Reconnaissance Flora and Vegetation Survey of M30/257 - November 2024

Prepared for

Minstrel Resources Pty Ltd

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1 INTRODUCTION

Minstrel Resources Pty Ltd (MR) have recently had the Mining license granted for M30/257, which comprised of previous Prospecting leases P30/110, P30/1102, P30/1103 and P30/1131, in Western Australia's Coolgardie Bioregion (DCCEEW, 2024).

The project is currently under exploration development. MR require a reconnaissance flora and vegetation survey to determine any impact to flora and vegetation within the now granted mining tenement.

Native Vegetation Solutions (NVS) was supplied with a survey area located approximately 110 km northwest of Kalgoorlie-Boulder, in the Coolgardie Region (COO) of Western Australia (Figure 1).

The total survey area received from MR covered approximately 406 ha. The survey area lies within the now granted Mining Tenement M30/257. Actual disturbance footprints are not yet defined; however, clearing required within the boundary of the survey area is anticipated to be less than the total survey area.

This report will encompass results of the reconnaissance flora and vegetation survey within the proposed survey area.



Figure 1: Regional map of survey location

1.1 Purpose and Scope

The objective of this report is to document the results of the flora and vegetation component of a reconnaissance assessment conducted in accordance with:

- *Environmental Factor Guideline- Flora and Vegetation* (EPA, 2016); and
- *Technical Guidance- Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016a).

A reconnaissance assessment has two components:

1). Desktop study which includes a literature review and a search of the relevant databases;
2). Reconnaissance survey of the survey area to verify the desktop survey, to define vegetation units present in the area, search for species of conservation significance and to determine potential sensitivity to impact.

As part of the reporting for the reconnaissance assessment, NVS has conducted a flora and vegetation survey which includes broad-scale vegetation mapping and vegetation condition mapping of the survey area.

The scope of work for the reconnaissance flora and vegetation survey was to:

- conduct a desktop study that includes a literature review and search of the relevant databases;
- describe the vegetation associations in the survey area;
- prepare an inventory of species occurring in the survey area;
- identify any vegetation communities or flora species of conservation significance;
- map broad-scale vegetation groups found within the survey area, including vegetation condition; and
- provide recommendations, including the management of perceived impacts to flora and vegetation within the survey area.

1.2 Statutory Framework and Guidance

This assessment took into account relevant sections of Commonwealth and State legislation and guidelines:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- *Environmental Protection Act 1986* (EP Act)
- *Biodiversity Conservation Act 2016* (BC Act)
- *Biosecurity and Agriculture Management Act 2007* (BAM Act)

The Minister for the Environment publishes lists of flora species in need of special protection because they are considered rare, likely to become extinct, or are presumed extinct. The current listings were published in the Government Gazette on 30 April 2024 (Lawn, 2024) and were taken into account.

As well as those listed above, the assessment took into account relevant sections of:

- EPA (2023) *Statement of environmental principles, factors, objectives and aims of EIA*;
- EPA (2016) *Environmental Factor Guideline: Flora and Vegetation;* and
- EPA (2016a) *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment*, known as *Flora and Vegetation Technical Guidance*

1.2.1 Western Australian *Biodiversity Conservation Act 2016*

The Western Australian *Biodiversity Conservation Act 2016* (BC Act) provides for the conservation, protection and ecologically sustainable use of biodiversity and biodiversity components in Western Australia. The BC Act replaced the *Wildlife Conservation Act 1950*.

Threatened species (both flora and fauna) that meet the categories listed within the Act are highly protected and require authorisation by the Ministerial to take or disturb. These are known as Threatened Flora and Threatened Fauna. The conservation categories of Critically Endangered, Endangered and Vulnerable have been aligned with those detailed in the EPBC Act, as below.

Flora and fauna species may be listed as being of special conservation interest if they have a naturally low population, restricted natural range, are subject to or recovering from a significant population decline or reduction of range or are of special interest, and the Minister considers that taking may result in depletion of the species. Migratory species and those subject to international agreement are also listed under the BC Act. These are known as specially protected species in the BC Act.

Threatened Ecological Communities (TECs) are also protected under BC Act and are categorised using the same criteria as threatened species.

1.2.2 Environmental Protection Act 1986

The *EP Act 1986* was created to provide for an Environmental Protection Authority (the EPA) that has the responsibility for:

- prevention, control and abatement of pollution and environmental harm
- conservation, preservation, protection, enhancement and management of the environment
- matters incidental to or connected with the above.

The EPA is responsible for providing the guidance and policy under which environmental assessments are conducted. It conducts environmental impact assessments (based on the information included in environmental assessments and provided by the proponent), initiates measures to protect the environment and provides advice to the Minister responsible for environmental matters.

1.2.3 Environment Protection and Biodiversity Conservation Act 1999

At a Commonwealth level, Threatened taxa are protected under the EPBC Act, which lists species and ecological communities that are considered Critically Endangered, Endangered, Vulnerable, Conservation Dependent, Extinct, or Extinct in the Wild (Section 6 below).

1.2.4 Flora

1.2.4.1 Threatened and Priority Flora

Conservation significant flora species are those that are listed as TF (Threatened Flora) and (within Western Australia) as PF (Priority Flora). TF species are listed as threatened by the Western Australian Department of Biodiversity Conservation and Attractions (DBCA) and protected under the provisions of the BC Act. Some State-listed TF are provided with additional protection as they are also listed under the Commonwealth EPBC Act. Species can also be listed under the EPBC Act without being listed under the BC Act.

Flora are listed as PF where populations are geographically restricted or threatened by local processes, or where there is insufficient information to formally assign them to TF categories. Whilst PF are not specifically listed in the BC Act, some may qualify as being of special conservation interest and these may require a greater level of protection than unlisted species. Generally though, PF have no statutory protection. They are generally considered in environmental impact assessments under the state approval processes by Department of Mines, Industry Regulation and Safety (DEMIRS) under the *Mining Act 1978* and DBCA under the EP Act. Under this approval process measures are usually taken to protect and avoid PF.

There are seven categories covering State-listed TF and PF species (DBCA, 2023) which are defined in Section 7 below. PF for Western Australia are regularly reviewed by DBCA whenever new information becomes available, with species status altered or removed from the list (Lawn, 2024) when data indicates that they no longer meet the requirements outlined in Section 7 below.

1.2.4.2 Other Significant Flora

According to the Flora and Vegetation Technical Guidance (EPA 2016a) other than being listed as Threatened or Priority Flora, a species can be considered as significant if it is considered to be:

- locally endemic or association with a restricted habitat type (e.g., surface water or groundwater dependent ecosystems)
- a new species or has anomalous features that indicate a potential new species
- at the extremes of range, recently discovered range extensions (generally considered greater than 100 km or in a different bioregion), or isolated outliers of the main range
- unusual species, including restricted subspecies, varieties or naturally occurring hybrids and
- relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

1.2.5 Ecological Communities and Vegetation

1.2.5.1 Threatened and Priority Ecological Communities

Nationally Listed Threatened Ecological Communities

An ecological community is a naturally occurring group of plants, animals and other organisms interacting in a unique habitat. The complex range of interactions between the component species provides an important level of biological diversity in addition to genetics and species. At Commonwealth level, Threatened Flora and TECs are protected under the Commonwealth EPBC Act. An ecological community may be categorised into one of the three subcategories:

- Critically Endangered, if it is facing an extremely high risk of extinction in the wild in the immediate future
- Endangered, if it is not critically endangered and is facing a very high risk of extinction in the wild in the near future and
- Vulnerable, if it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.

State Listed Threatened Ecological Communities

The Western Australian DBCA also maintains a list of TECs, protected under the BC Act, which are further categorised into three subcategories much like those of the EPBC Act.

