ *Ficus religiosa*

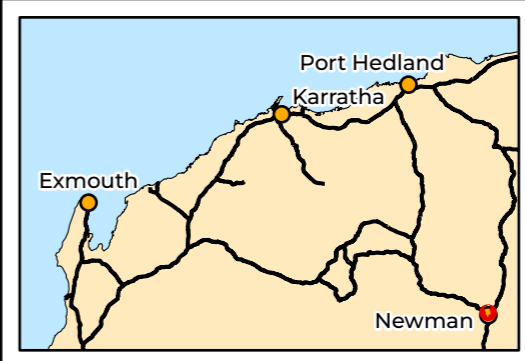


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BHP WAIO
OB32 Settlement Pond
Flora and Vegetation

Figure 4.4: Introduced
flora recorded in the
Survey Area

4.2.2 Vegetation

4.2.2.1 Broad Landforms

Landform, topography, and geology are major drivers of water and nutrient availability within the Pilbara and strongly influence the patterns of vegetation found across the landscape. Vegetation type classifications have been provided by BHP and incorporate broad landforms: Drainage Lines/ Floodplains (Drainage Area/ Floodplain (FP), Major Drainage Lines (MA), Medium Drainage Lines (ME) and Minor Drainage Lines (MI)), Gullies (GU), Hills (Hillcrests/ Upper Hillslopes (HC) and Hillslopes (HS)), and Plains (Calcrete Plains (CP), Sand Plains (SA) and Stony Plains (SP)).

Two broad landforms supporting four vegetation types were identified and mapped within the Survey Area (Table 4.7):

- Drainage Area/ Floodplain – two vegetation types; and
- Sandy/ Stony Plain – two vegetation types.

The dominant broad landform based on coverage across the Survey Area was Sandy/ Stony Plain (73.8%, 43.8 ha), with the remaining area consisting Minor Drainage Line and Floodplain vegetation types (18.1%, 10.8 ha) and cleared areas.

4.2.2.2 Vegetation Types

Four vegetation types were described and delineated in the Survey Area based on two broad landforms (Figure 4.5, Table 4.7). The most common vegetation type was SS AanApr Tpu, extending across 73.5% (43.7 ha) of the Survey Area.

In addition to the four vegetation types described and delineated from the Survey Area, a Cleared unit was also mapped (Figure 4.5, Table 4.7). This contains cleared and/or disturbed areas including roads, informal tracks, infrastructure, disturbed areas not representing natural vegetation, and other areas void of vegetation from unnatural processes.

Vegetation types in the east of the Survey Area were amended slightly from those mapped by Spectrum (2022b). Based on the location of sites and tracklogs from Spectrum (2022b), this area was possibly not ground-truthed and thus vegetation in this area was likely to have been extrapolated from nearby sample sites. This area was defined by Spectrum (2022b) as a major drainage line with *Eucalyptus camaldulensis* as a dominant taxon; however, ground-truthing during the current survey indicated that the area comprised *Eucalyptus victrix* over *Acacia* spp. and **Cenchrus ciliaris*. As a result, this area has been remapped as a minor drainage line. Data from two Spectrum (2022b) sample sites to the northwest of this area also support this approach.

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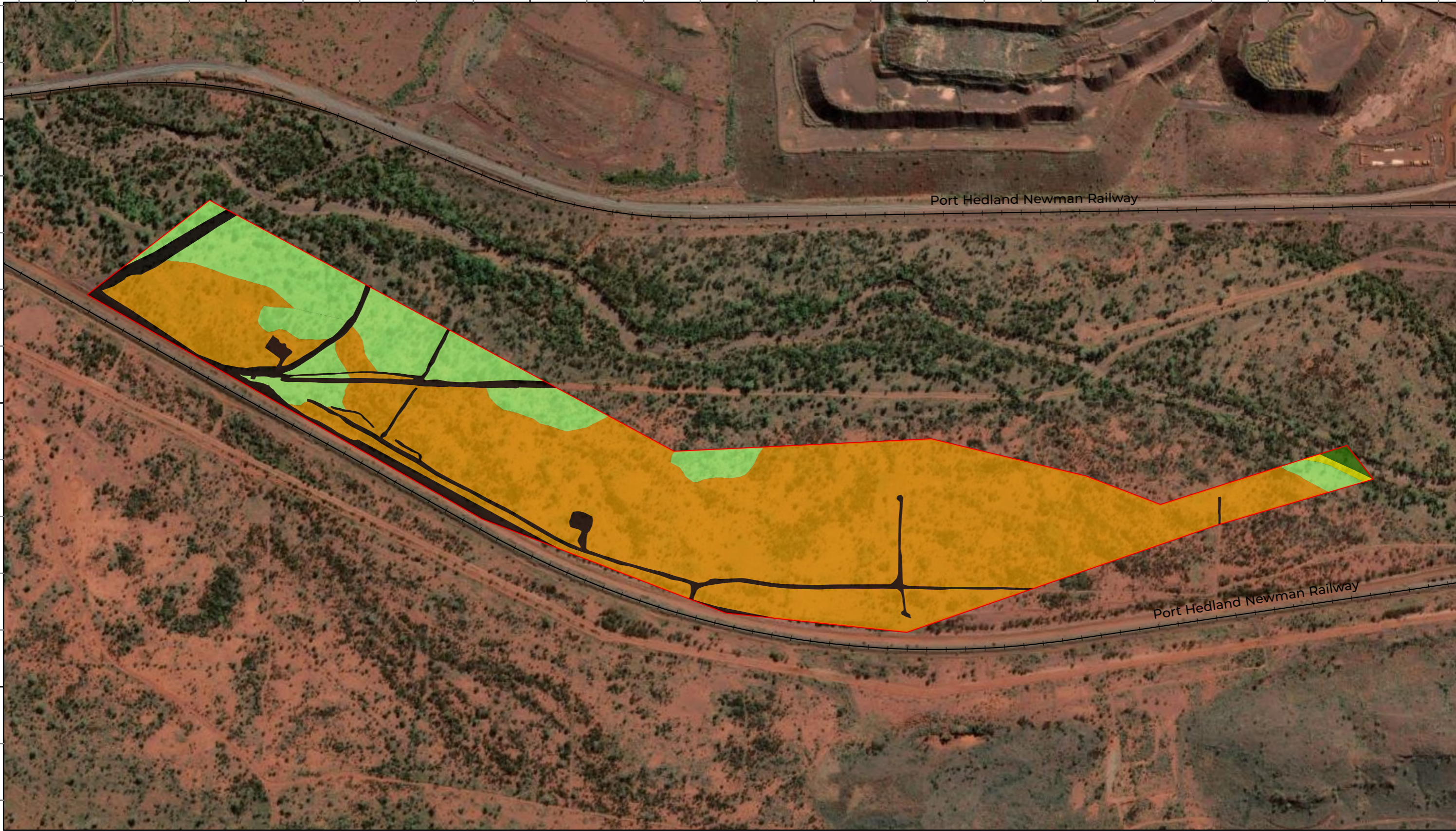
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LEGEND

- Survey Area
- Rail

- Vegetation Type
- FP CcChfTt AaAci ChExCoc
 - MI CcCs AciAaAte ChEvEg
 - SS AanAprApt Tp

- SS CcEnpo Aci
- Cleared

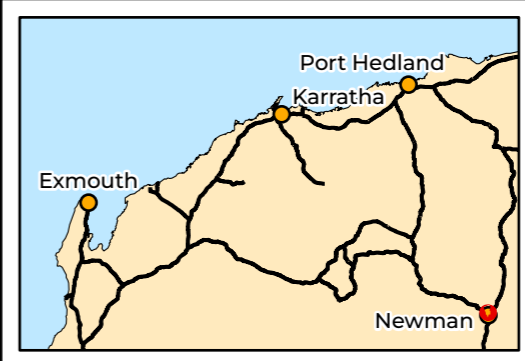


Biologic

Scale 1:7,000

0 0.1 0.2 Km



Coordinate System: GDA 1994 MGA Zone 50 Transverse Mercator Created: 23/05/2025




BHP WAIO
OB32 Settlement Pond
Flora and Vegetation

Figure 4.4: Vegetation types in the Survey Area

Table 4.7: Vegetation types of the Survey Area

| Vegetation Codes, Broad Floristic Formation & Description | Sample Sites | Survey Area Extent | Environmental Values & Features of Interest | Representative Photo |
|---|---|--------------------------|---|--|
| Drainage Area/ Floodplain | | | | |
| <p>*Cenchrus mid tussock grassland</p> <p>FP CcChfTt AaAci ChExCoc</p> <p><i>*Cenchrus ciliaris, Chrysopogon fallax, Themeda triandra</i> tall open to closed tussock grassland with <i>Acacia aptaneura, Acacia citrinoviridis</i> tall open shrubland with <i>Corymbia hamersleyana, Eucalyptus xerothermica, Corymbia candida</i> low open woodland on red-brown silty clay sand of drainage areas/ floodplains.</p> <p>Aligns with Biologic (in prep.) Formerly mapped as FP Cci ChaAci AbiApr (Spectrum, 2022b)</p> | <p><u>Quadrat:</u> SWD-01 <u>Mapping Note:</u> SWDMN-01</p> | <p>10.6 ha 17.8%</p> | <p>Significant flora present: None.</p> <p>Flora of 'other' significance: <i>Hibiscus</i> aff. <i>campanulatus</i></p> <p>Vegetation of 'other' significance: Aligns with 'valley floor mulga' Ecosystem at Risk (Kendrick, 2003).</p> |  |
| <p>*Cenchrus mid closed tussock grassland</p> <p>MI CcCs AciAaAte ChEvEg</p> <p><i>*Cenchrus ciliaris, *Cenchrus setiger</i> closed tussock grassland with <i>Acacia citrinoviridis, Acacia aptaneura, Acacia tetragonophylla</i> tall shrubland with <i>Corymbia hamersleyana, Eucalyptus victrix, Eucalyptus gamophylla</i> low open woodland on red-brown clayey sand on drainage areas/ floodplains and drainage lines.</p> <p>Aligns with Biologic (in prep.) Formerly mapped as MA EcrEvi Aci Mgl (Spectrum, 2022b)</p> | <p><u>Relevé:</u> SWDR-01</p> | <p>0.2 ha 0.3%</p> | <p>Significant flora present: None.</p> <p>Vegetation of 'other' significance: Aligns with 'valley floor mulga' Ecosystem at Risk (Kendrick, 2003).</p> |  |

| Vegetation Codes, Broad Floristic Formation & Description | Sample Sites | Survey Area Extent | Environmental Values & Features of Interest | Representative Photo |
|--|---|--------------------------|---|---|
| <p>Acacia low open forest</p> <p>SS AanAprApt Tp</p> <p><i>Acacia aneura</i>, <i>Acacia pruinocarpa</i>, <i>Acacia pteraneura</i> low open forest of over <i>Triodia pungens</i> open hummock grassland on red sand clay on plains.</p> <p>Aligns with MP1 SA AanApr Tpu (Spectrum, 2022b)</p> | <p><u>Quadrat</u>: SWD-02</p> <p><u>Relevé</u>: SWDR-02</p> | <p>43.7 ha 73.5%</p> | <p>Significant flora present:</p> <p>None.</p> <p>Vegetation of 'other' significance:</p> <p>Aligns with 'valley floor mulga' Ecosystem at Risk (Kendrick, 2003).</p> |  |
| <p>*Cenchrus tussock grassland</p> <p>SS CcEnpo Aci</p> <p>*<i>Cenchrus ciliaris</i>, <i>Enneapogon polyphyllus</i> tussock grassland with <i>Acacia citrinoviridis</i> low woodland on orange-brown sand and clay on floodplains.</p> <p>Aligns with SC CciEpo Aci (Spectrum, 2022b)</p> | <p>No sample site; based on Spectrum (2022b)</p> | <p>0.1 ha 0.2%</p> | <p>Significant flora present:</p> <p>None.</p> <p>Vegetation of 'other' significance:</p> <p>None.</p> | <p>No photograph available.</p> |
| <p>Cleared</p> <p>Cleared areas including gravel tracks, drill pads and other areas cleared for infrastructure and mining related activities.</p> | | <p>4.8 ha 8.1%</p> | | <p>No photograph available.</p> |

4.2.2.3 Significant Vegetation

There are no TECs that intersect the Survey Area and none of the vegetation types identified in the Survey Area resemble known TECs from the Pilbara. Further, none of the vegetation types identified in the Survey Area resemble known PECs.

Vegetation of Other Significance

Multiple vegetation types within the Survey Area are analogous with ‘ecosystems at risk’ (EAR) for the Hamersley IBRA subregion (Kendrick, 2003), which is the dominant IBRA subregion in the Survey Area (Table 4.7). EAR are ecosystems originally identified in the Pilbara bioregion as being vulnerable to human-induced threats such as cattle grazing, weed ingress and water shadow from linear infrastructure, but have no formal conservation listing. No further review of this work has been completed since 2003; as such, there is limited information available as to the current level of significance of EAR. For this reason, EAR are encompassed in “Vegetation of Other Significance” in this report (EPA, 2016b).

Vegetation types containing mulga species (*Acacia aneura*, *A. aptaneura*, *A. incurvaneura* and/or *A. macraneura*) as the most dominant components of either open forest, woodland, open woodland, shrubland or open shrubland are considered to be the ‘valley floor mulga’ EAR. These vegetation types occur on valley floor landforms of floodplains and sandy/ stony plains. Most ‘valley floor mulga’ vegetation types also contained tussock/ bunch or hummock grasses as the grassland layer. Vegetation types aligning with ‘valley floor mulga’ comprise:

- FP CcChfTt AaAci ChExCoc;
- MI CcCs AciAaAte ChEvEg; and
- SS AanAprApt Tp.

These mulga over tussock grass ecosystems occur on loamy, friable soils susceptible to erosion, and are open to heavy grazing and fire, making them vulnerable to ecosystem degradation/ alteration and extend across approximately 91.6% of the Survey Area. These vegetation types are considered to be well-represented throughout the Pilbara and, as such, were considered to be of low local and regional significance. Spectrum (2022b) also assessed SS AanAprApt Tp (Spectrum code MP1 SA AanApr Tpu) and MI CcCs AciAaAte ChEvEg (formerly mapped as MA EcrEvi Aci Mgl) as having low regional significance.

While loamy soils are not mentioned in vegetation descriptions, the above vegetation types are still reflective of this EAR. To help with data consistency, existing vegetation types have been used when possible. The soils suffix needs to amalgamate multiple data descriptions and this is sometimes more broadly reflective of what is present, or can be subjective; such as describing a Sandy Clay Loam as opposed to Sandy Clay.

Additionally, each of the sampling sites has "loam" recorded in the data (Appendix F); either Sandy Clay Loam or Silty Clay Loam. Further, all other factors align – associated species, structural composition, density, landform (floodplain).

Groundwater Dependent Ecosystems

None of the vegetation types in the Survey Area were considered to constitute groundwater dependent vegetation. As discussed in Section 4.2.2.2, vegetation type MI CcCs AciAaAte ChEvEg was formerly mapped by Spectrum (2022b) as a major drainage line comprising woodland of *Eucalyptus camaldulensis*. Ground-truthing during the current survey indicated that *E. camaldulensis* was not present in this area, nor were any riparian species that would indicate dependence on groundwater or presence of permanent soil moisture. As such, this vegetation type was not considered to be groundwater dependent.

While *Eucalyptus victrix* was present, it is a facultative phreatophyte and there was insufficient other contributing evidence (i.e., indicator species or surface water presence) to infer GDV in the Survey Area.

Sheet-flow Dependent Ecosystems

No mulga banding indicative of sheet-flow dependent vegetation was observed in the Survey Area.

4.2.2.4 Vegetation Condition

Vegetation condition within the Survey Area ranged from Good to Completely Degraded (Table 4.8, Figure 4.6). A total of 8.1% (4.2 ha) of the Survey Area was recorded as Completely Degraded (mapped as Cleared). Where weeds, trampling or tracks were observed in intact remnant vegetation, condition was rated as Good, which constituted the majority of the Survey Area.

Table 4.8: Vegetation condition and extent of the Survey Area

| Condition | Extent (ha/%) | Comment |
|-------------------------------|------------------|---|
| Good | 52.3 ha 88.1% | High weed invasion, trampling, tracks and clearing, rubbish, evidence of human disturbance to vegetation strata |
| Poor | 2.3 ha 3.8% | High weed invasion, tracks and clearing, rubbish, significant evidence of disturbance to vegetation strata |
| Completely Degraded (Cleared) | 4.8 ha 8.1% | Areas associated with roads, tracks, mining or exploration operations and infrastructure. |

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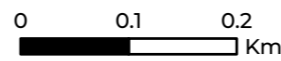
- Survey Area
 - Rail
- Vegetation Condition
- Good
 - Poor
 - Completely Degraded



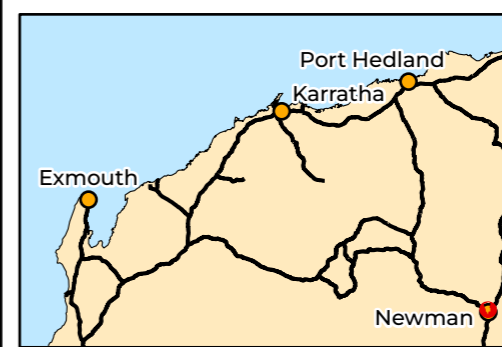
Biologic



Scale 1:7,000



Coordinate System: GDA 1994 MGA Zone 50 Transverse Mercator Created: 28/05/2025



BHP WAI0
OB32 Settlement Pond
Flora and Vegetation

Figure 4.6: Vegetation
condition in the
Survey Area

5 Constraints and limitations

The EPA (2016b) outlines several potential limitations to flora and vegetation surveys. These aspects are assessed and discussed in Table 5.1.

Table 5.1: Survey limitations and constraints

| Limitation | Constraint | Comment |
|---|------------|---|
| Availability of contextual information at a regional and local scale | No | Sufficient contextual information was available for the Survey Area, including broad information on land systems and vegetation associations. The Survey Area is situated around the Newman townsite where an extensive amount of biological survey work has previously been undertaken. A comprehensive review of other reports was completed. Several surveys have been completed recently in the vicinity or intersecting with the Survey Area, including Spectrum (2022b) and Biologic (in prep.). Additionally, numerous flora and vegetation records were available through the seven databases and 26 previous reports reviewed as part of the desktop assessment. |
| Competency/ experience of the survey team, including experience in the bioregion surveyed | No | The survey was led by Carmel Winton, a Principal Botanist with over ten years' experience. All Senior Botanists involved in the field survey had more than the recommended five years' experience to manage a flora and vegetation field survey or lead field teams in the Pilbara bioregion (EPA, 2016b). The remaining team members had either 5 or more years' experience, or worked closely with a more experienced team member. |
| Proportion of flora recorded/ collected and any identification issues | No | The survey intensity (single-season detailed) was designed to capture most of the flora within the Survey Area. Two taxa (2.6% of the total taxa recorded) collected from the field were difficult to confidently identify to species or infraspecies level due to lack of identifiable characteristics such as flowers or fruit; a relatively low number of taxa when compared to total taxa recorded (77). |
| Survey timing, weather and season | No | The field survey was conducted over one half day by four botanists and one half day by two botanists in one field trip. Conditions during the survey were adequate to complete the survey. Weather conditions did not present any survey limitations. The seasonal timing of the survey was appropriate for this level of single-season detailed survey for the Eremaean (March to June (wet season)) (EPA, 2016b). Total rainfall in the three months prior to the survey was over 30 mm above LTA. Weather conditions during the survey did not present any limitations. |

| Limitation | Constraint | Comment |
|---|------------|---|
| Disturbance that may have affected results, e.g., fire, flood | No | Disturbances within the Survey Area were mainly associated with mining and pastoralism, such as tracks, weeds, and cattle grazing. These disturbances are typical for this area in the Pilbara and were not considered a limitation |
| Appropriate area fully surveyed (effort and extent) | No | The sampling methods and survey intensity was appropriate to achieve the scope of the survey. The Survey Area was systematically grid searched at 50 m spacing for significant flora. Five sampling sites were undertaken to assess the flora and vegetation of the area, a sufficient number given the small size of the Survey Area and recent survey history and effort. |
| Access restrictions within the Survey Area | No | The Survey Area was accessed via mining, exploration and pastoral tracks which provided access across the entire of the Survey Area. Walking traverses were limited to a maximum distance of 1 km from the vehicle for safety reasons. Access was sufficient and did not pose any limitations on the survey. |
| Problems with data and analysis, including sampling bias | No | No limitations with data collection were encountered during the field survey. |

6 Conclusion

A single-season detailed flora and vegetation survey was completed across the Survey Area on 17 and 19 March 2025, over three person days. Two quadrats, two relevés, and one vegetation mapping note were sampled. Targeted survey for significant and introduced flora species and opportunistic sampling were also undertaken.

Key results of the survey are as follows:

- A total of 75 confirmed vascular flora taxa, representing 44 genera from 21 families, were recorded during the field survey, comprising 72 native flora taxa and three introduced flora taxa;
- No significant flora taxa have been previously recorded in the Survey Area;
- No Threatened or Priority flora taxa were recorded during the current survey;
- Post-survey review of the likelihood of significant flora occurring in the Survey Area assessed all remaining taxa as either Highly Unlikely or Unlikely;
- One taxon recorded in the Survey Area, *Hibiscus* aff. *campanulatus*, was considered flora of other significance due to anomalous features;
- One taxon recorded in the Survey Area represented a range extension of 90.1 km from the nearest known record and three taxa fill a minor gap in known distribution (locality holes), though each of these has been recorded closer to the Survey Area recently;
- Three confirmed introduced taxa were recorded within the Survey Area, none of which are listed as WoNS or DPs;
- Four vegetation types were described and delineated in the Survey Area based on two broad landforms (Drainage Area/ Floodplains and Sandy/ Stony plains);
- None of the vegetation types recorded represented any of the known TECs or PECs listed under the BC Act or EPBC Act;
- Three vegetation types potentially hold 'other' significance for providing habitat for significant flora or aligning with published Ecosystems at Risk;
- Vegetation condition ranged from Good to Completely Degraded, with the majority (88.1%) of vegetation assessed as Good condition; and
- No limitations to the survey were noted.

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Appendix A: 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: <ul style="list-style-type: none"> (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: <ul style="list-style-type: none"> (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: <ul style="list-style-type: none"> (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: <ul style="list-style-type: none"> (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 <ul style="list-style-type: none"> (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 (TEC) | |
| 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 <i>Wildlife Conservation (Rare Flora) Notice 2018</i> 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 <i>Wildlife Conservation (Rare Flora) Notice 2018</i> 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 <i>Wildlife Conservation (Rare Flora) Notice 2018</i> 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 <i>Wildlife Conservation (Rare Flora) Notice 2018</i> 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 |

| Category | Definition |
|--|--|
| | <p>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.</p> |
| Threatened Ecological Communities (TEC) | |
| Critically Endangered (CR) | <p>An ecological community is eligible for listing in the category of critically endangered ecological community at a particular time if, at that time —</p> <ul style="list-style-type: none"> (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) | <p>An ecological community is eligible for listing in the category of endangered ecological community at a particular time if, at that time —</p> <ul style="list-style-type: none"> (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) | <p>An ecological community is eligible for listing in the category of vulnerable ecological community at a particular time if, at that time —</p> <ul style="list-style-type: none"> (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 | <p>An ecological community is eligible for listing as a collapsed ecological community at a particular time if, at that time —</p> <ul style="list-style-type: none"> (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 — <ul style="list-style-type: none"> (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) | <p>Poorly-known Species</p> <p>Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g., agricultural, or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.</p> |
| Priority 2 (P2) | <p>Poorly-known Species</p> <p>Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g., national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.</p> |
| Priority 3 (P3) | <p>Poorly-known Species</p> <p>Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.</p> |
| Priority 4 (P4) | <p>Rare, Near Threatened and other species in need of monitoring</p> <p>(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.</p> <p>(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.</p> <p>(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p> |

| Category | Definition |
|--|--|
| Priority Ecological Communities (PEC) | |
| Priority 1 (P1) | <p>Poorly-known ecological communities</p> <p>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.</p> |
| Priority 2 (P2) | <p>Poorly-known Ecological Communities</p> <p>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.</p> |
| Priority 3 (P3) | <p>Poorly-known Ecological Communities</p> <p>(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:</p> <p>(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or;</p> <p>(iii) communities made up of large, and/or widespread occurrences, which may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.</p> <p>Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.</p> |

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

Furthermore, any species or ecological communities that may be rare but for which there is insufficient information available to allocate a threatened status under the BC Act, can also be listed as Priority species by the WA Department of Biodiversity, Conservation and Attractions (DBCA)

Significant flora may extend beyond the assigned codes and in line with EPA (2016b) may include:

- Being identified as Threatened, Critically Endangered, Endangered, Vulnerable, Extinct or Extinct in the Wild species (State listed BC Act and/or commonwealth listed EPBC Act);
- Being listed as Priority Flora species (DBCA, 2023b);
- 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 in line with EPA (2016b) may include:

- Being identified as Threatened Ecological Community (TEC), Critically Endangered, Endangered, Vulnerable or Collapsed ecological community (State listed BC Act and/or commonwealth listed EPBC Act);
- Identified as a Priority Ecological Community (PEC) (DBCA, 2023a);
- 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.