State Listed Priority Ecological Communities

DBCA maintains a list of Priority Ecological Communities (PECs). PECs include potential TECs that do not meet survey criteria, or that are not adequately defined.

1.2.5.2 Other Significant Vegetation

According to the Flora and Vegetation Technical Guidance (EPA 2016a), other than being listed as a TEC or PEC, vegetation can be considered as significant if it is considered to have:

- restricted distribution
- a degree of historical impact from threatening processes
- a role as a refuge; and/or
- provides an important function required to maintain ecological integrity of a significant ecosystem.

1.2.5.3 Declared Pest Plants

The Western Australian Organism List (WAOL) details organisms listed as Declared Pests under the BAM Act). Under the BAM Act, Declared Pests are listed as one of the three categories, or exempt:

- C1 (exclusion), that applies to pests not established in Western Australia; control measures are to be taken to prevent their entry and establishment

- C2 (eradication), that applies to pests that are present in Western Australia but in low numbers or in limited areas where eradication is still a possibility
- C3 (management), that applies to established pests where it is not feasible or desirable to manage them in order to limit their damage; or
- Exempt (no category).

2. EXISTING ENVIRONMENT

2.1 Geology and Vegetation

The survey area lies in the Coolgardie (COO) bioregion, more specifically the Eastern Goldfields (COO03) subregion. The Eastern Goldfields subregion covers over 5 million hectares and comprises the Yilgarn craton's 'Eastern Goldfields' Terrains. The subregion is characterised by gentle undulating plains, the west containing Archaean greenstone ridges and low hills, while the east contains a horst of proterozoic granulite. In the western half there are a series of large playa lakes which are remnants of an ancient major drainage line. The dominant soil type is Calcareous earth, which cover most of the plains and greenstone areas. The vegetation of the Eastern Goldfields botanical subregion consists of mallees, diverse *Eucalyptus* woodlands and *Dodonaea* shrublands and is rich in endemic Acacias. The salt lakes support dwarf shrublands of samphire. Acacia thickets and shrubheaths are found on sandplains (CALM, 2002).

2.2 Climate

The climate of the Coolgardie Region is classified as arid to semi-arid with 200-300 mm of rainfall, sometimes in summer but usually in winter (CALM, 2002). The nearest official meteorological weather station with the most complete and up to date climate and rainfall information is Kalgoorlie-Boulder Airport (station number 012038), which is located approximately 113.2 km southeast of the survey area.

2.2.1 Temperature

Mean annual minimum temperature at Kalgoorlie-Boulder Airport is 11.8°C and mean annual maximum temperature is 25.4°C (BOM, 2024). The coldest temperatures are attained in July (mean minimum temperature 5.1°C), the hottest is January (mean maximum temperature 33.7°C) and diurnal temperature variations are relatively consistent throughout the year (Figure 2).

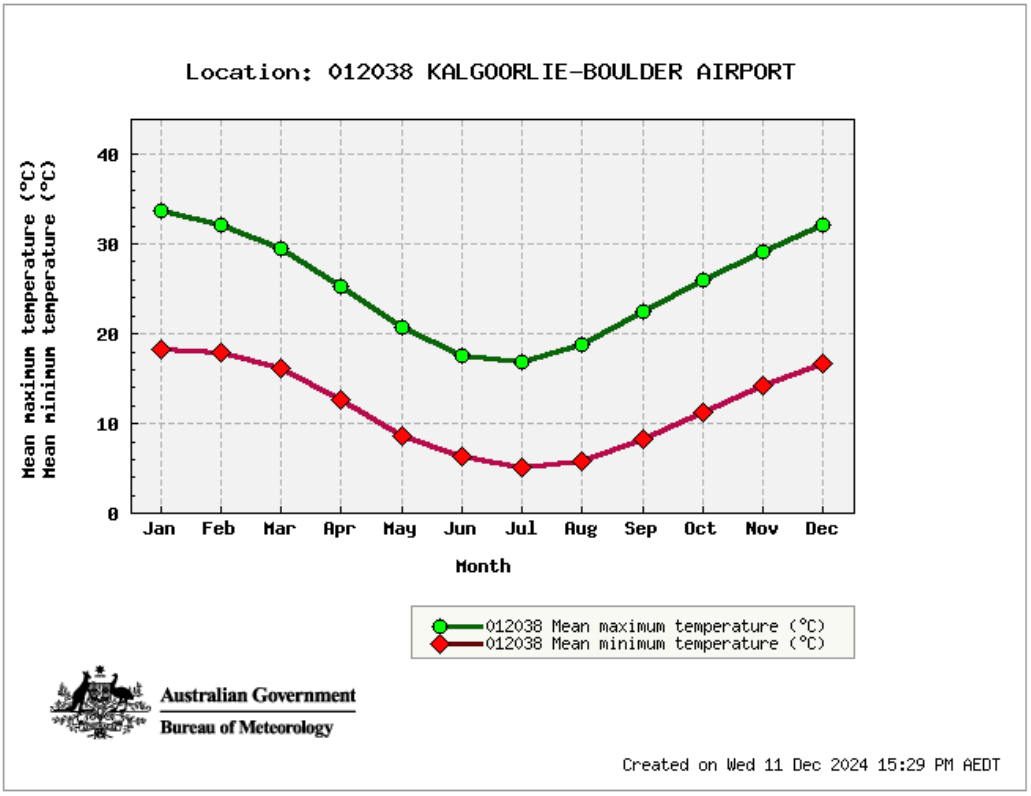


Figure 2: Mean temperature ranges for Kalgoorlie-Boulder Airport weather station

2.2.2 Rainfall

The annual average rainfall at Kalgoorlie-Boulder Airport is 264.9 mm, which falls (>1 mm) on an average of 39 rain-days (BOM, 2024). Larger rainfall events occur from January to March and May to August (Figure 3). Prior to the survey in 2024, rainfall in March, June, July and November exceeded monthly averages while rainfall for all other months remained below monthly averages (BOM, 2024).

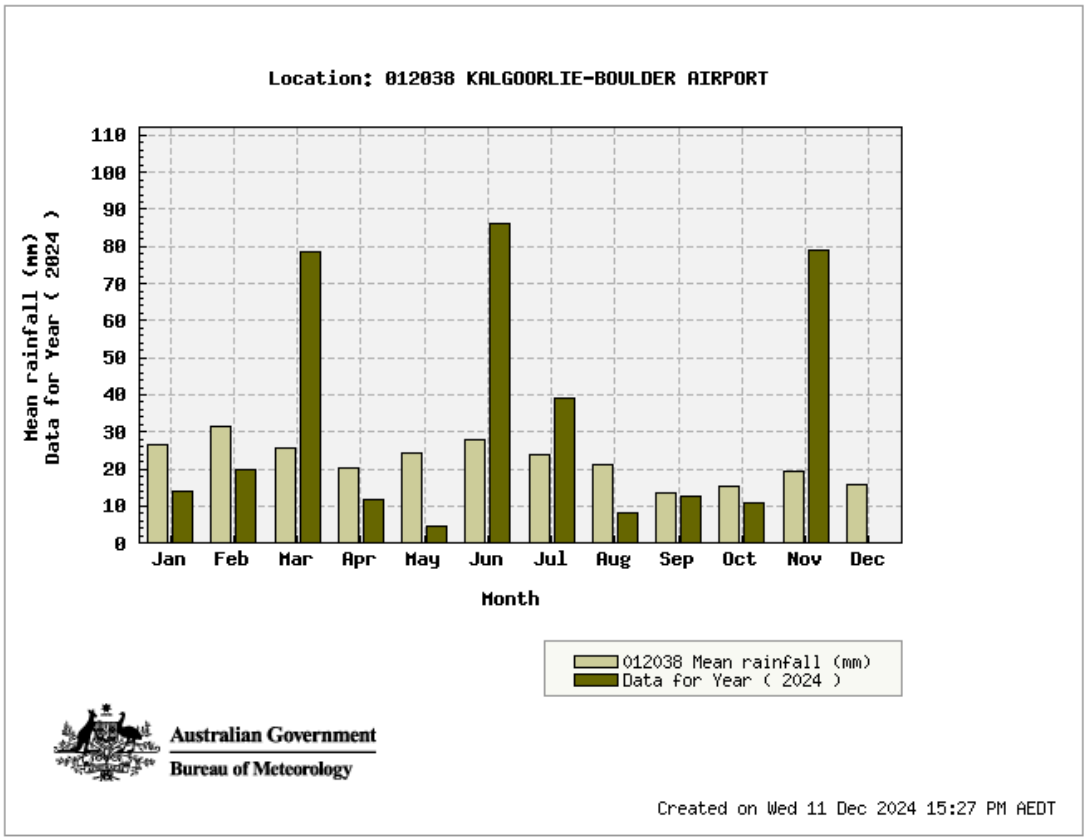


Figure 3: Monthly and mean rainfall for Kalgoorlie-Boulder Airport weather station

3. ASSESSMENT METHODOLOGY

3.1 Personnel and Reporting

The following personnel were involved in the Reconnaissance flora and vegetation survey:

- Mr Eren Reid (*BSc- Biological Science),* Principal Botanist, Native Vegetation Solutions, undertook the survey, vegetation mapping, data collation, field identification of flora, preparation and review of the report. Mr Eren Reid has over 20 years' experience in botanical surveys throughout the Murchison Region and over a variety of environments across Western Australia.
- Ms Adele Thomasz (*BSc*- Conservation and Wildlife Biology), Native Vegetation Solutions, data collation and preparation of the report. Adele Thomasz has over 5 years' experience working in the conservation sector and three years specifically working on botanical survey reporting; and

3.2 Preliminary Desktop Study

A preliminary assessment of the survey area and its potential constraints was undertaken by reviewing relevant government agency managed databases (Sections 3.2.1 to 3.2.5, and Appendices 1 & 2) and consulting with government agencies where necessary. The following sections provide a summary of desktop searches undertaken for the project.

3.2.1 *Environment Protection and Biodiversity Conservation Act* Protected Matters

The *EPBC Act* Protected Matters Search tool was utilised to provide results for matters of National Environmental Significance within the survey area using the survey area as the search criteria with a 10 km buffer (DCCEEW, 2024).

3.2.2 Threatened Flora and Communities

The Threatened and Priority Flora Database managed by the Department of Biodiversity, Conservation and Attractions (DBCA) was searched for threatened and priority flora within a 20km radial area of the survey area (DBCA, 2024a).

The TEC and PEC database was searched to determine the presence of PECs or TECs (DBCA, 2024), with Geographic Information System (GIS) data supplied for assessment, within a 20 km radial area of the survey area.

3.2.3 Environmentally Sensitive Areas (ESAs) and Conservation Reserves

The Department of Water and Environmental Regulation (DWER, 2024) Clearing Permit System Map Viewer was used to determine the location of any ESAs and Conservation Reserves.

3.2.4 Vegetation Type, Extent and Status

Vegetation extent and status data was sourced from the Department of Agriculture and Food (DAFWA) report and its associated GIS file (Shepherd *et al*, 2002). This data comprises Beard's Pre-European vegetation groups.

DBCA's Statewide Vegetation Statistics (DBCA, 2019) was also referenced for the current extent of Beard's Vegetation Groups. The purpose of examining this information is to determine if the survey area lies within any vegetation groups defined by Beard that may have been subjected to widescale clearing for European settlement. The national objectives and targets for biodiversity conservation recognise that the retention of 30% or more of the pre-clearing extent of a Beard vegetation association is necessary if Australia's biological diversity is to be protected.

3.2.5 Wetlands

The potential of wetlands within the project area was determined by examining DWER's Clearing Permit System Map Viewer (DWER, 2024).

3.2.6 Dieback

Under normal circumstances Dieback is only considered a potential issue for any project if the project area lies within the Southwest Land Division and the mean annual rainfall of the area is greater than 400 mm. There is no record of *Phytophthora cinnamomi* (Dieback*)* establishing in natural ecosystems in regions receiving <400mm rainfall per annum (CALM, 2003).

However, as indicated within the more recent Dieback guidelines (DBCA, 2020), other species of *Phytophthora* may persist east of the 400mm isohyet in unusually wet conditions. It is therefore recommended to conduct a risk assessment as per these guidelines.

3.3 Site Investigation

A site visit of the survey area was carried out by Botanist Eren Reid from Native Vegetation Solutions on the 18th of November 2024 and 5th December 2024 to examine the flora and vegetation groups contained within the survey area. A total of 18 hours was spent on site traversing the survey area, by Yamaha Viking All-Terrain Vehicle (ATV) and on foot.

The survey was conducted in accordance with relevant Environmental Protection Authority's (EPA's) Statements and Technical Guidance (Section 1.1).

The EPA uses the Interim Biogeographic Regionalisation of Australia (IBRA) as the largest unit for Environmental Impact Assessment (EIA) decision making in relation to the conservation of biodiversity. Given the scale and nature of the proposed disturbance as well as the existing disturbance, and that the survey area is located within the Coolgardie (COO) IBRA region, a reconnaissance flora and vegetation survey was deemed adequate.

3.3.1 Licenses

A Scientific License was not required for the field work as no samples were collected for identification. All taxa were able to be identified in the field.

3.3.2 Field Methods

Prior to the field work, the aerial photography was examined and representative sample sites for relevés were chosen to provide coverage over all potential vegetation types.

In the field, 20m x 20m relevé sites were established at these sites, taking into account representation of surrounding vegetation and vegetation boundaries. Relevé sites are represented in Appendix 4.

Each relevé site was captured on a TwoNav Aventura GPS at ±4m accuracy, using Universal Transverse Mercator location on GDA94 datum. Digital photographs were taken of each representative vegetation group present in the survey area.

Data collected at each relevé included:

- Photograph of representative vegetation group:
- GPS Location;

- Species Present;
- Population Count/Estimate of Conservation Significant Flora (if present);
- Disturbance Level; and
- Vegetation Condition

The vegetation structure was assessed using the method developed by Muir (1977). Definitions of the vegetation structure are presented in Appendix 3.

The condition of each relevé was assessed using the method developed by Keighery (1994). Definitions of the condition scale are presented in Appendix 3.

Vegetation groups were mapped using the methods listed in Section 3.3.4 below.

Opportunistic recording of plant taxa and vegetation group mapping was also utilised in the survey area between relevé sampling points, via wandering traverses. Smaller singular relevé sites were also utilised as opportunistic sample sites to record taxa and assist in mapping vegetation groups.

All relevé sample sites and GPS tracks are included in Appendix 4.

3.3.3 Post-Field Methods

Taxa were identified with the use of information published on Florabase (WAHERB, 2024). Threatened flora range extensions and new locations were submitted to the Western Australian Herbarium (WAHERB) as per the EPA Technical Guidelines (EPA 2016a).

Species information was transferred into Microsoft Excel® worksheets representing presence/absence of species per vegetation group.

3.3.4 Mapping

Vegetation mapping was produced via GPS recorded information in the field, cross-referenced with vegetation descriptions made in the field, overlaid on aerial imagery of the survey area. The GPS utilised (TwoNav Aventura GPS) displayed aerial imagery, hence real-time mapping of vegetation groups was available during field work.