Introduced flora

Legal Status Definitions of Listed Plants in Western Australia

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

Appendix B: Species list of the desktop assessment

| Family | Taxon | Source | | | | | | | Conservation Status | | | Introduced | | |
|---------------------------------|--|--------|-----|-----|------|------|------|-----|---------------------|--------|----------|------------|---|---|
| | | NM | ALA | WAH | TPFL | EPBC | WAOL | BHP | DFCA | BC Act | EPBC Act | | | |
| Amaranthaceae cont. | <i>Ptilotus rotundifolius</i> | • | • | | | | | | | | | | | |
| | <i>Ptilotus schwartzii</i> | • | • | | | | | | | | | | | |
| | <i>Ptilotus xerophilus</i> | | • | | | | | | | | | | | |
| Apiaceae | <i>Daucus glochidiatus</i> | • | | | | | | | | | | | | |
| Apocynaceae | <i>Calotropis procera</i> | | | | | | | • | | | | | Y | |
| | <i>Cryptostegia madagascariensis</i> | | | | | | | • | | | | | Y | |
| | <i>Cynanchum floribundum</i> | • | • | | | | | | | | | | | |
| | <i>Gymnanthera cunninghamii</i> | • | • | • | • | | | | • | P3 | | | | |
| | <i>Vincetoxicum lineare</i> | • | | | | | | | | | | | | |
| Araceae | <i>Pistia stratiotes</i> | | | | | | | • | | | | | Y | |
| | <i>Zantedeschia aethiopica</i> | | | | | | | • | | | | | Y | |
| Araliaceae | <i>Astrotricha hamptonii</i> | • | • | | | | | | | | | | | |
| | <i>Hydrocotyle ranunculoides</i> | | | | | | | • | | | | | Y | |
| | <i>Trachymene bialata</i> | • | • | | | | | | | | | | | |
| | <i>Trachymene oleracea</i> | • | • | | | | | | | | | | | |
| | <i>Trachymene oleracea</i> subsp. <i>oleracea</i> | • | | | | | | | | | | | | |
| | <i>Trachymene pilbarensis</i> | • | | | | | | | | | | | | |
| Asparagaceae | <i>Asparagus asparagoides</i> | | | | | | | • | | | | | Y | |
| Asteraceae | <i>Actinobole oldfieldianum</i> | • | | | | | | | | | | | | |
| | <i>Bidens bipinnata</i> | • | • | | | | | | | | | | Y | |
| | <i>Bidens pilosa</i> | • | | | | | | | | | | | Y | |
| | <i>Blumea tenella</i> | • | | | | | | | | | | | | |
| | <i>Brachyscome rudallensis</i> | • | • | | | | | | | | | | | |
| | <i>Calocephalus beardii</i> | • | • | | | | | | | | | | | |
| | <i>Calocephalus pilbarensis</i> | • | • | | | | | | | | | | | |
| | <i>Calotis hispidula</i> | • | • | | | | | | | | | | | |
| | <i>Calotis latiuscula</i> | • | • | | | | | | | | | | | |
| | <i>Calotis multicaulis</i> | • | • | | | | | | | | | | | |
| | <i>Calotis plumulifera</i> | • | • | | | | | | | | | | | |
| | <i>Centipeda minima</i> | • | • | | | | | | | | | | | |
| | <i>Centipeda minima</i> subsp. <i>macrocephala</i> | • | | | | | | | | | | | | |
| | <i>Centipeda thespidioides</i> | • | • | | | | | | | | | | | |
| | <i>Chondrilla juncea</i> | | | | | | | | • | | | | | Y |
| | <i>Chrysocephalum apiculatum</i> | • | • | | | | | | | | | | | |
| | <i>Chrysocephalum apiculatum</i> subsp. <i>pilbarensis</i> | • | | | | | | | | | | | | |
| | <i>Chrysocephalum gilesii</i> | • | • | | | | | | | | | | | |
| | <i>Chrysocephalum pterochaetum</i> | • | • | | | | | | | | | | | |
| | <i>Erigeron bonariensis</i> | • | | | | | | | | | | | | Y |
| <i>Flaveria trinervia</i> | • | • | | | | | | | | | | | Y | |
| <i>Gnaphosis arachnoidea</i> | • | • | | | | | | | | | | | | |
| <i>Helichrysum oligochaetum</i> | | | | | • | • | | | | | P1 | | | |
| <i>Iotasperma sessilifolium</i> | | | | | • | | | | | | P3 | | | |

| Family | Taxon | Source | | | | | | | Conservation Status | | | Introduced | |
|-------------------------------------|--|--|-----|-----|------|------|------|-----|---------------------|--------|----------|------------|---|
| | | NM | ALA | WAH | TPFL | EPBC | WAOL | BHP | DBC Act | BC Act | EPBC Act | | |
| Asteraceae cont. | <i>Vittadinia eremaea</i> | • | • | | | | | | | | | | |
| | <i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwen 4684) | • | | • | • | | | | • | P3 | | | |
| | <i>Xanthium spinosum</i> | | | | | | | • | | | | | Y |
| | <i>Xanthium strumarium</i> | | | | | | | • | | | | | Y |
| Boraginaceae | <i>Echium plantagineum</i> | | | | | | | • | | | | | Y |
| | <i>Euploca cunninghamii</i> | • | • | | | | | | | | | | |
| | <i>Euploca heterantha</i> | • | • | | | | | | | | | | |
| | <i>Euploca inexplicita</i> | • | • | | | | | | | | | | |
| | <i>Euploca ovalifolia</i> | | • | | | | | | | | | | |
| | <i>Euploca pachyphylla</i> | • | • | | | | | | | | | | |
| | <i>Euploca tanythrix</i> | • | • | | | | | | | | | | |
| | <i>Euploca tenuifolia</i> | • | • | | | | | | | | | | |
| | <i>Halgania erecta</i> | • | • | | | | | | | | | | |
| | <i>Halgania solanacea</i> | | • | | | | | | | | | | |
| | <i>Halgania solanacea</i> var. Mt Doreen (G.M. Chippendale 4206) | • | | | | | | | | | | | |
| | <i>Trichodesma zeylanicum</i> | • | • | | | | | | | | | | |
| | <i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i> | • | | | | | | | | | | | |
| | Brassicaceae | <i>Lepidium catapycnon</i> | • | • | • | • | | | | | • | P4 | |
| <i>Lepidium echinatum</i> | | • | • | | | | | | | | | | |
| <i>Lepidium muelleri-ferdinandi</i> | | • | • | | | | | | | | | | |
| <i>Lepidium oxytrichum</i> | | • | • | | | | | | | | | | |
| <i>Lepidium pedicellosum</i> | | • | • | | | | | | | | | | |
| <i>Lepidium phlebopetalum</i> | | • | • | | | | | | | | | | |
| <i>Lepidium pholidogynum</i> | | • | • | | | | | | | | | | |
| <i>Lepidium platypetalum</i> | | • | • | | | | | | | | | | |
| <i>Menkea villosula</i> | | • | | | | | | | | | | | |
| <i>Stenopetalum anfractum</i> | | • | | | | | | | | | | | |
| <i>Stenopetalum decipiens</i> | | • | • | | | | | | | | | | |
| <i>Stenopetalum nutans</i> | | • | • | | | | | | | | | | |
| <i>Stenopetalum velutinum</i> | | • | • | | | | | | | | | | |
| Cactaceae | | <i>Austrocylindropuntia cylindrica</i> | | | | | | | | • | | | |
| | <i>Austrocylindropuntia subulata</i> | | | | | | | | • | | | | Y |
| | <i>Cylindropuntia fulgida</i> | | | | | | | | • | | | | Y |
| | <i>Cylindropuntia imbricata</i> | | | | | | | | • | | | | Y |
| | <i>Cylindropuntia kleiniae</i> | | | | | | | | • | | | | Y |
| | <i>Cylindropuntia pallida</i> | | | | | | | | • | | | | Y |
| | <i>Cylindropuntia tunicata</i> | | | | | | | | • | | | | Y |
| | <i>Opuntia elata</i> | | | | | | | | • | | | | Y |
| | <i>Opuntia elatior</i> | | | | | | | | • | | | | Y |
| | <i>Opuntia engelmannii</i> | | | | | | | | • | | | | Y |
| | <i>Opuntia ficus-indica</i> | | | | | | | | • | | | | Y |
| | <i>Opuntia microdasys</i> | | | | | | | | • | | | | Y |

Appendix C: Introduced flora of the desktop assessment

| Family | Taxon | Source | | | | DP | WoNS | DBCAs Weed Prioritisation | |
|----------------------------|--|--------|----|------|-----------------|-----|--------------|---------------------------|--------------|
| | | ALA | NM | WAOL | Biologic (2024) | | | Ecological Impact | Invasiveness |
| Alismataceae | <i>Sagittaria platyphylla</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| Amaranthaceae | <i>Aerva javanica</i> | • | • | | • | No | No | High | Rapid |
| | <i>Alternanthera pungens</i> | • | • | | | No | No | Low | Slow |
| Apocynaceae | <i>Calotropis procera</i> | | | • | | Yes | No | Not Assessed | Not Assessed |
| | <i>Cryptostegia madagascariensis</i> | | | • | | Yes | No | Not Assessed | Not Assessed |
| Araceae | <i>Pistia stratiotes</i> | | | • | | Yes | No | Not Assessed | Not Assessed |
| | <i>Zantedeschia aethiopica</i> | | | • | | Yes | No | Not Assessed | Not Assessed |
| Araliaceae | <i>Hydrocotyle ranunculoides</i> | | | • | | Yes | No | Not Assessed | Not Assessed |
| Asparagaceae | <i>Asparagus asparagoides</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| Asteraceae | <i>Bidens bipinnata</i> | • | • | | • | No | No | Unknown | Rapid |
| | <i>Bidens pilosa</i> | | • | | | No | No | Unknown | Rapid |
| | <i>Chondrilla juncea</i> | | | • | | Yes | No | Not Assessed | Not Assessed |
| | <i>Erigeron bonariensis</i> | | • | | | No | No | Not Assessed | Not Assessed |
| | <i>Flaveria trinervia</i> | • | • | | • | No | No | Not Assessed | Not Assessed |
| | <i>Lactuca saligna</i> | • | • | | | No | No | Not Assessed | Not Assessed |
| | <i>Onopordum acaulon</i> | | | • | | Yes | No | Not Assessed | Not Assessed |
| | <i>Silybum marianum</i> | | | • | | Yes | No | Not Assessed | Not Assessed |
| | <i>Sonchus oleraceus</i> | • | • | | | No | No | Low | Rapid |
| | <i>Symphotrichum squamatum</i> | • | • | | | No | No | Not Assessed | Not Assessed |
| | <i>Xanthium spinosum</i> | | | • | | Yes | No | Not Assessed | Not Assessed |
| | <i>Xanthium strumarium</i> | | | • | | Yes | No | Not Assessed | Not Assessed |
| Boraginaceae | <i>Echium plantagineum</i> | | | • | | Yes | No | Not Assessed | Not Assessed |
| Cactaceae | <i>Austrocylindropuntia cylindrica</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| | <i>Austrocylindropuntia subulata</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| | <i>Cylindropuntia fulgida</i> | | | • | | Yes | Yes | High | Slow |
| | <i>Cylindropuntia imbricata</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| | <i>Cylindropuntia kleiniae</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| | <i>Cylindropuntia pallida</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| | <i>Cylindropuntia tunicata</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| | <i>Opuntia elata</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| | <i>Opuntia elatior</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| <i>Opuntia engelmannii</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed | |

| Family | Taxon | Source | | | | DP | WoNS | DBCA Weed Prioritisation | |
|----------------|---|--------|----|------|-----------------|-----|------|--------------------------|--------------|
| | | ALA | NM | WAOL | Biologic (2024) | | | Ecological Impact | Invasiveness |
| | <i>Opuntia ficus-indica</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| | <i>Opuntia microdasys</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| | <i>Opuntia monacantha</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| | <i>Opuntia polyacantha</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| | <i>Opuntia puberula</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| | <i>Opuntia stricta</i> | | | • | | Yes | Yes | High | Rapid |
| | <i>Opuntia tomentosa</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| Cucurbitaceae | <i>Citrullus amarus</i> | • | • | | • | No | No | Not Assessed | Not Assessed |
| | <i>Citrullus colocynthis</i> | | | | • | No | No | Not Assessed | Not Assessed |
| | <i>Coccinia grandis</i> | | | • | | Yes | No | Not Assessed | Not Assessed |
| Cyperaceae | <i>Cyperus tenuiflorus</i> | | • | | | No | No | Not Assessed | Not Assessed |
| Euphorbiaceae | <i>Euphorbia hirta</i> | • | | | | No | No | Low | Slow |
| | <i>Jatropha gossypifolia</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| Fabaceae | <i>Alhagi maurorum</i> | | | • | | Yes | No | Not Assessed | Not Assessed |
| | <i>Desmanthus virgatus</i> | • | • | | | No | No | Not Assessed | Not Assessed |
| | <i>Neltuma glandulosa × velutina</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| | <i>Parkinsonia aculeata</i> | | | • | | Yes | Yes | High | Rapid |
| | <i>Senna alata</i> | | | • | | Yes | No | Not Assessed | Not Assessed |
| | <i>Senna obtusifolia</i> | | | • | | Yes | No | Not Assessed | Not Assessed |
| Fabaceae cont. | <i>Senna occidentalis</i> | • | • | | | No | No | Not Assessed | Not Assessed |
| | <i>Ulex europaeus</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| | <i>Vachellia farnesiana var. farnesiana</i> | | | • | • | Yes | Yes | Not Assessed | Not Assessed |
| Iridaceae | <i>Moraea flaccida</i> | | | • | | Yes | No | Not Assessed | Not Assessed |
| | <i>Moraea miniata</i> | | | • | | Yes | No | Not Assessed | Not Assessed |
| Malvaceae | <i>Gossypium hirsutum</i> | | • | | | No | No | Not Assessed | Not Assessed |
| | <i>Malvastrum americanum</i> | • | • | | • | No | No | High | Rapid |
| Poaceae | <i>Cenchrus ciliaris</i> | • | • | | • | No | No | High | Rapid |
| | <i>Cenchrus setiger</i> | • | • | | • | No | No | High | Rapid |
| | <i>Chloris virgata</i> | • | • | | • | No | No | High | Rapid |
| | <i>Cynodon dactylon</i> | • | • | | • | No | No | High | Rapid |
| | <i>Dichanthium annulatum</i> | | | | • | No | No | Not Assessed | Not Assessed |
| | <i>Echinochloa colona</i> | • | • | | • | No | No | High | Rapid |

| Family | Taxon | Source | | | | DP | WoNS | DBCA Weed Prioritisation | |
|----------------|-------------------------------|--------|----|------|-----------------|-----|------|--------------------------|--------------|
| | | ALA | NM | WAOL | Biologic (2024) | | | Ecological Impact | Invasiveness |
| | <i>Eragrostis tenuifolia</i> | • | | | | No | No | Not Assessed | Not Assessed |
| | <i>Setaria verticillata</i> | • | • | | | No | No | High | Rapid |
| Polygonaceae | <i>Rumex vesicarius</i> | • | • | | | No | No | Not Assessed | Not Assessed |
| Portulacaceae | <i>Portulaca pilosa</i> | | • | | | No | No | Not Assessed | Not Assessed |
| Rhamnaceae | <i>Ziziphus mauritiana</i> | | | • | | Yes | No | Not Assessed | Not Assessed |
| Rosaceae | <i>Rubus anglocandicans</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| | <i>Rubus laudatus</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| | <i>Rubus rugosus</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| | <i>Rubus ulmifolius</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| Solanaceae | <i>Solanum elaeagnifolium</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| | <i>Solanum linnaeanum</i> | | | • | | Yes | No | Not Assessed | Not Assessed |
| | <i>Solanum nigrum</i> | | • | | | No | No | Low | Rapid |
| Tamaricaceae | <i>Tamarix aphylla</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| Verbenaceae | <i>Lantana camara</i> | | | • | | Yes | Yes | Not Assessed | Not Assessed |
| Zygophyllaceae | <i>Tribulus terrestris</i> | • | • | | • | No | No | Unknown | Medium |

Appendix D: Key findings of the desktop assessment

| | Western Ridge Pipeline reconnaissance flora and vegetation survey | OB32 Surplus Water & Homestead Creek Wetting Front detailed flora and vegetation assessment | Western Creek and an Unnamed Creek detailed flora and vegetation survey | Level 1 flora and fauna surveys along the Great Northern Highway for Jimblebar Mine module transport | Jimblebar Wye rail junction priority flora and riparian vegetation assessment | |
|----------------------|---|---|--|---|--|--|
| Survey Details | Reference | Biologic (2022c) | Spectrum (2022b) | Biologic (2022a) | Eco Logical (2012) | Ecologia (2005) |
| | Type | Reconnaissance | Detailed | Detailed | Reconnaissance | Vegetation Assessment |
| | Client | BHP Billiton Iron Ore Pty Ltd | BHP Billiton Iron Ore Pty Ltd | BHP Billiton Iron Ore Pty Ltd | BHP Billiton Iron Ore Pty Ltd | Mine and Ports Development Joint Venture |
| | Location | Western Ridge, 23 km SW to 10 km E of Newman | 4.3 to 65 km NE of Newman | Western Creek and an Unnamed Creek, 27 km SW to 7 km SE of Newman | Three sites along the Great Northern Highway: Site 1 - ~3.8 km SE of Newman Site 2 - ~9 km NW of Newman Site 3 - ~98 km WNW Of Newman | Jimblebar Wye Junction |
| | Size (ha) | 2,169 | 14, 786 | 2,392.5 | Not provided | 3.24 to be cleared |
| | Timing | March 2021 and 2022 | March, August, and September 2021 | March, October and November 2021 and March 2022 | August 2011 | (0.68 Community Type 1, 0.94 Community Type 2 and 1.62 Riparian Vegetation) |
| Methods | Desktop Assessment (Yes/No) | Yes | Yes | Yes | Yes | July 2005 |
| | Quadrat # | - | 37 | 57 | 8 | - |
| | Relevé # | 148 (+21 from Paddy's Bore Survey Area) | 16 | 3 | - | - |
| | Targeted Searching (Yes/No) | Yes | Yes | Yes | Yes | - |
| | Other Methods | 46 vegetation mapping notes & opportunistic sampling | - | 47 vegetation mapping notes & opportunistic sampling | Opportunistic sampling | Yes |
| Results | Taxa | 279 | 342 | 291 | 52 | - |
| | Families | 38 | 45 | 42 | 14 | - |
| | Genera | 115 | 142 | 141 | 26 | - |
| | Vegetation Types | 29 | 13 | 9 | 7 | - |
| | Vegetation Condition | Completely Degraded to Excellent | Excellent to Completely Degraded | Degraded to Very Good | Degraded to Excellent | 3 |
| | Weeds # | 11 | 12 | 21 | 1 | - |
| Significant Findings | Threatened/ Priority Flora | Two Priority Flora Recorded: • <i>Ipomoea racemigera</i> (P2) ¹ • <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (P3) ² | Three Priority Flora Recorded: • <i>Crotalaria smithiana</i> (P3) • <i>Gymnanthera cunninghamii</i> (P3) • <i>Eremophila youngii subsp. lepidota</i> (P4) • <i>Goodenia nuda</i> (P4) ² | Four Priority Flora Recorded: • <i>Aristida lazardis</i> (P2) ¹ • <i>Ipomoea racemigera</i> (P2) ¹ • <i>Gymnanthera cunninghamii</i> (P3) • <i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727) (P3) | None recorded | Two Priority Flora Recorded: • <i>Gymnanthera cunninghamii</i> (P3) • <i>Eremophila</i> sp. Ophthalmia Range (P1) ³ |
| | Threatened/ Priority Ecological Communities | None recorded | None recorded | None recorded | None recorded | None recorded |
| | WoNS and DPP Weeds | None recorded | <i>Calotropis procera</i> | None recorded | None recorded | None Recorded |
| | Range Extensions | Seven range extensions and two locality holes | None recorded | Five range extensions and five locality holes | None recorded | None Recorded |
| | Other significant findings | Five vegetation types considered significant for other reasons, including those considered to be 'ecosystems at risk' for the Hamersley subregion. Two vegetation types considered to be groundwater dependent vegetation. One vegetation type considered to be a sheet-flow dependent ecosystem. | - | Four vegetation types considered significant for other reasons, including those considered to be 'ecosystems at risk' for the Hamersley subregion. Two vegetation types considered to be Groundwater Dependent Vegetation. | - | - |
| Other | Limitations of Survey | No substantial limitations | Partial area was not traversed due to limited track access and heritage restrictions | No substantial limitations | No substantial limitations | No substantial limitations |
| | Proximity | Partially overlaps western Survey Area | Within Survey Area | 6.1 km S | 3 km S at closest point (Site 1) | 8 km NE |

¹ Species is now Priority 3.

² Species is no longer a Priority taxon.

³ Now known as *Eremophila margarethae*

| | Rapid growth project 5: Repeater 9 access road flora and vegetation assessment | Targeted flora survey Acacia sp. East Fortescue | East Ophthalmia & Ninga detailed flora and vegetation survey | Acacia corusca Species Distribution Modelling | Jimblebar Wind Power 2030 Single Season Flora and Vegetation Report | |
|-----------------------------------|--|---|--|---|---|---|
| Survey Details | Reference | ENV (2008) | Onshore (2015c) | Spectrum (2023) | Spectrum (2022a) | Biologic (in prep.) |
| | Type | Detailed | Targeted | Detailed | Desktop assessment | Detailed |
| | Client | Calibre Engenium Joint Venture Pty Ltd | BHP Billiton Iron Ore Pty Ltd | BHP Billiton Iron Ore Pty Ltd | BHP WAIO | BHP WAIO |
| | Location | Repeater 9 Access Road (3 km by 40 km corridor at Jimblebar-Wye), 14 km NE of Newman | Phase 1 – known pop. in BHP Iron Ore tenure Phase 2 –N of Newman to SE Jimblebar, Karijini National Park, Mt Channer, Snowy Mountain & Turee Creek East region, NW from BHPBIOs Rocklea tenement to W Pannawonica Phase 3 – Jigalong, Balfour, Newman SE, Newman SW and Karijini | 15 km NE of Newman | Hamersley Range and surrounds, approx. 35 km east of Newman | Shovelanna/Ninga project area and Eastern Ridge project area |
| | Size (ha) | 12 | 65 (Phase 1) | 5, 851 | - | 4,186 |
| | Timing | June 2008 | Phase 1 - March 2015 Phase 3 – August 2023 | April and August 2022 | 2022 | 2024 |
| Methods | Desktop Assessment (Yes/No) | Yes | Yes | Yes | Yes | Yes |
| | Quadrat # | 6 | - | 43 | - | 35 |
| | Relevé # | 1 | - | 20 | - | 14 |
| | Targeted Searching (Yes/No) | | Yes | Yes | - | Yes |
| | Other Methods | | Transects | - | Spatial distribution modelling | Vegetation mapping notes (1) |
| Results | Taxa | 163 | 1 | 320 | - | 375 |
| | Families | 39 | 1 | 46 | - | 49 |
| | Genera | 95 | 1 | 132 | - | 143 |
| | Vegetation Types | 3 | - | 9 | - | 24 |
| | Vegetation Condition | Completely Degraded to Very Good | - | Excellent to Completely Degraded | - | Completely Degraded to Excellent |
| | Weeds # | 14 | - | 9 | - | 14 |
| Significant Findings | Threatened/ Priority Flora | Two Priority Flora Recorded: • <i>Eremophila</i> sp. Ophthalmia Range (P1) • <i>Rostellularia subsp. adscendens</i> var. <i>latifolia</i> (P3) ⁴ | One Priority Flora Recorded: • <i>Acacia corusca</i> (P1) | Three Priority Flora Recorded: • <i>Gymnanthera cunninghamii</i> (P3) • <i>Rhagodia</i> sp. <i>Hamersley</i> (M. Trudgen 17794) (P3) ² • <i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739) (P3) | • <i>Acacia corusca</i> (P1) | Nine Priority Flora recorded: • <i>Goodenia hartiana</i> (P2) • <i>Aristida jerichoensis</i> var. <i>subspinulifera</i> (P3) • <i>Aristida lazaridis</i> (P3) ¹ • <i>Eragrostis</i> sp. Mt Robinson (S. van Leeuwen 4109) (P3) ¹ • <i>Eremophila naaykensis</i> (P3) • <i>Ipomoea racemigera</i> (P3) • <i>Isotropis parviflora</i> (P3) • <i>Swainsona thompsoniana</i> (P3) • <i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739) (P3) |
| | Threatened/ Priority Ecological Communities | None Recorded | None recorded | None Recorded | - | None recorded |
| | WoNS and DPP Weeds | None Recorded | None recorded | None Recorded | - | None recorded |
| | Range Extensions | None Recorded | None recorded | <i>Frankenia magnifica</i> | - | • <i>Aristida lazaridis</i> (P3) • <i>Eragrostis</i> sp. Mt Robinson (S. van Leeuwen 4109) (P2) ¹ • <i>Eulalia simonii</i> • <i>Polymeria mollis</i> • <i>Wahlenbergia gracilenta</i> |
| Other significant findings | - | 6 localised populations 3 delineated populations recorded 567 plants, across 8.1 ha: | <i>Hibiscus</i> aff. <i>campanulatus</i> was found during the survey | Analysis results suggested that <i>Acacia corusca</i> occurs in close proximity to the Boolgeeda Iron Formation (<12 km) and is highly specific to Banded Iron Formations (BIF) of the Hamersley Range. | <i>Hibiscus</i> aff. <i>campanulatus</i> recorded <i>Euphorbia</i> aff. <i>ferdinandi</i> recorded | |

| | | Rapid growth project 5: Repeater 9 access road flora and vegetation assessment | Targeted flora survey Acacia sp. East Fortescue | East Ophthalmia & Ninga detailed flora and vegetation survey | Acacia corusca Species Distribution Modelling | Jimblebar Wind Power 2030 Single Season Flora and Vegetation Report |
|-------|------------------------------|--|--|---|---|---|
| | | | Populations: 1a.) 209 plants (p) 2 hectares (ha), 1b.) 105 p 3 ha, 1c. 34 p 0.5 ha, 2.) 114 p 2 ha, 3a.) 72 p 0.5 ha and 3b.) 33 p 0.1 ha. | | | |
| Other | Limitations of Survey | No substantial limitations | Poor vehicle access restricted on foot access to wider target areas. | Track access provided a minor constraint to accessibility in parts of the Survey Area | - | No limitations identified |
| | Proximity | 7.8 km NE | 2.7 km N | 7.3 km E | 3.2 km NW | <1 km NW |

¹ Species is now Priority 3.

² Species is no longer a Priority taxon.

³ Now known as *Eremophila margarethae* (not significant).