Vegetation Health Condition was assessed in the field with reference to Keighery (1994).

GPS tracks and waypoints recorded during field work are presented in Appendix 4.

3.3.5 IBSA Data Package

The Environmental Protection Authority (EPA), Department of Water and Environmental Regulation (DWER) and Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) require Index of Biodiversity Surveys for Assessments (IBSA) Data Packages to be submitted to support assessment and compliance under the *Environmental Protection Act 1986.*

An IBSA data package is a single file in .zip format, containing:

- one survey report in .pdf format;
- one plain-text survey report in .txt format; and
- a set of electronic data files, comprising:
    - one survey details spatial dataset in shapefile (.shp, etc.) or MapInfo (.tab, etc.) format; and
    - one or more survey data spatial datasets, as required, in shapefile (.shp, etc.) or MapInfo (.tab, etc.) format.

The IBSA Data package for this survey will be submitted via the DWER IBSA Submission Portal.

3.4 Nomenclature And Taxonomy

Nomenclature follows that used by the WAHERB.

The WAHERB has updated its sequence and arrangement of collections to conform to the systematic sequence of the Angiosperm Phylogeny Group (APGIII), with the result that many Families and Genera have been moved or renamed. This report attempts to follow those changes in relation to species recorded during this survey.

3.5 Limitations

Table 1 lists potential limitations that may have affected the survey.

Table 1: List of potential survey limitations

Potential Limitations	Constraint (Y/N)	Comment
Competency and experience of the consultants undertaking the survey	N	Experienced and competent personnel conducted the survey. Eren Reid (*BSc*) has over 20 years' experience in botanical surveys throughout the Coolgardie and Murchison Regions and over a variety of environments across Western Australia.
Scope	N	The Scope of work was adequately defined. Vascular flora species were the focus of the survey and were thoroughly sampled.
Proportion of flora identified during survey	N	As the survey was planned to target species of conservation significance and flora within a defined survey area, a complete census of the species present was attempted (Approx. 95%). Sufficient identifications were made to allow vegetation descriptions to be made.
Sources of information	N	Threatened and Priority Flora GIS information was available from DBCA.
Proportion of the task achieved	N	All tasks completed.
Timing/Season	N	The reconnaissance flora and vegetation survey was conducted in November and December 2024. Flowering annual species were present within the survey area, suggesting recent above average rainfall in July and November 2024 was sufficient for the period of survey. The most recent rainfall received in the area was on 20th and 21st November 2024.
Disturbance in survey area	N	Minor disturbance (historical mining access tracks and exploration) was observed within the survey area, however, did not compromise the results of the survey as these areas were avoided whilst collecting data.
Intensity of survey effort	N	The survey intensity is considered to have been sufficient for a reconnaissance survey according to EPA (2016) guidelines. Areas most likely to contain threatened and priority species were targeted. Vegetation mapping sites were selected to provide adequate coverage of the survey area.
Resources	N	Resources, in terms of time, equipment, support and personnel were adequate to undertake and complete the reconnaissance survey.
Access problems	N	All the areas in need of survey were easily accessible from existing tracks, or by foot.
Availability of contextual information on the region	N	Contextual information regarding vegetation and flora of the Coolgardie bioregion is readily available. Adequate information was able to be accessed from available databases.

4. RESULTS

4.1 Preliminary Desktop Assessment

4.1.1 EPBC Act Protected Matters

Results of the EPBC Protected Matters search tool are included in Appendix 1.

The EPBC Protected Matters report indicated no TF, TECs or Commonwealth Reserves within the requested survey area.

The search results indicated that one State and Territory Reserve, Credo Nature Reserve, occurs within of the survey area. The location is shown in Appendix 1, and appears as a Schedule One area, of the Clearing Regulations.

4.1.2 Threatened Flora and Communities

The DBCA database searches revealed a potential for one Threatened and five Priority Flora species to occur within a 20km radius of the survey area (DBCA, 2024a). No known locations of Threatened or Priority Flora occur within the survey area, with the closest Priority Flora located approximately 3.5 km south of the survey area, as shown on Map 3 of Appendix 4.

Results of the threatened flora database search are included in Appendix 2 which includes the likelihood of each species to occur within the survey area.

The PEC/TEC search (DBCA, 2022) revealed that no TECs fall within the survey area, or within 20km of the survey area.

Priority Flora species within a 20 km radius of the survey area are displayed in Map 3 of Appendix 4.

4.1.3 Environmentally Sensitive Areas and Conservation Reserves

No ESA's are located within the survey area. However, the area is situated within two 'C' Class Reserves (DWER, 2024). Reserve details are listed in Table 2 below and displayed in Appendix 1.

Table 2: Reserves located within the survey area

Reserve Number	Class	Purpose	Responsible Agency
R 10111	C	Expected From Sale	Department of Planning, Lands and Heritage (SLSD)
R12202	C	Common	Department of Planning, Lands and Heritage (SLSD)

4.1.4 Land Systems

As part of the Rangeland resource surveys, the Department of Agriculture mapped the Land Systems of Western Australia (DPIRD, 2017). The Land Systems occurring within the survey area are listed in Table 3 below and displayed in Appendix 4.

Table 3: Land Systems occurring within the survey area (DPIRD, 2017)

Land System	Description	Extent of Survey Area (ha)	% Of Survey Area (%)
BB5	Rocky ranges and hills of greenstones-basic igneous rocks	17.94	4.42%
Mx40	Flat to undulating valley plains and pediments; some rock outcrop	186.07	45.83%
Mx43	Gently undulating valley plains and pediments; some outcrop of basic rock	201.99	49.75%

4.1.5 Vegetation Type, Extent and Status

two vegetation unit defined by Beard (1990) was identified as part of the desktop assessment. The vegetation unit identifies the Pre-European extent of vegetation, as mapped by Beard (1990). The national objectives and targets for biodiversity conservation recognise that the retention of 30% or more of the pre-clearing extent of Beard's vegetation associations is necessary if Australia's biological diversity is to be protected.

Information relating to known Beard (1990) vegetation units within the survey area has been summarised in Table 4, Table 5 and Table 6 below. This information has been compiled through both desktop assessments and the site visit.

The extent of the Beard vegetation unit 40 within the survey area at the Association WA scale is less than 1% of the total area, however at the IBRA Region, IBRA Subregion and Shire scales the extent of the beard vegetation unit 40 within the survey area is 19.10%, 23.98% and 11.97% respectively (Table 4).

The extent of the Beard vegetation unit 468 within the survey area at all scales is less than 1% of the total area at each scale.

The Beard vegetation units are above the 30% threshold at State, bioregional and subregional scale.