⁴ *Rostellularia adscendens* subsp. *adscendens* var. *latifolia* (P3) is currently known as *Rostellularia adscendens* var. *latifolia* (P3).

| | Western Ridge: Single season detailed flora and vegetation survey | Coombanbunna Well Detailed Flora and Vegetation Survey | Jumbuck reconnaissance flora and vegetation assessment | Orebody 31 Level 2 Flora and Vegetation Survey | Orebody 31 Targeted Significant Flora Survey | Homestead Creek & Cathedral Gorge detailed flora and vegetation assessment | |
|----------------------|---|---|--|---|---|--|---|
| Survey Details | Reference | Biologic (2021) | Biologic (2020a) | Biologic (2020b) | Onshore (2014a) | Onshore (2014b) | Spectrum (2024) |
| | Type | Detailed | Detailed | Reconnaissance | Detailed | Targeted | Detailed |
| | Client | BHP Billiton Iron Ore Pty Ltd | BHP Billiton Iron Ore Pty Ltd | BHP Billiton Iron Ore Pty Ltd | BHP Billiton Iron Ore Pty Ltd | BHP Billiton Iron Ore Pty Ltd | BHP Billiton Iron Ore Pty Ltd |
| | Location | Western Ridge Exploration Tenement, 8 km SW of Newman | Tenements E52/3361 and E52/3360, 3 km S Mt Whaleback Mine, & 7 km SW of Newman | Tenement E52/3628, 4 km S of Jimblebar mine site and 28 km ESE of Newman | OB31 and surrounds | SE Pilbara Orebody 31 Project Area (OB31), direct E Orebody 17/18 (OB17/18), 40 km E of Newman | 9 km NW of Newman |
| | Size (ha) | 4,765 | 1,745 | 3,159 | 3,335.85 | - | 3,263 |
| | Timing | April 2020 | March 2019 | October 2018 | October 2013 | April 2014 | May 2023 |
| Methods | Desktop Assessment (Yes/No) | Yes | Yes | Yes | Yes | Yes | Yes |
| | Quadrat # | 80 | 44 | - | 45 | - | 47 |
| | Relevé # | 1 | 6 | 83 | 146 | - | 18 |
| | Targeted Searching (Yes/No) | Yes | Yes | Yes | Yes | Yes | Yes |
| | Other Methods | Opportunistic sampling | - | - | - | Transects (NS to EW 0.5 – 1 km) | - |
| Results | Taxa | 379 | 185 | 124 | 280 | - | 278 |
| | Families | 49 | 34 | 25 | 35 | - | 41 |
| | Genera | 147 | 91 | 48 | 110 | - | 122 |
| | Vegetation Types | 21 | 9 | 4 | 35 | - | 17 |
| | Vegetation Condition | Poor to Excellent | Completely Degraded to Excellent | Degraded to Very Good | Excellent to Good | - | Excellent to poor |
| | Weeds # | 11 | 9 | 2 | 2 | - | 9 |
| Significant Findings | Threatened/ Priority Flora | Five Priority Flora Recorded: <ul style="list-style-type: none"> • <i>Isotropis parviflora</i> (P2)¹ • <i>Eremophila</i> sp. Hamersley Range (K. Walker KW 136) (P3)³ • <i>Gymnanthera cunninghamii</i> (P3) • <i>Indigofera gilesii</i> (P3) • <i>Goodenia nuda</i> (P4)² | • None Recorded | • None Recorded | One Priority Flora recorded: <ul style="list-style-type: none"> • <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (P3)² | Three Priority Flora Recorded: <ul style="list-style-type: none"> • <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (P3)² • <i>Triodia</i> sp. Mt Ella (M.E. Trudgen 17794) (P3) • <i>Goodenia nuda</i> (P4)² | Six Priority Flora Recorded: <ul style="list-style-type: none"> • <i>Ipomoea racemigera</i> (P2)¹ • <i>Eragrostis</i> sp. Mt Robinson (S. van. Leeuwen 1409) (P2)¹ • <i>Dolichocarpa</i> sp. Hamersley Station (A.A. Mitchell 1479) (P3) • <i>Indigofera gilesii</i> (P3) • <i>Themeda</i> sp. Hamersley Station (P3) • <i>Lepidium catapyrcnon</i> (P4) |
| | Threatened/ Priority Ecological Communities | None recorded | None Recorded | None Recorded | None Recorded | None recorded | |
| | WoNS and DPP Weeds | None recorded | None Recorded | None Recorded | None Recorded | None recorded | |
| | Range Extensions | None recorded | None Recorded | None Recorded | None Recorded | Three Range Extensions Recorded: <ul style="list-style-type: none"> • <i>Acacia clelandii</i> (400 km N) (12 locations on N half of study area) | One Range Extension Recorded: <i>Goodenia heterochila</i> |
| | Other significant findings | Some evidence of phreatophytic vegetation. Several mesophytic/ hydrophytic flora species were observed. | - | Shovelanna Creek and the unnamed creek are considered Groundwater Dependent Ecosystem (GDE) due to the presence of the facultative phreatophyte <i>Eucalyptus camaldulensis</i> subsp. <i>refulgens</i> | Two species of interest recorded: <i>Acacia</i> sp. nov (reticulate/anastomosing) and <i>Triodia</i> ? sp. Mt Ella (M.E. Trudgen 12739). | - | <i>Hibiscus</i> aff. <i>Campanulatus</i> was found during the survey |
| Other | Limitations of Survey | No substantial limitations | Dry conditions may have limited presence of annual and ephemeral taxa. Reduced flowering/ fruiting from perennial taxa | Dry conditions may have limited presence of annual and ephemeral taxa | No limitations. | Poor vehicle access restricted on foot access to wider target areas. | No substantial limitations |
| | Proximity | 12.4 km NE | 11.2 km NE | 22.9 km S | 30 km ENE | 29.7 km E | ~12.9 km NW |

¹ Species is now Priority 3.

² Species is no longer a Priority taxon.

³ Species is now known as *Eremophila naaykensis* (P3).

| | Southwest Jimblebar Level 2 flora and vegetation survey | Caramulla Creek flora and vegetation survey | East Jimblebar and Caramulla flora and vegetation assessment | Shearers East reconnaissance flora and vegetation assessment | Roy Hill: Southern Borefield Study Area (L47/642 and L47/735) Detailed Flora and Vegetation Assessment | |
|----------------------|---|---|--|---|--|---|
| Survey Details | Reference | Syrinx (2014) | Astron (2019) | Biologic (2019a) | Biologic (2019b) | Maia (2018) |
| | Type | Detailed | Reconnaissance | Detailed | Reconnaissance | Detailed |
| | Client | BHP Billiton Iron Ore Pty Ltd | BHP Billiton Iron Ore Pty Ltd | BHP Billiton Iron Ore Pty Ltd | BHP Billiton Iron Ore Pty Ltd | Roy Hill |
| | Location | Jimblebar lease AML7000266, adjacent to Jimblebar/Wheelarra Hill mine (to N), ~40 km E of Newman | Caramulla Creek, 65 km NE of Newman | 48 km E of Newman | Shearers East, tenement E52/3456-1 47 km E of Newman | Roy Hill's Southern Borefield (RHSB) and RHSB Extension and Marillana stations, 37 km NE of Newman |
| | Size (ha) | 20.52 | 16, 814 | 10, 318 | 924 | L47/642 Tenement 75,902 L47/735 Tenement- 48, 267 |
| | Timing | March 2011, August, and September 2013 | October 2018 | April 2019 | October 2018 | Jul. – Aug. 2009 (GGE) October 2017 and April 2018 |
| Methods | Desktop Assessment (Yes/No) | Yes | Yes | Yes | Yes | Yes |
| | Quadrat # | 38 | - | 63 | - | 49 |
| | Relevé # | - | 63 | 14 | 50 | 1 |
| | Targeted Searching (Yes/No) | Yes | Yes | Yes | Yes | Yes |
| | Other Methods | - | 38 Mapping Notes | 119 sites historical surveys | Opportunistic sampling | Traverses (174 km) |
| Results | Taxa | 330 | 196 | 221 | 112 | 253 |
| | Families | 44 | 40 | 37 | 25 | 34 |
| | Genera | 137 | 106 | 95 | 51 | 106 |
| | Vegetation Types | 9 | 27 | 13 | 17 | 9 |
| | Vegetation Condition | Very Good to Excellent | Poor to Excellent | Degraded to Excellent | Degraded to Very Good | Degraded to Excellent |
| | Weeds # | 7 | 7 | 6 | 2 | 9 |
| Significant Findings | Threatened/ Priority Flora | Three Priority Flora Recorded: <ul style="list-style-type: none"> • <i>Aristida jerichoensis</i> var. <i>subspinulifera</i> (P3) • <i>Vittadinia</i> sp. Coondewanna Flats (S. van Leeuwen 4684) (P1)¹ • <i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i> (P2)¹ | One Priority Flora Recorded: <ul style="list-style-type: none"> • <i>Crotalaria smithiana</i> (P3) | Two Priority Flora Recorded: <ul style="list-style-type: none"> • <i>Eremophila capricornica</i> (P1) • <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (P3)² • <i>Goodenia nuda</i> (P4)² | • None recorded | One Priority Flora Recorded: <ul style="list-style-type: none"> • <i>Goodenia nuda</i> (P4)² |
| | Threatened/ Priority Ecological Communities | None Recorded | None Recorded | None recorded | None recorded | None recorded |
| | WoNS and DPP Weeds | None Recorded | None Recorded | None recorded | None recorded | None recorded |
| | Range Extensions | Five Range Extensions Recorded: <i>Abutilon malvifolium</i> , <i>Brachyscome ciliaris</i> var. <i>ciliaris</i> , <i>Euphorbia porcata</i> , <i>Leptochloa fusca</i> subsp. <i>muelleri</i> , <i>Tephrosia sphaerospora</i> | None Recorded | None recorded | None recorded | 13 Range extensions |
| | Other significant findings | - | - | Four vegetation associations are indicated to potentially be Groundwater Dependent Ecosystems | Jimblebar Creek is potentially a GDE due to presence of the facultative phreatophyte <i>Eucalyptus camaldulensis</i> subsp. <i>refulgens</i> . | - |
| Other | Limitations of Survey | No substantial limitations | Dry conditions may have limited presence of annual and ephemeral taxa | Dry conditions may have limited presence of annual and ephemeral taxa. Perennial species were generally lacking flowering/ fruiting material | Seasonal conditions prior to the survey was considered below optimal. | Historic burns and grazing may affect vegetation assemblages particularly in NE section of RHSB area. |
| | Proximity | ~21.9 km SE | 57 km E | 41.9 km E | 42 km E | ~38.7 km N |

¹ Species is now Priority 3.

² Species is no longer a Priority taxon.

| | | Jimblebar North Reconnaissance Flora and Vegetation Survey | Reconnaissance Flora and Vegetation Survey Caramulla | Shearers West Detailed Flora and Vegetation Survey | Dynasty and West Jimblebar Level 2 Flora and Vegetation Survey | Jimblebar Creek Riparian Flora and Vegetation Baseline Survey |
|----------------------|--|--|---|---|--|---|
| Survey Details | Reference | Onshore (2019) | Onshore (2018a) | Onshore (2018b) | Onshore (2015a) | Onshore (2015b) |
| | Type | Reconnaissance and Targeted | Reconnaissance and Targeted | Detailed | Detailed | Detailed |
| | Client | BHP Billiton Iron Ore Pty Ltd | BHP Billiton Iron Ore Pty Ltd | BHP Billiton Iron Ore Pty Ltd | BHP Billiton Iron Ore Pty Ltd | BHP Billiton Iron Ore Pty Ltd |
| | Location | 50 km E of Newman, 10 km NE of BHP WAIOS Jimblebar Wheelarra Hill mine E52/1776 tenement | 46 km E of Newman | 42 km E of Newman | Dynasty and West Jimblebar tenements, ~25 km E of Newman | 6 m N of Jimblebar Iron Ore Mine, E of OB31. Along 20 km length of creek line, 40 km E of Newman |
| | Size (ha) | 1,680 | 12,500 | 15 km ² | 3,385 | - |
| | Timing | September 2018 | February and June 2018 | May 2018 | February and March 2015 | September 2014 |
| Methods | Desktop Assessment (Yes/No) | Yes | Yes | Yes | Yes | Yes |
| | Quadrat # | - | - | 49 | 29 | 13 |
| | Relevé # | 174 | 115 | - | 142 | 81 |
| | Targeted Searching (Yes/No) | Yes | Yes | Yes | Yes | Yes |
| | Other Methods | - | - | - | Opportunistic sampling | - |
| Results | Taxa | - | - | 264 | 263 | 167 |
| | Families | - | - | 38 | 36 | 39 |
| | Genera | - | - | 110 | 106 | 97 |
| | Vegetation Types | 14 | 12 | 9 | 26 | 7 |
| | Vegetation Condition | Degraded to Excellent | Good to Excellent | Completely Degraded to Very Good | | Good to Excellent |
| | Weeds # | 2 | 5 | 6 | 4 | 3 |
| Significant Findings | Threatened/ Priority Flora | Two Priority Flora Recorded: <ul style="list-style-type: none"> • <i>Eremophila capricornica</i> (P1) • <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (P3)² | Five Priority Flora Recorded: <ul style="list-style-type: none"> • <i>Eremophila capricornica</i> (P1) • <i>Ipomea racemigera</i> (P2) • <i>Crotalaria smithiana</i> (P3) • <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (P3)² • <i>Goodenia nuda</i> (P4)² | <ul style="list-style-type: none"> • None Recorded | Three Priority Flora Recorded: <ul style="list-style-type: none"> • <i>Ipomea racemigera</i> (P2)¹ • <i>Goodenia berringbinensis</i> (P4) • <i>Goodenia nuda</i> (P4)² | <ul style="list-style-type: none"> • None Recorded |
| | Threatened/ Priority Ecological Communities | None recorded | None recorded | None Recorded | None recorded | None Recorded |
| | WoNS and DPP Weeds | None recorded | None recorded | None Recorded | None recorded | None Recorded |
| | Range Extensions | None recorded | None recorded | Two Range Extensions Recorded: <ul style="list-style-type: none"> • <i>Euphorbia multifaria</i> (150 km SE) • <i>Ipomea coptica</i> (100 km S) | Five range extensions | Three Range Extensions Recorded: <ul style="list-style-type: none"> • <i>Chamaecrista symonii</i> (200 km N) • <i>Eragrostis speciosa</i> (200 km SE) • <i>Halgania erecta</i> (60 km SE) |
| | Other significant findings | - | - | - | - | - |
| Other | Limitations of Survey | Limited rainfall produced poor conditions led to possible under estimation of ephemeral flora and annuals. | Conducted when conditions were poor (Feb.), under estimation of ephemeral flora. Access in some areas limited | No substantial limitations | No substantial limitations | Dry conditions may have limited presence of annual and ephemeral taxa |
| | Proximity | ~39.1 km N | 44.9 km E | ~32.2 km S | 37.6 km E | 39.5 km E |

¹ Species is now Priority 3.

² Species is no longer a Priority taxon.

Appendix E: Assessment of Occurrence

| Taxon | DBCA | BC Act | EPBC Act | Habit and habitat | Habitat within Survey Area | Within current known distribution | Proximity from Survey Area | Source | Pre-survey | Post-survey likelihood |
|--|------|--------|----------|---|----------------------------|-----------------------------------|----------------------------|------------------------------|---------------|------------------------|
| Pre-survey likelihood – Highly Likely | | | | | | | | | | |
| <i>Aristida jerichoensis</i> var. <i>subspinulifera</i> | P3 | | | Compactly tufted perennial, grass-like or herb, 0.3-0.8 m high, lemma groove muricate. Hardpan plains. | Yes | Yes | 0.5 km NNE | A; B; E; V, W | Highly Likely | Highly Unlikely |
| Pre-survey likelihood – Likely | | | | | | | | | | |
| <i>Aristida lazaridis</i> | P3 | | | Tufted perennial, grass-like or herb, 0.4-1.5 m high. Fl. green/purple, Apr. Sand or loam. | Yes | Yes | 3.4 km WNW | A; B; C; I, W | Likely | Unlikely |
| <i>Ipomoea racemigera</i> | P3 | | | Creeping annual, herb or climber. Fl. white. | Yes | Yes | 7.7 km WSW | A; B; C; E; I; J; O; Q; U, W | Likely | Unlikely |
| <i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431) | P3 | | | Tussocky perennial, grass-like or herb, 0.9-1.8 m high. Fl. Aug. Red clay. Claypan, grass plain. | Yes | No | 0.2 km S | A; B; E; U | Likely | Highly Unlikely |
| Pre-survey likelihood – Possible | | | | | | | | | | |
| <i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i> | P3 | | | Prostrate annual herb, to 0.1 m high. Red brown clay loam. Flat plain, cracking clay floodplain, gentle slopes. | Yes | Yes | 10.3 km W | A; B; E; V | Possible | Unlikely |
| <i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727) | P3 | | | Open, erect annual or biennial, herb, to 0.2 m high. Fl. yellow. Red-brown clay soil, calcrete pebbles. Low undulating plain, swampy plains. | No | Yes | 3.5 km ESE | A; B; E; I | Possible | Unlikely |
| <i>Vittadinia</i> 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. | Yes | Yes | 25.6 km E | A; B; E; V | Possible | Unlikely |
| <i>Eremophila youngii</i> subsp. <i>lepidota</i> | 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. | Possible | No | 14.1 km NE | A; B; S | Possible | Unlikely |
| <i>Eremophila magnifica</i> subsp. <i>velutina</i> | P3 | | | Shrub, 0.5-1.5 m high. Fl. blue-purple, Aug to Sep. Skeletal soils over ironstone. Summits. | No | Yes | 0.9 km N | A; B; E | Possible | Highly Unlikely |
| <i>Eremophila naaykensis</i> | P3 | | | Erect shrub, 1-3 m high. Fl. White/pale blue. Red brown sandy clay loam. Upper slopes, gullies, gorges. | No | Yes | 2.3 km N | A; B; E; H, W | Possible | Highly Unlikely |
| <i>Gymnanthera cunninghamii</i> | P3 | | | Erect shrub, 1-2 m high. Fl. cream-yellow-green, Jan to Dec. Sandy soils. | Possible | Yes | 7.9 km NE | A; B; C; E; H; I; K; S; T | Possible | Highly Unlikely |
| <i>Isotropis parviflora</i> | P3 | | | Shrub, 0.1 m high. Fl. white/pink, Mar. Valley slope of ironstone plateau. | No | Yes | 5.2 km N | A; B; C; E; H, W | Possible | Highly Unlikely |
| <i>Swainsona thompsoniana</i> | P3 | | | Prostrate annual herb, to 0.2 m high, Fl. blue, Mar-Sep, Nov-Dec. Higher altitude floodplains, top of hilltops and cracking clays on red-brown clay. | Possible | Yes | 6.7 km SW | A; C, W | Possible | Highly Unlikely |
| <i>Streptoglossa</i> sp. Cracking clays (S. van Leeuwen et al. PBS 7353) | P3 | | | Erect or decumbent annual herb, multi-stemmed to 0.25 m tall. Fl. pink, June. Clay-loam. Cracking clay, colluvium/alluvium, sheet-flow, sub-saline flats, ironstone flats. | Possible | Adjacent | 14.2 km W | A; C | Possible | Highly Unlikely |
| Pre-survey likelihood – Unlikely | | | | | | | | | | |
| <i>Uvedalia clementii</i> | P3 | | | Compact, erect herb, to 0.1 m high. Fl. blue and yellow, Aug. Red or brown alluvial clay. Claypans, drainage areas, flat terrain low in landscape. | Yes | Yes | 16.7 km NW | C | Unlikely | Unlikely |
| <i>Acacia corusca</i> | P1 | | | Shrub, 1.5-5(-7) m high. Red brown sandy loam soils. Hill slopes, hillcrests, drainage lines. | No | No | 29.9 km ENE | A; B; C; E; P | Unlikely | Highly Unlikely |

| Taxon | DBCA | BC Act | EPBC Act | Habit and habitat | Habitat within Survey Area | Within current known distribution | Proximity from Survey Area | Source | Pre-survey | Post-survey likelihood |
|--|------|--------|----------|--|----------------------------|-----------------------------------|----------------------------|------------------|-----------------|------------------------|
| <i>Paranotis</i> sp. Pilbara (H. Ajduk HAOP04a) | P1 | | | Erect, ephemeral herb, to 0.25 m high. Fl. white, Feb-Mar. Raised banks adjacent to shallow flowlines on exposed hardpan. | Possible | No | 36.1 km WNW | A | Unlikely | Highly Unlikely |
| <i>Goodenia hartiana</i> | P2 | | | Erect to spreading, multistemmed perennial, herb or shrub (sub-shrub). Fl. blue-purple. Sand. Sand dune swales, sandhills. | No | No | 29.2 km E | A; B; C | Unlikely | Highly Unlikely |
| <i>Acacia subtiliformis</i> | 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 | No | 31.7 km NW | A; B; C | Unlikely | Highly Unlikely |
| <i>Amaranthus centralis</i> | 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 | Possible | No | 42.3 km NE | A; B | Unlikely | Highly Unlikely |
| <i>Crotalaria smithiana</i> | P3 | | | Annual, herb, to 0.4 m high. Fl. yellow, Jun. Regeneration site on floodplain. | Yes | No | 23.3 km NE | A; B; C; F; Q; S | Unlikely | Highly Unlikely |
| <i>Dolichocarpa</i> sp. Hamersley Station (A.A. Mitchell 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. | Possible | No | 15.8 km WNW | U | Unlikely | Highly Unlikely |
| <i>Eragrostis</i> sp. Mt Robinson (S. van Leeuwen 4109) | P3 | | | Tussock-forming perennial, grass-like or herb, to 0.3 m high. Fl. Sep. Red-brown skeletal soils, ironstone. Steep slopes, summits. | No | No | 6.7 km WSW | A; U, W | Unlikely | Highly Unlikely |
| <i>Eremophila rigida</i> | P3 | | | Bushy shrub, 0.3-4 m high. Fl. cream, Sep. Red sand alluvium. Hardpan plains, stony clay depressions. | Possible | No | 22.5 km S | A; B; C | Unlikely | Highly Unlikely |
| <i>Indigofera gilesii</i> | P3 | | | Shrub, to 1.5 m high. Fl. purple-pink, May or Aug. Pebbly loam. Amongst boulders & outcrops, hills. | No | No | 15.1 km WNW | A; B; C; H; U | Unlikely | Highly Unlikely |
| <i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739) | P3 | | | Perennial, grass-like or herb, 0.4 m high. Light orange-brown, pebbly loam. Amongst rocks & outcrops, gully slopes. | No | Yes | 19.5 km WNW | A; B; E; N; T, W | Unlikely | Highly Unlikely |
| <i>Bulbostylis burbidgeae</i> | 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; involucre bracts long, hairy. Fl. brown, Mar or Jun to Aug. Granitic soils. Granite outcrops, cliff bases. | No | No | 8.7 km NE | E | Unlikely | Highly Unlikely |
| <i>Eremophila magnifica</i> subsp. <i>magnifica</i> | P4 | | | Shrub, 0.5-1.5 m high. Fl. blue, Aug to Nov. Skeletal soils over ironstone. Rocky screes. | No | Adjacent | 6.7 km NW | A; B; E | Unlikely | Highly Unlikely |
| <i>Goodenia berringbinensis</i> | P4 | | | Ascending annual, herb, 0.1-0.3 m high. Fl. yellow, Oct. Red sandy loam. Along watercourses. | Possible | No | 21.5 km SE | A; B; C; E; O | Unlikely | Highly Unlikely |
| <i>Lepidium catapycnon</i> | P4 | | | Open, woody perennial, herb or shrub, 0.2-0.3 m high, stems zigzag. Fl. white, Oct. Skeletal soils. Hillsides. | No | No | 7.7 km NW | A; B; C; E; U | Unlikely | Highly Unlikely |
| Pre-survey likelihood – Highly Unlikely | | | | | | | | | | |
| <i>Hibiscus campanulatus</i> | P3 | | | Erect bushy shrub, 1-3.5 m high. Fl. White/pale pink. Brown loamy to skeletal soils. Rocky gullies, ironstone range. | No | No | 137.9 km SSW | B | Highly Unlikely | Highly Unlikely |
| <i>Eremophila capricornica</i> | P1 | | | Compact shrub, 0.2-0.5(-0.75) m high. Fl. blue-purple. Red brown loam soil. Hardpan plain over granite. | No | No | 42.2 km E | A; B; C; G; Q; R | Highly Unlikely | Highly Unlikely |
| <i>Eremophila pilosa</i> | P1 | | | Shrub, ca 0.8 m high. Fl. purple, Sep. Sandplain. | No | No | 56.7 km NNE | A; B; E; H | Highly Unlikely | Highly Unlikely |