Table 4: Extent of Beard Associations within the survey area

Beard Vegetation Association	Extent within survey area (ha)	% of survey area (%)	By Association WA	By IBRA Region *(COO)*	By IBRA Sub-region *(COO03)*	By Shire *(Shire of Menzies)*
40	320.04	78.83	<1%	19.10	23.98	11.97
468	85.96	21.17	<1%	<1%	<1%	<1%

Table 5: Summary of information regarding Pre-European and current vegetation extent of Vegetation Association 40 within the survey area

Factor	Value				
Beard Vegetation Association*	40				
Vegetation Association Description*	Shrublands; *Acacia* scrub, various species				
Pre-European Extent (ha)	Scale				
	By Association (WA)*	By Association (WA)**	By IBRA Region (COO)**	By IBRA Sub-region (COO03)**	By Shire (Shire Menzies)**
	550,752	369,056	1,675	1,334	2,674
% Pre-European Extent Remaining	75.38%	95.15%	100.00%	100.00%	100.00%
Surrounding Land Use***	Mining, Exploration, Pastoral Lease				
Weed prevalence***	Low				

* Source: Shepherd *et al.* (2002) Appendix 2
**Source: DBCA, (2019)
***Source: Field Assessment

Table 6: Summary of information regarding Pre-European and current vegetation extent of Vegetation Association 468 within the survey area

Factor	Value				
Beard Vegetation Association*	468				
Vegetation Association Description*	Medium woodland; salmon gum & goldfields blackbutt				
Pre-European Extent (ha)	Scale				
	By Association (WA)*	By Association (WA)**	By IBRA Region (COO)**	By IBRA Sub-region (COO03)**	By Shire (Shire Menzies)**
	476,113	592,022	583,358	482,362	138,653
% Pre-European Extent Remaining	100.00%	98.63%	98.63%	98.34%	99.68%
Surrounding Land Use***	Mining, Exploration, Pastoral Lease				
Weed prevalence***	Low				

* Source: Shepherd *et al.* (2002) Appendix 2
**Source: DBCA, (2019)
***Source: Field Assessment

4.1.6 Wetlands

The DWER Clearing Permit System Map Viewer revealed no waterbodies within the survey area (DWER, 2024).

4.1.7 Dieback

The survey area lies south of the 26th parallel, however receives average annual rainfall of 264.9 mm. There is no record of *Phytophthora cinnamomi* establishing in natural ecosystems in regions receiving less than 400mm rainfall per annum (CALM, 2003).

However, as indicated within the more recent Dieback guidelines (DBCA, 2020), other species of *Phytophthora* may persist east of the 400mm isohyet in unusually wet conditions. It is therefore recommended to conduct a risk assessment as per these guidelines.

Additionally, all measures should be taken to prevent any possible soil contamination (including seeds of non-native species *etc*.) which poses a risk in the survey area during seasonally favourable conditions.

4.2 Field Assessment

4.2.1 Threatened Flora

No Priority Flora or Threatened Flora were recorded in the survey area.

4.2.2 Vegetation Type, Extent and Status

A total of 22 Families, 40 Genera and 92 Species were recorded within the survey area. Nine major vegetation groups were recorded in the survey area and range from Completely Degraded to Very Good condition (using the scale of Keighery 1994, see Appendix 3). Existing disturbance within the survey area is comprised of historic exploration activities, and access roads.

No unique or restricted vegetation communities were identified, and all vegetation types/communities are common, widespread and well represented in the Eastern Goldfields subregion.

The summary of vegetation groups contained within the survey area is summarised in Table 7 below. Maps of the survey area can be seen in Appendix 4.

Table 7: Vegetation Group Summary

Vegetation Group	Veg Group Code	Families	Genera	Species	Area (ha)	Percentage of survey area (%)
Eucalyptus griffithsii over Acacia acuminata thicket	A	10	16	22	**7.67**	**1.89%**
Eucalyptus griffithsii and Eucalyptus lesouefii woodland	B	14	20	36	**55.35**	**13.63%**
Eucalyptus over Acacia and sclerophyll shrubland	C	19	30	49	**300.79**	**74.09%**
Acacia burkittii shrubland with emergent Eucalypts	D	9	10	12	**0.39**	**0.10%**
Eucalyptus oleosa woodland	E	9	13	17	**19.37**	**4.77%**
Eucalyptus salubris woodland	F	9	15	26	**4.83**	**1.19%**
Mulga over laterite breakaway	G	11	13	18	**1.54**	**0.38%**
Mixed Eucalyptus over mixed sclerophyll shrubland on undulating rises	H	11	13	20	**2.38**	**0.58%**
Eucalyptus dundasii woodland	I	10	18	22	**8.39**	**2.07%**
Existing Disturbance	N/A	N/A	N/A	N/A	**5.29**	**1.30%**
	Total	**22***	**40***	**92***	**406.00#**	**100.00%#**

Note: * Within total survey area (not sum of column)
Sum of column

The vegetation groups within the survey area are described in more detail below.

4.2.2.1 Eucalyptus griffithsii over *Acacia acuminata* thicket (A)

This Tree Mallee (Muir, 1977) consisted of 10 Families, 16 Genera and 22 Species. The vegetation group was approximately 7.67 ha which makes up 1.89% of the survey area.



Figure 4: Vegetation Group A within the survey area

4.2.2.2 *Eucalyptus griffithsii* and *Eucalyptus lesouefii* woodland (B)

This Open Tree Mallee (Muir, 1977) consisted of 14 Families, 20 Genera and 36 Species. The vegetation group was approximately 55.35 ha which makes up 13.63% of the survey area.



Figure 5: Vegetation Group B within the survey area

4.2.2.3 *Eucalyptus* over *Acacia* and sclerophyll shrubland (C)

This Shrub Mallee (Muir, 1977) consisted of 19 Families, 30 Genera and 49 Species. The vegetation group was approximately 300.79 ha which makes up 74.09% of the survey area.



Figure 6: Vegetation Group C within the survey area

4.2.2.4 *Acacia burkittii* shrubland with emergent Eucalypts (D)

This Thicket (Muir, 1977) consisted of 9 Families,10 Genera and 12 Species. The vegetation group was approximately 0.39 ha which makes up 0.10% of the survey area.



Figure 7: Vegetation Group D within the survey area

4.2.2.5 *Eucalyptus oleosa* woodland (E)

This Open Tree Mallee (Muir, 1977) consisted of 9 Families, 13 Genera and 17 Species. The vegetation group was approximately 19.37 ha which makes up 4.77% of the survey area.



Figure 8: Vegetation Group E within the survey area

4.2.2.6 *Eucalyptus salubris* woodland (F)

This Open Tree Mallee (Muir, 1977) consisted of 9 Families, 15 Genera and 26 Species. The vegetation group was approximately 4.83 ha which makes up 1.19% of the survey area.



Figure 9: Vegetation Group F within the survey area

4.2.2.7 Mulga over laterite breakaway (G)

This Scrub (Muir, 1977) consisted of 11 Families, 13 Genera and 18 Species. The vegetation group was approximately 1.54 ha which makes up 0.38% of the survey area.



Figure 10: Vegetation Group G within the survey area

4.2.2.8 Mixed *Eucalyptus* over mixed sclerophyll shrubland on undulating rises (H)

This Open Tree Mallee (Muir, 1977) consisted of 11 Families, 13 Genera and 20 Species. The vegetation group was approximately 2.38 ha which makes up 0.58% of the survey area.



Figure 11: Vegetation Group H within the survey area

4.2.2.9 *Eucalyptus dundasii* woodland (I)

This Low Woodland B (Muir, 1977) consisted of 10 Families, 18 Genera and 22 Species. The vegetation group was approximately 8.39 ha which makes up 2.07% of the survey area.



Figure 12: Vegetation Group I within the survey area

4.2.2.11 Existing Disturbance

Existing disturbance within the survey area consisted of historic exploration clearing and access roads and was approximately 5.29 ha which makes up 1.30% of the survey area.



Figure 13: Existing disturbance within the survey area

4.2.3 Weeds

No weed species were recorded within the survey area.

4.2.4 Vegetation Condition

Evidence of historic exploration and access tracks was observed during the field assessment.

Overall, the condition of the vegetation was determined to range from “Completely Degraded” to “Very Good” with most of the area falling into the “Very Good” Category. Areas which were affected by historic exploration and clearing were deemed in “Completely Degraded” condition. A map of the vegetation condition within the survey is depicted in Appendix 4.