| Taxon | DBCA | BC Act | EPBC Act | Habit and habitat | Habitat within Survey Area | Within current known distribution | Proximity from Survey Area | Source | Pre-survey | Post-survey likelihood |
|---|------|--------|----------|---|----------------------------|-----------------------------------|----------------------------|--------|-----------------|------------------------|
| <i>Eremophila rhexos</i> | P1 | | | Erect shrub, ca 1 m high. Fl. blue-purple-white, Sep. Skeletal stony loam over granite. | No | No | 43.3 km S | A | Highly Unlikely | Highly Unlikely |
| <i>Helichrysum oligochaetum</i> | P1 | | | Erect annual, herb, to ca 0.25 m high. Fl. yellow, Aug to Nov. Red clay. Alluvial plains. | Possible | No | 74.7 km NNE | A | Highly Unlikely | Highly Unlikely |
| <i>Stemodia</i> sp. Battle Hill (A.L. Payne 1006) | P1 | | | Low shrub. Cracking clay. Floodplain. | Yes | No | 75.8 km NNE | A | Highly Unlikely | Highly Unlikely |
| <i>Hibiscus</i> 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. | No | No | 41.7 km NNW | A; B | Highly Unlikely | Highly Unlikely |
| <i>Dampiera metallorum</i> | P3 | | | Rounded, multistemmed 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. | No | No | 59.4 km W | A | Highly Unlikely | Highly Unlikely |
| <i>Eremophila</i> sp. West Angelas (S. van Leeuwen 4068) | P3 | | | Spindly shrub, 0.4-3 m high. Skeletal brown-red soil or loam. Hill slopes and summits. | No | No | 43 km W | A; B | Highly Unlikely | Highly Unlikely |
| <i>Eremophila spongiocarpa</i> | P3 | | | Compact, succulent-leaved shrub, to 1 m high. Fl. white, May or Sep. Weakly saline alluvial plain on margins of marsh. | No | No | 74.2 km NE | A | Highly Unlikely | Highly Unlikely |
| <i>Eucalyptus rowleyi</i> | P3 | | | Mallee, 3-5 m. Lignotuber present. Smooth grey to tan brown bark. Lanceolate leaves. Fruit barrel shaped with pedicel. 3/4 valves. Disc deeply descending. Red sandy loams on plains and minor and broad flood-out plains. | Possible | No | 63.8 km NNE | A | Highly Unlikely | Highly Unlikely |
| <i>Grevillea saxicola</i> | 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. | No | No | 57.8 km WNW | A | Highly Unlikely | Highly Unlikely |
| <i>Iotasperma sessilifolium</i> | P3 | | | Erect herb. Fl. pink. Cracking clay, black loam. Edges of waterholes, plains. | Possible | No | 68.7 km NNE | A | Highly Unlikely | Highly Unlikely |
| <i>Maireana prosthocochaeta</i> | P3 | | | Open, densely-leaved shrub, 0.3-0.6 m high. Laterite. Hills, salty places. | No | No | 48.3 km SSW | A | Highly Unlikely | Highly Unlikely |
| <i>Oxalis</i> sp. Pilbara (M.E. Trudgen 12725) | P3 | | | Annual herb, 0.1-0.3 m high. Fl. Yellow. Brown sandy loam or clay. Gorge, ironstone outcrops, gully, shaded areas, creeklines. | No | No | 48.7 km WNW | A | Highly Unlikely | Highly Unlikely |
| <i>Rostellularia adscendens</i> var. <i>latifolia</i> | P3 | | | Herb or shrub, 0.1-0.3 m high. Fl. blue-purple-violet, Apr to May. Ironstone soils. Near creeks, rocky hills. | No | No | 69.1 km WNW | A; L | Highly Unlikely | Highly Unlikely |
| <i>Stylidium weeliwalli</i> | 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 | Possible | No | 59.1 km NW | A | Highly Unlikely | Highly Unlikely |
| <i>Triodia birriliburu</i> | P3 | | | Stoloniferous, tussock-forming perennial, grass-like or herb, 1 m high. Foliage non-resinous, leaf blades amphistomatous (hard-type). Fl. Apr-Jun, Aug. On or beside sand dunes. | No | No | 59.6 km NE | F^ | Highly Unlikely | Highly Unlikely |
| <i>Acacia bromilowiana</i> | 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. | No | No | 43 km W | A; B | Highly Unlikely | Highly Unlikely |

| Taxon | DBCA | BC Act | EPBC Act | Habit and habitat | Habitat within Survey Area | Within current known distribution | Proximity from Survey Area | Source | Pre-survey | Post-survey likelihood |
|--|------|--------|----------|--|----------------------------|-----------------------------------|----------------------------|--------|-----------------|------------------------|
| <i>Sida</i> sp. Barlee Range (S. van Leeuwen 1642) | P4 | | | Spreading shrub, to 0.5 m high. Fl. yellow, Aug. Skeletal red soils pockets. Steep slope. | No | No | 41.9 km NNW | A; B | Highly Unlikely | Highly Unlikely |
| <i>Thryptomene wittweri</i> | T | VU | VU | Spreading or rounded shrub, 0.5-1.5(-2.1) m high. Fl. white-cream, Apr or Jul or Aug. Skeletal red stony soils. Breakaways, stony creek beds | No | No | 120 km NW | D | Highly Unlikely | Highly Unlikely |

Source key: A = DBCA (WAH &/or TPFL) (DBCA, 2025b), B = NatureMap (DBCA, 2025a), C = Atlas of Living Australia (ALA) (ALA, 2025), D = Protected Matters Search Tool (EPBC) (DCCEEW, 2025), E = BHP WAIO (2025), F = Astron (2019), G = Biologic (2019a), H = Biologic (2021), I = Biologic (2022b), J = Biologic (2022c), K = Ecologia (2005), L = ENV (2008), M = Maia (2018), N = Onshore (2014b), O = Onshore (2015a), P = Onshore (2015c), Q = Onshore (2018a), R = Onshore (2019), S = Spectrum (2022b), T = Spectrum (2023), U = Spectrum (2024), V = Syrinx (2014), W = Biologic (in prep.)

^This taxon was recorded as a tentative identification (*Triodia ?birriliburu* (P3)) by Astron (2019).

Appendix F: Sample site data

OB32 SWD Settlement Pond
Site SWD-01

Date 17/03/2025
Described by KG & EK
Type Q 50m x 50m
Location MGA Zone 50
 783563 mE; 7416071 mN
 119.773224 E; -23.340457 S



Condition Very Good
Soil Sandy Clay Loam
Rock Type None Discernible
Fire Age Old (6+ yr)
Habitat Sand Plain
Vegetation Low hummock grassland of *Triodia pungens* over low open tussock grassland of **Cenchrus ciliaris* with low woodland of *Corymbia candida* over tall sparse shrubland of *Acacia aptaneura*

| Site Taxa | Cover (%) | Height (m) | Specimen |
|--|-----------|------------|-----------------|
| <i>Abutilon otocarpum</i> | 0.2 | 0.2 | |
| <i>Acacia aptaneura</i> | 4 | 4 | SWD01.02 |
| <i>Acacia catenulata</i> subsp. <i>occidentalis</i> | 0.1 | 3 | SWD01.03 |
| <i>Acacia citrinoviridis</i> | 0.1 | 1.3 | |
| <i>Acacia dictyophleba</i> | 0.1 | 0.4 | |
| <i>Acacia pachyacra</i> | 0.1 | 1 | PWRMN15.01 |
| <i>Acacia tetragonophylla</i> | 0.5 | 2 | |
| <i>Aristida contorta</i> | 0.1 | 0.1 | |
| <i>Aristida holathera</i> var. <i>holathera</i> | 0.1 | 0.2 | |
| <i>Cenchrus ciliaris</i> | 20 | 0.5 | 100 individuals |
| <i>Chrysopogon fallax</i> | 0.1 | 0.3 | |
| <i>Corymbia candida</i> subsp. <i>candida</i> | 20 | 7 | |
| <i>Cymbopogon ambiguus</i> | 0.1 | 0.4 | |
| <i>Enneapogon polyphyllus</i> | 0.1 | 0.2 | PWRR15.01 |
| <i>Enneapogon robustissimus</i> | 0.1 | 0.4 | SWD01.07 |
| <i>Eragrostis eriopoda</i> | 0.1 | 0.3 | |
| <i>Euphorbia boophthona</i> | 0.1 | 0.1 | |
| <i>Euphorbia tannensis</i> subsp. <i>eremophila</i> | 0.1 | 0.1 | |
| <i>Euphorbia trigonosperma</i> | 0.1 | 0.1 | |
| <i>Evolvulus alsinoides</i> var. <i>villosicalyx</i> | 0.1 | 0.1 | |

| Site Taxa | Cover (%) | Height (m) | Specimen |
|--|-----------|------------|-----------|
| <i>Hakea lorea</i> subsp. <i>lorea</i> | 0.5 | 3 | |
| <i>Indigofera linnaei</i> | 0.1 | 0.2 | PWRR15.01 |
| <i>Ptilotus exaltatus</i> | 0.1 | 0.1 | |
| <i>Rhagodia eremaea</i> | 0.1 | 1.3 | |
| <i>Rhynchosia minima</i> | 0.1 | 0.1 | |
| <i>Senna artemisioides</i> subsp. <i>oligophylla</i> | 0.1 | 0.6 | |
| <i>Sida fibulifera</i> | 0.1 | 0.15 | SWD01.06 |
| <i>Tephrosia</i> sp. Newman (A.A. Mitchell PRP 29) | 0.1 | 0.3 | |
| <i>Triodia pungens</i> | 65 | 0.4 | SWD01.01 |

OB32 SWD Settlement Pond
Site SWD-02

Date 19/03/2025
Described by KG & EK
Type Q 50m x 50m
Location MGA Zone 50
 784886 mE; 7415612 mN
 119.786240 E; -23.344365 S



Condition Good
Soil Sandy Clay Loam
Rock Type CID
Fire Age Old (6+ yr)
Habitat Sandy/ Stony Plain
Vegetation Low open tussock grassland of **Cenchrus ciliaris*, *Enneapogon polyphyllus*, *Aristida contorta* with tall open shrubland of *Acacia aptaneura*, *Acacia pruinocarpa*

| Name | Cover (%) | Height (m) | Specimen |
|--|-----------|------------|-----------|
| <i>Abutilon macrum</i> | 0.1 | 0.4 | SWD02.11 |
| <i>Abutilon otocarpum</i> | 0.1 | 0.3 | SWD01.04 |
| <i>Acacia aptaneura</i> | 8 | 4.5 | SWD02.12 |
| <i>Acacia macraneura</i> | 1 | 2 | SWD02.13 |
| <i>Acacia pruinocarpa</i> | 4 | 4 | |
| <i>Acacia synchronicia</i> | 0.1 | 2.5 | |
| <i>Aristida contorta</i> | 2 | 0.3 | |
| <i>Aristida holathera</i> var. <i>holathera</i> | 0.1 | 0.3 | |
| <i>Aristida inaequiglumis</i> | 0.1 | 0.5 | SWD02.14 |
| <i>Arivela viscosa</i> | 0.1 | 0.4 | |
| <i>Boerhavia coccinea</i> | 0.1 | 0.1 | |
| <i>Cenchrus ciliaris</i> | 15 | 0.5 | |
| <i>Duperreya commixta</i> | 0.1 | 0 | |
| <i>Enneapogon polyphyllus</i> | 10 | 0.4 | PWRR15.01 |
| <i>Enteropogon ramosus</i> | 0.1 | 0.3 | SWD02.15 |
| <i>Evolvulus alsinoides</i> var. <i>villosicalyx</i> | 0.1 | 0.2 | |
| <i>Gomphrena affinis</i> subsp. <i>pilbarensis</i> | 0.5 | 0.3 | SWDR02.01 |
| <i>Goodenia prostrata</i> | 0.1 | 0.1 | |
| <i>Hakea lorea</i> subsp. <i>lorea</i> | 1 | 4.5 | |
| <i>Hibiscus burtonii</i> | 0.2 | 0.2 | SWD02.08 |
| <i>Hibiscus sturtii</i> var. <i>campylochlamys</i> | 0.2 | 0.4 | SWD02.09 |

| Name | Cover (%) | Height (m) | Specimen |
|--|-----------|------------|-----------|
| <i>Indigofera colutea</i> | 0.1 | 0.3 | SWD02.03 |
| <i>Maireana villosa</i> | 0.1 | 0.3 | SWD02.10 |
| <i>Neurachne muelleri</i> | 0.1 | 0.3 | |
| <i>Portulaca filifolia</i> | 0.1 | 0.1 | SWD02.07 |
| <i>Portulaca intraterranea</i> | 0.1 | 0.1 | SWD02.01 |
| <i>Ptilotus astrolasius</i> | 0.1 | 0.3 | SWD02.06 |
| <i>Ptilotus exaltatus</i> | 0.1 | 0.2 | |
| <i>Ptilotus helipteroides</i> | 0.1 | 0.1 | SWDR02.01 |
| <i>Rhagodia eremaea</i> | 0.1 | 1 | |
| <i>Salsola australis</i> | 0.1 | 0.5 | |
| <i>Sclerolaena cornishiana</i> | 0.1 | 0.4 | PWRR70.03 |
| <i>Senna artemisioides</i> subsp. <i>helmsii</i> | 0.1 | 0.5 | |
| <i>Senna artemisioides</i> subsp. <i>oligophylla</i> | 0.1 | 0.5 | |
| <i>Sida</i> sp. L (A.M. Ashby 4202) | 0.1 | 0.2 | SWD02.02 |
| <i>Solanum lasiophyllum</i> | 0.1 | 0.4 | |
| <i>Tribulus astrocarpus</i> | 0.1 | 0.1 | SWD02.05 |
| <i>Tribulus macrocarpus</i> | 0.1 | 0.1 | SWD02.04 |
| <i>Triodia pungens</i> | 0.1 | 0.4 | |

OB32 SWD Settlement Pond
Site SWDR-01

Date 19/03/2025
Described by KG & EK
Type R
Location MGA Zone 50
 785606 mE; 7415715 mN
 119.793250 E -23.343307 S