5. DISCUSSION

The field assessment established that the condition of the vegetation in the proposed disturbance area ranged from “Completely Degraded” to “Very Good” with most of the area falling into the “Very Good” Category. Areas which were affected by historic exploration were deemed in “Completely Degraded” condition. No areas of vegetation were assessed to be in “Pristine” condition.

No weed species were recorded within the survey area.

No Priority or Threatened Flora were recorded in the survey area.

No PECs or TECs were recorded in the survey area.

No unique or restricted vegetation communities were identified, and all vegetation types/communities are common, widespread and well represented in the Eastern Goldfields subregion.

Any proposed disturbance/clearing of vegetation will result in a loss of some flora and vegetation. However, given the size of the area and the extent of the Beard (1990) vegetation association elsewhere, the impact on the vegetation and its component flora will not affect the conservation values of either or create fragmentation or patches of remnant vegetation.

The following recommendations arise from the reconnaissance flora survey:

- Weed control measures should be implemented during and following earthworks; and
- Dust control measures should be implemented during earthworks.

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7. GLOSSARY

Acronyms:

BOM	Bureau of Meteorology, Australian Government
BSc	Bachelor of Science
CALM	Department of Conservation and Land Management (now DBCA)
COO	Coolgardie Bioregion (IBRA)
COO03	Eastern Goldfields Subregion (IBRA)
CPS	Clearing Permit System (DWER)
DBCA	Department of Biodiversity, Conservation and Attractions, Western Australia
DCCEEW	Department of Climate Control, Energy, the Environment and Water, Australian Government
DEMIRS	Department of Energy, Mines, Industry Regulation and Safety, Western Australia
DPAW	Department of Parks and Wildlife, Western Australia (now DBCA)
DPIRD	Department of Primary Industries and Regional Development, Western Australia
DRF	Declared Rare Flora (now classed as Threatened Flora)
DWER	Department of Water and Environmental Regulation, Western Australia
EPA	Environmental Protection Authority, Western Australia
EP Act	Environmental Protection Act 1986, Western Australia
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth Act)
ESA	Environmentally Sensitive Area
GIS	Geographical Information System
ha	Hectare (10,000 square metres)
IBRA	Interim Biogeographic Regionalisation for Australia, DCCEEW
IUCN	International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union
km	Kilometres
m	Metres
NVS	Native Vegetation Solutions
PEC	Priority Ecological Community, Western Australia
PF	Priority Flora
Ramsar	A wetland site designated of international importance under the Ramsar Convention (UNESCO)
TEC	Threatened Ecological Community
TF	Threatened Flora
UNESCO	United Nations Educational, Scientific and Cultural Organization
WA	Western Australia
WAHERB	Western Australian Herbarium (DBCA)
WAOL	Western Australian Organism List (DPIRD)

Definitions:

DBCA (2023) Conservation Codes for Western Australian Flora and Fauna. Department of Biodiversity, Conservation and Attractions, Western Australia, August 2023: -

T Threatened species:

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR Critically endangered species

Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines".

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for critically endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for critically endangered flora.

EN Endangered species

Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines".

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for endangered flora.

VU Vulnerable species

Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines".

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for vulnerable fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for vulnerable flora.

Extinct species:

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX Extinct species

Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.

EW Extinct in the wild species

Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

MI Migratory species

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

CD Species of special conservation interest (conservation dependent fauna)

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

OS Other specially protected species

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018.*

P Priority Species

Priority is not a listing category under the BC Act. The Priority Flora and Fauna lists are maintained by the department and are published on the department's website.

All fauna and flora are protected in WA following the provisions in Part 10 of the BC Act. The protection applies even when a species is not listed as threatened or specially protected, and regardless of land tenure (State managed land (Crown land), private land, or Commonwealth land).

Species that may possibly be threatened species that do not meet the criteria for listing under the BC Act because of insufficient survey or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of prioritisation for survey and evaluation of conservation status so that consideration can be given to potential listing as threatened.

Species that are adequately known, meet criteria for near threatened, or are rare but not threatened, or that have been recently removed from the threatened species list or conservation dependent or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of priority status is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

Priority 1: Poorly-known species

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

Priority 2: Poorly-known species

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

Priority 3: Poorly-known species

Species that are known from several locations and the species does not appear to be under imminent threat or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. These species need further survey.

Priority 4: Rare, Near Threatened and other species in need of monitoring

a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.
b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as a conservation dependent specially protected species.
c) Species that have been removed from the list of threatened species or lists of conservation dependent or other specially protected species, during the past five years for reasons other than taxonomy.
d) Other species in need of monitoring.

Appendix 1: Relevant Government Database Search Results

Australian Government
Department of Climate Change, Energy, the Environment and Water

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 22-Oct-2024

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements



Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	7
Listed Migratory Species:	5

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	8
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	1
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	1
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Aphelocephala leucopsis			
Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Falco hypoleucos			
Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area
Leipoa ocellata			
Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Pezoporus occidentalis			
Night Parrot [59350]	Endangered	Species or species habitat may occur within area	In feature area
MAMMAL			
Dasyurus geoffroii			
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area	In feature area
PLANT			
Ricinocarpos brevis			
[82879]	Endangered	Species or species habitat likely to occur within area	In feature area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Motacilla cinerea			
Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]	
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis			
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris acuminata			
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans			
Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area	In feature area
Merops ornatus			
Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla cinerea			
Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Credo	NRS Addition - Gazettal in Progress	WA	In feature area

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

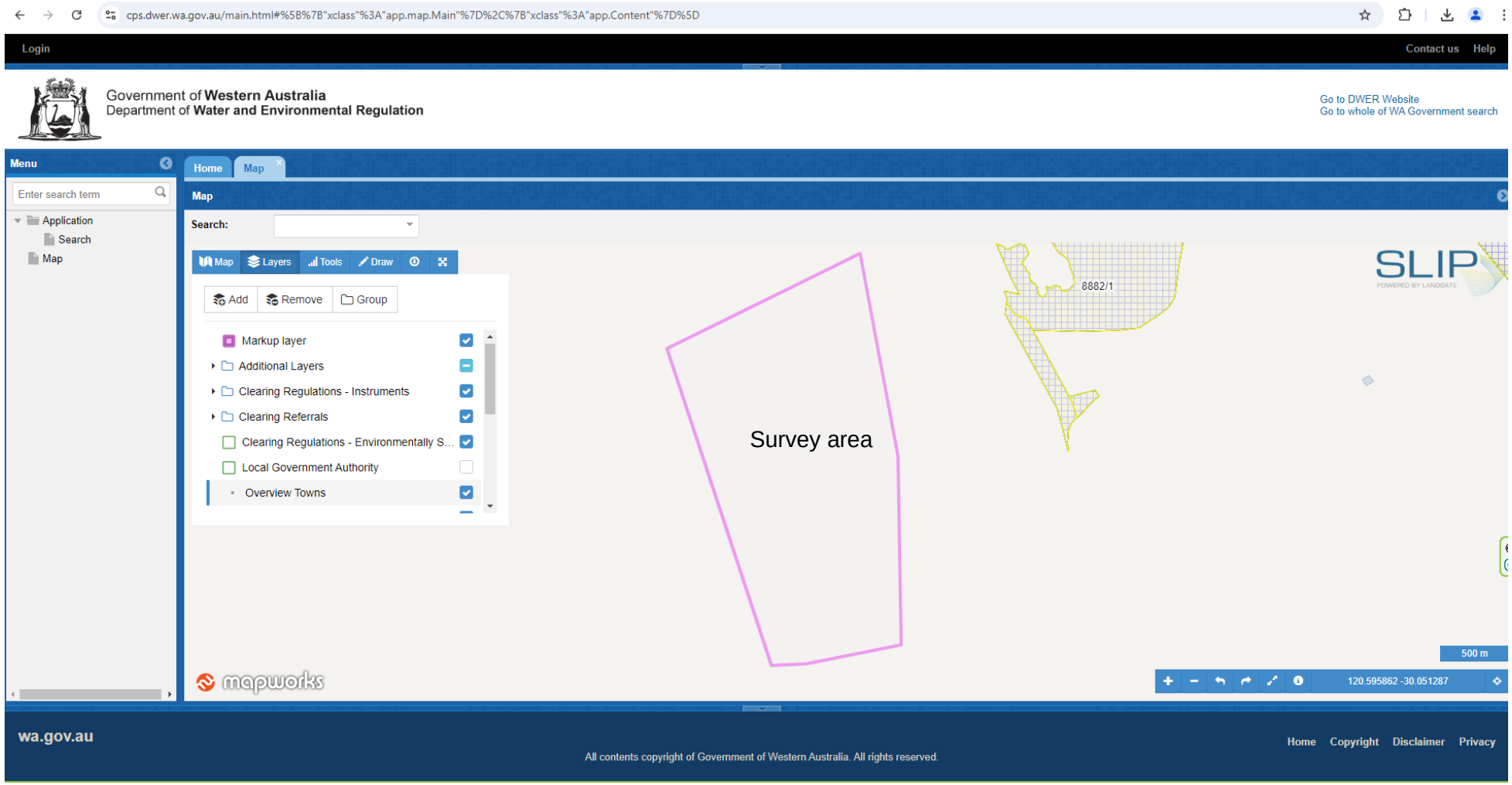
This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

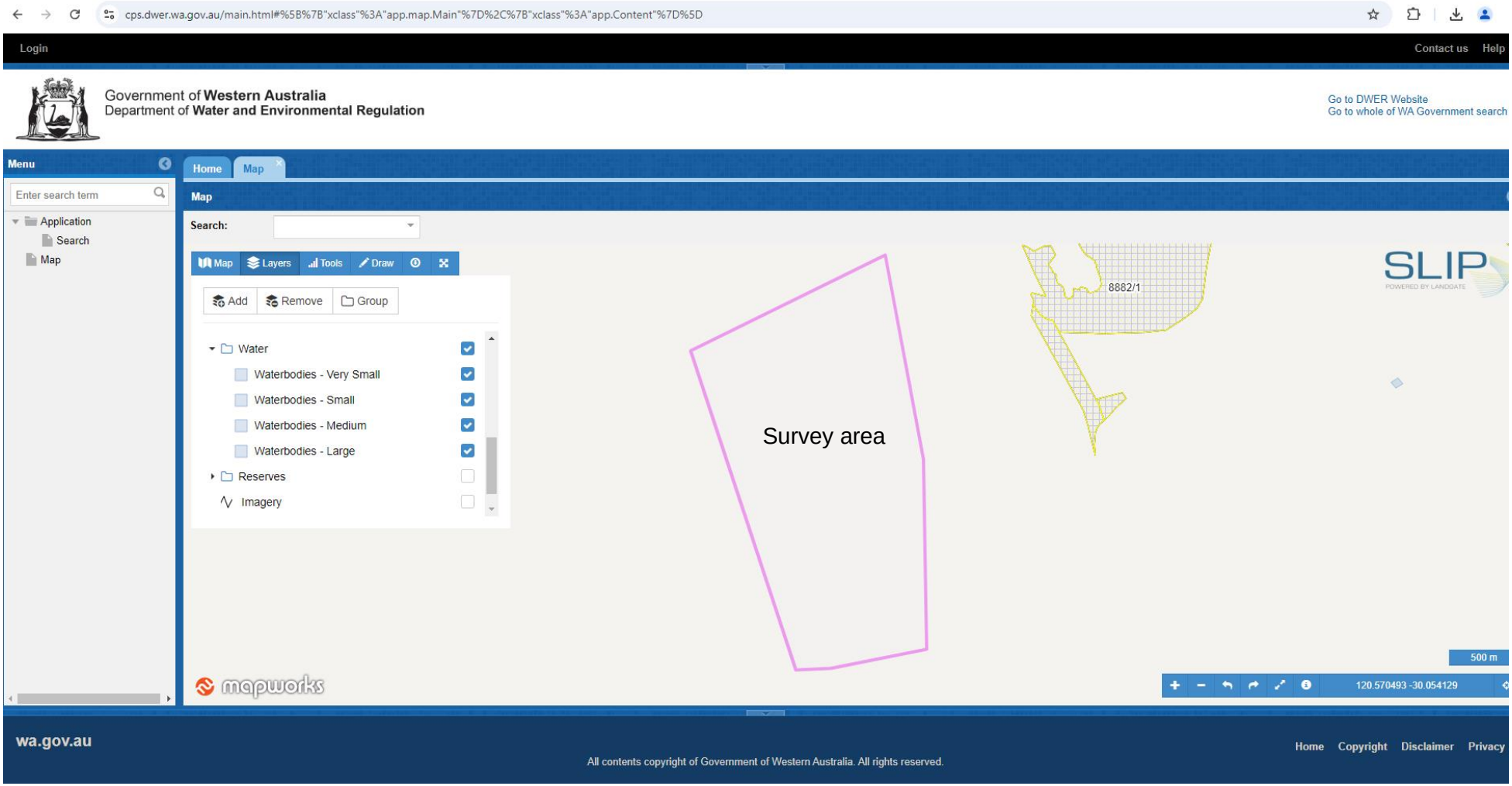
The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