Condition Good
Soil Silty Clay Loam
Rock Type CID
Fire Age Old (6+ yr)
Habitat Medium Drainage Line
Vegetation Low closed tussock grassland of **Cenchrus ciliaris* with low woodland of *Acacia citrinoviridis* with mid open woodland of *Eucalyptus victrix*
Notes Relevé targeting bank and river bed

| Name | Cover (%) | Height (m) | Specimen |
|--|-----------|------------|----------|
| <i>Acacia citrinoviridis</i> | 0.1 | | |
| <i>Arivela viscosa</i> | 0.1 | | |
| <i>Cenchrus ciliaris</i> | 0.1 | | |
| <i>Corymbia hamersleyana</i> | 0.1 | | |
| <i>Cyperus bifax</i> | 0.1 | SWDR01.01 | |
| <i>Duperreya commixta</i> | 0.1 | | |
| <i>Eucalyptus victrix</i> | 0.1 | | |
| <i>Nellica maderaspatensis</i> | 0.1 | | |
| <i>Tephrosia rosea</i> var. Fortescue creeks (M.I.H. Brooker 2186) | 0.1 | | |

OB32 SWD Settlement Pond
Site SWDR-02
Date 17/03/2025

Described by KG & EK

Type R

Location MGA Zone 50

784014 mE; 7415671 mN

119.777705 E -23.343984 S

Condition Very Good

Soil Sandy Clay Loam

Rock Type CID

Fire Age Old (6+ yr)

Habitat Sandy/ Stony Plain

Vegetation Low hummock grassland of *Triodia pungens* with tall open shrubland of *Acacia incurvaneura* over low open grassland of **Cenchrus ciliaris*, *Enneapogon polyphyllus*, *Aristida contorta*


| Name | Cover (%) | Height (m) | Specimen |
|--|-----------|------------|----------|
| <i>Acacia aptaneura</i> | 10 | SWD01.02 | |
| <i>Acacia incurvaneura</i> | 15 | SWDR02.05 | |
| <i>Acacia pachyacra</i> | 0.1 | PWRMN15.01 | |
| <i>Aristida contorta</i> | 0.5 | | |
| <i>Arivela viscosa</i> | 0.1 | | |
| <i>Boerhavia coccinea</i> | 0.1 | | |
| <i>Cenchrus ciliaris</i> | 12 | | |
| <i>Enneapogon polyphyllus</i> | 1 | PWRR15.01 | |
| <i>Euphorbia tannensis</i> subsp. <i>eremophila</i> | 0.1 | | |
| <i>Evolvulus alsinoides</i> var. <i>villosicalyx</i> | 0.1 | | |
| <i>Gomphrena affinis</i> subsp. <i>pilbarensis</i> | 0.1 | SWDR02.01 | |
| <i>Goodenia prostrata</i> | 0.1 | | |
| <i>Hakea lorea</i> subsp. <i>lorea</i> | 0.1 | | |
| <i>Maireana</i> sp. Indet | 0.1 | SWDR02.06 | |
| <i>Ptilotus exaltatus</i> | 0.1 | | |
| <i>Ptilotus helipteroides</i> | 0.1 | SWDR02.01 | |
| <i>Salsola australis</i> | 0.1 | | |
| <i>Senna artemisioides</i> subsp. <i>oligophylla</i> | 0.1 | | |
| <i>Sida fibulifera</i> | 0.1 | SWD01.06 | |
| <i>Sida</i> sp. L (A.M. Ashby 4202) | 0.1 | SWDR02.03 | |
| <i>Triodia pungens</i> | 45 | SWD01.01 | |

Appendix G: Vegetation structural classification

NVIS Vegetation Structural Classifications

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

| Growth Form | Height ranges (m) | Structural Formation Classes | | | | | | |
|--------------------------------|-------------------|------------------------------|--------------------|-------------------------|---------------------------|--------------------------|------------------------------------|-----------------|
| Tree, Palm | >30 Tall | Closed Forest | Open Forest | Woodland | Open Woodland | Isolated Trees | Isolated Clumps Of Trees | Trees |
| | 10-30 Mid | | | | | | | |
| | <10 Low | | | | | | | |
| Tree Mallee | 10-30 Tall | Closed Mallee Forest | Open Mallee Forest | Mallee Woodland | Open Mallee Woodland | Isolated Mallee Trees | Isolated Clumps Of Mallee Trees | Mallee Trees |
| | <10 Mid | | | | | | | |
| | <3 Low | | | | | | | |
| Shrub, Cycad, Grass-Tree, Fern | >2 Tall | Closed Shrubland | Shrubland | Open Shrubland | Sparse Shrubland | Isolated Shrubs | Isolated Clumps Of Shrubs | Shrubs |
| | 1-2 Mid | | | | | | | |
| | <1 Low | | | | | | | |
| Mallee Shrub | 10-30 Tall | Closed Mallee Shrubland | Mallee Shrubland | Open Mallee Shrubland | Sparse Mallee Shrubland | Isolated Mallee Shrubs | Isolated Clumps Of Mallee Shrubs | Mallee Shrubs |
| | <10 Mid | | | | | | | |
| | <3 Low | | | | | | | |
| Heath Shrub | >2 Tall | Closed Heathland | Heathland | Open Heathland | Sparse Heathland | Isolated Heath Shrubs | Isolated Clumps Of Heath Shrubs | Heath Shrubs |
| | 1-2 MID | | | | | | | |
| | <1 LOW | | | | | | | |
| Chenopod Shrub | >2 Tall | Closed Chenopod Shrubland | Chenopod Shrubland | Open Chenopod Shrubland | Sparse Chenopod Shrubland | Isolated Chenopod Shrubs | Isolated Clumps Of Chenopod Shrubs | Chenopod Shrubs |
| | 1-2 MID | | | | | | | |
| | <1 LOW | | | | | | | |
| Samphire Shrub | >0.5 Low | Closed Samphire Shrubland | Samphire Shrubland | Open Samphire Shrubland | Sparse Samphire Shrubland | Isolated Samphire Shrubs | Isolated Clumps Of Samphire Shrubs | Samphire Shrubs |
| | <0.5 LOW | | | | | | | |
| Hummock Grass | >1 Tall | Closed Hummock Grassland | Hummock Grassland | Open Hummock Grassland | Sparse Hummock Grassland | Isolated Hummock Grasses | Isolated Clumps Of Hummock Grasses | Hummock Grasses |
| | 0.5-1 Mid | | | | | | | |
| | <0.5 low | | | | | | | |

| Cover Characteristics | | | | | | | | |
|-----------------------|-------------------|------------------------------|-------------------|------------------------|--------------------------|--------------------------|------------------------------------|-----------------|
| Growth Form | Height ranges (m) | Structural Formation Classes | | | | | | |
| Tussock Grass | >0.5 Mid | Closed Tussock Grassland | Tussock Grassland | Open Tussock Grassland | Sparse Tussock Grassland | Isolated Tussock Grasses | Isolated Clumps Of Tussock Grasses | Tussock Grasses |
| | <0.5 LOW | | | | | | | |
| Other Grass | >0.5 Mid | Closed Grassland | Grassland | Open Grassland | Sparse Grassland | Isolated Grasses | Isolated Clumps Of Grasses | Other Grasses |
| | <0.5 LOW | | | | | | | |
| Sedge | >0.5 Mid | Closed Sedgeland | Sedgeland | Open Sedgeland | Sparse Sedgeland | Isolated Sedges | Isolated Clumps Of Sedges | Sedges |
| | <0.5 LOW | | | | | | | |
| Rush | >0.5 Mid | Closed Rushland | Rushland | Open Rushland | Sparse Rushland | Isolated Rushes | Isolated Clumps Of Rushes | Rushes |
| | <0.5 LOW | | | | | | | |
| Forb | >0.5 Mid | Closed Forbland | Forbland | Open Forbland | Sparse Forbland | Isolated Forbs | Isolated Clumps Of Forbs | Forbs |
| | <0.5 Low | | | | | | | |
| Fern | >2 Tall | Closed Fernland | Fernland | Open Fernland | Sparse Fernland | Isolated Ferns | Isolated ClumpsOf Ferns | Ferns |
| | 1-2 Tall | | | | | | | |
| | <1 Low | | | | | | | |
| Bryophyte | <0.5 | Closed Bryophyte Land | Bryophyte Land | Open Bryophyte Land | Sparse Bryophyte Land | Isolated Bryophytes | Isolated Clumps Of Bryophytes | Bryophytes |
| Lichen | <0.5 | Closed Lichenland | Lichenland | Open Lichenland | Sparse Lichenland | Isolated Lichens | Isolated Clumps Of Lichens | Lichens |
| Vine | >30 Tall | Closed Vineland | Vineland | Open Vineland | Sparse Vineland | Isolated Vines | Isolated Clumps Of Vines | Vines |
| | 10-30 Med | | | | | | | |
| | <10 Low | | | | | | | |
| Aquatic | <1 Tall | Closed Aquatic Bed | Aquatic Bed | Open Aquatic Bed | Sparse Aquatics | Isolated Aquatics | Isolated Clumps Of Aquatics | Aquatics |
| | 0-0.5 Low | | | | | | | |
| Seagrass | <1 Tall | Closed Seagrass Bed | Seagrass Bed | Open Seagrass Bed | Sparse Seagrass Bed | Isolated Seagrasses | Isolated Clumps Of Seagrasses | Seagrasses |
| | 0-0.5 Low | | | | | | | |

From: NVIS Structural Formation Terminology (Australian Vegetation Attribute Manual Version 7.0 November 2017 <https://www.environment.gov.au/land/publications/australian-vegetation-attribute-manual-version-7>)

* Foliage Cover is defined for each stratum as 'the proportion of the ground, which would be shaded if sunshine came from directly overhead'. It includes branches and leaves and is obtained by multiplying Crown Cover with Crown type (Hnatiuk *et al.*, 2009). It is applied to a stratum in a plot, rather than an individual crown, with the NVIS measure for a vegetation type ideally being a summary of several plots. Foliage Projective Cover, which considers only the vertical projection of photosynthetic components (generally leaves), can be measured by line interception methods for tree, shrub and ground layer vegetation (Specht & Specht, 1999).

** Crown Cover (canopy cover) as per Hnatiuk *et al.* (2009). Although relationships between this attribute and Foliage Cover are dependent on season, species, species age etc., the crown cover category classes have been adopted as the defining measure.

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

Appendix H: Vegetation condition rating scale

Keighery (1994) Vegetation Condition Rating Scale

| Vegetation Condition | Definition |
|----------------------------|---|
| Pristine | Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement. |
| Excellent | Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks. |
| Very Good | Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging, and grazing. |
| Good | Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback, and grazing. |
| Degraded | Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback, and grazing. |
| Completely Degraded | The structure of the vegetation is no longer intact, and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees and shrubs |

Appendix I: Species list

Aizoaceae

Trianthema pilosum

Amaranthaceae

Gomphrena affinis subsp. *pilbarensis*

Ptilotus aevoides

Ptilotus astrolasius

Ptilotus exaltatus

Ptilotus helipteroides

Asteraceae

**Bidens bipinnata*

Chenopodiaceae

Maireana sp. indet.

Maireana villosa

Rhagodia sp. Hamersley (M. Trudgen 17794)

Rhagodia eremaea

Salsola australis

Sclerolaena cornishiana

Cleomaceae

Arivela viscosa

Convolvulaceae

Duperreya commixta

Evolvulus alsinoides var. *villosicalyx*

Polymeria mollis

Cyperaceae

Cyperus bifax

Euphorbiaceae

Euphorbia boophthona

Euphorbia ferdinandi var. *ferdinandi*

Euphorbia tannensis subsp. *eremophila*

Euphorbia trigonosperma

Fabaceae

Acacia aptaneura

Acacia catenulata subsp. *occidentalis*

Acacia citrinoviridis

Acacia dictyophleba

Acacia incurvaneura

Acacia macraneura

Acacia pachyacra

Acacia pruinocarpa

Acacia synchronicia

Acacia tetragonophylla

Indigofera colutea
Indigofera linnaei
Rhynchosia minima
Senna artemisioides subsp. *helmsii*
Senna artemisioides subsp. *oligophylla*
Senna glutinosa subsp. *x luerssenii*
Senna notabilis
Tephrosia sp. Newman (A.A. Mitchell PRP 29)
Tephrosia rosea var. *Fortescue creeks* (M.I.H. Brooker 2186)

Goodeniaceae

Goodenia prostrata

Malvaceae

Abutilon macrum
Abutilon otocarpum
Hibiscus burtonii
Hibiscus aff. *campanulatus*
Hibiscus sturtii var. *campylochlamys*
Sida sp. indet.
Sida sp. L (A.M. Ashby 4202)
Sida fibulifera

Moraceae

**Ficus religiosa*

Myrtaceae

Corymbia candida subsp. *candida*
Corymbia hamersleyana
Eucalyptus victrix

Nyctaginaceae

Boerhavia coccinea

Phyllanthaceae

Nelica maderaspatensis

Poaceae

Aristida contorta
Aristida holathera var. *holathera*
Aristida inaequiglumis
**Cenchrus ciliaris*
Chrysopogon fallax
Cymbopogon ambiguus
Enneapogon polyphyllus
Enneapogon robustissimus
Enteropogon ramosus
Eragrostis eriopoda
Eriachne pulchella

Neurachne muelleri

Themeda triandra

Triodia pungens

Portulacaceae

Portulaca cyclophylla

Portulaca filifolia

Portulaca intraterranea

Proteaceae

Hakea lorea subsp. lorea

Scrophulariaceae

Eremophila lanceolata

Solanaceae

Solanum lasiophyllum

Zygophyllaceae

Tribulus astrocarpus

Tribulus macrocarpus