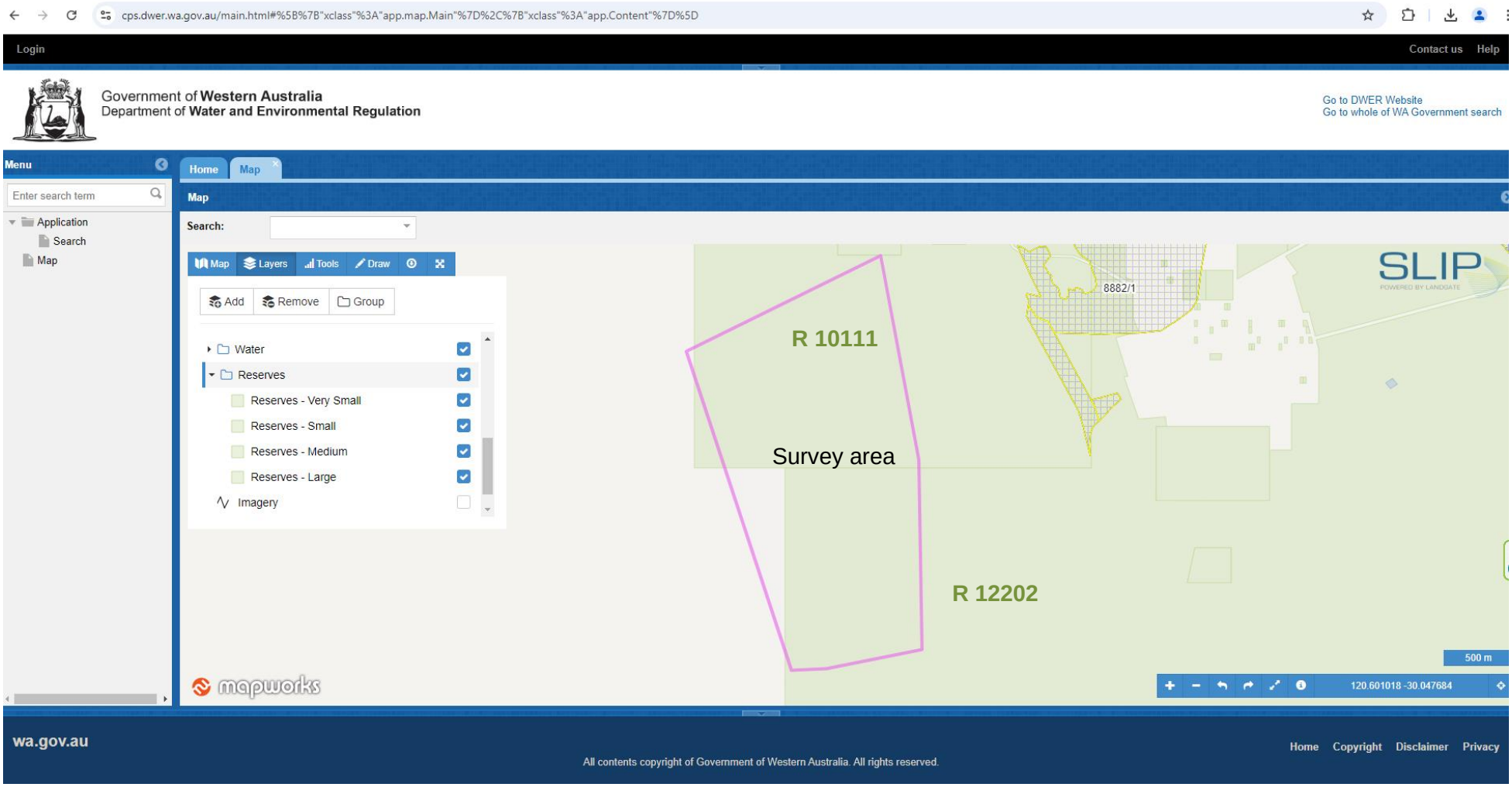
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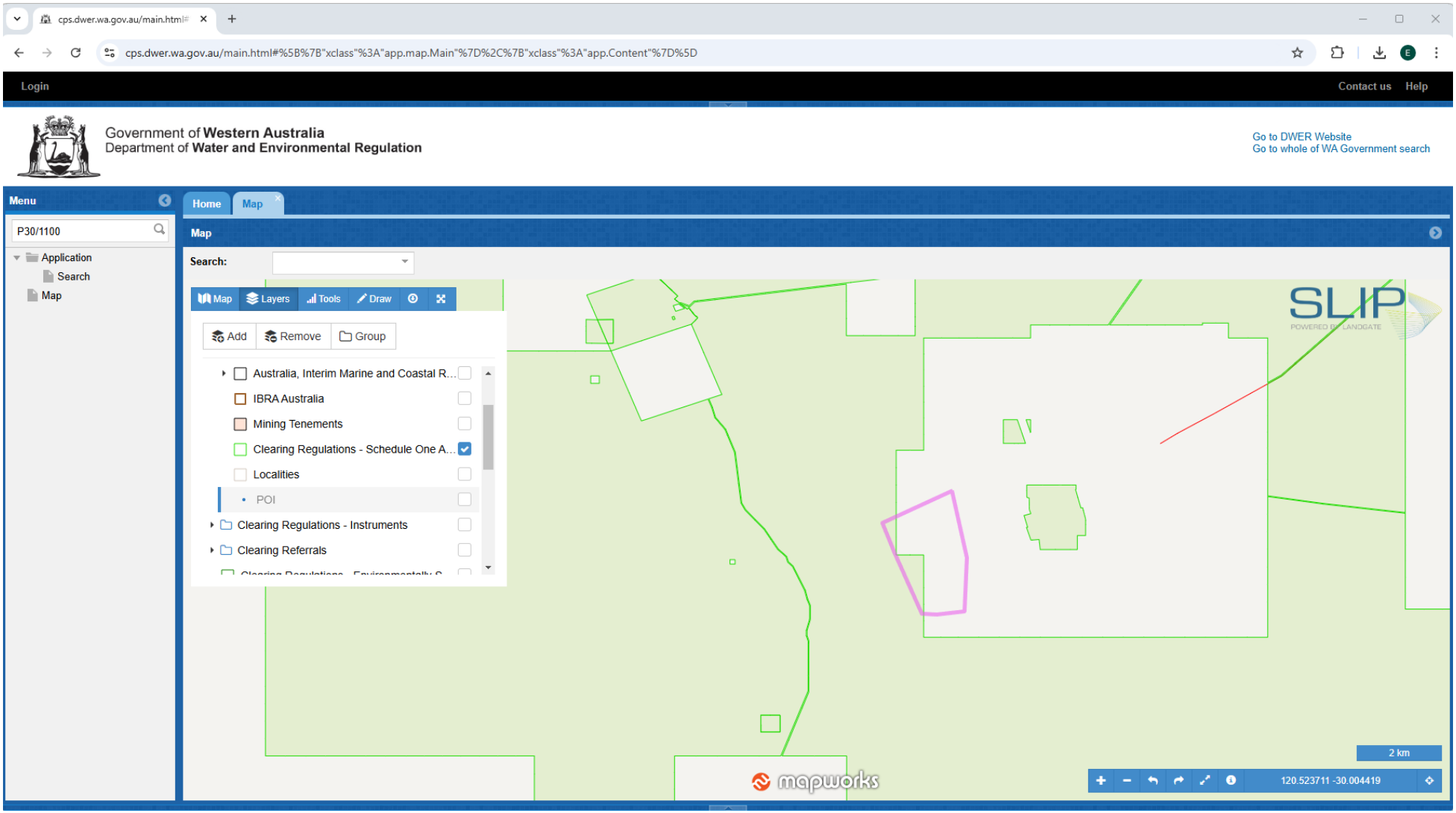
DWER's Clearing Permit System Map Viewer showing no ESA's (dark green shaded areas) within the survey area (DWER, 2024)



DWER Clearing Permit System Map Viewer showing no waterbodies within the survey area (DWER, 2024)



DWER Clearing Permit System Map Viewer showing Class C reserves (Green polygons) within the survey area (DWER, 2024)



DWER Clearing Permit System Map Viewer showing Schedule One Areas (Green polygons) within the survey area (DWER, 2024)

Appendix 2: Threatened Flora Databases Search Results

GIS information provided in the Search results (Reference:50-0824FL) listed the following species within a 20km radius of the survey area (DBCA, 2024a):

TAXON	CONS_CODE	**Comment (Post field work)**
Calytrix hislopii	3	Unlikely- Suitable habitat extensively searched
Eucalyptus crucis subsp. *crucis*	T	Unlikely- Suitable habitat extensively searched
Eucalyptus educta	2	Unlikely- Suitable habitat extensively searched
Grevillea georgeana	3	Unlikely- Suitable habitat extensively searched
Notisia intonsa	3	Unlikely- Suitable habitat extensively searched
Ptilotus procumbens	1	Unlikely- Suitable habitat extensively searched

Appendix 3: Vegetation Definitions

Vegetation Condition Definitions (Keighery, 1994)

Pristine (1). Pristine or nearly so, no obvious signs of disturbance.

Excellent (2). Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.

Very Good (3). Vegetation structure altered, obvious signs of disturbance.
For example, disturbance to vegetation structure caused by repeating fires, the presence of some more aggressive weeds, dieback, logging and grazing.

Good (4). Vegetation structure significantly altered by very obvious signs of multiple disturbance.
Retains basic vegetation structure or ability to regenerate it.
For example, disturbance to vegetation structure caused by frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.

Degraded (5). Basic vegetation structure severely impacted by disturbance.
Scope for regeneration but not to a state approaching good condition without intensive management.
For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.

Completely Degraded (6). 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 compromising weed or crop species with isolated trees or shrubs.

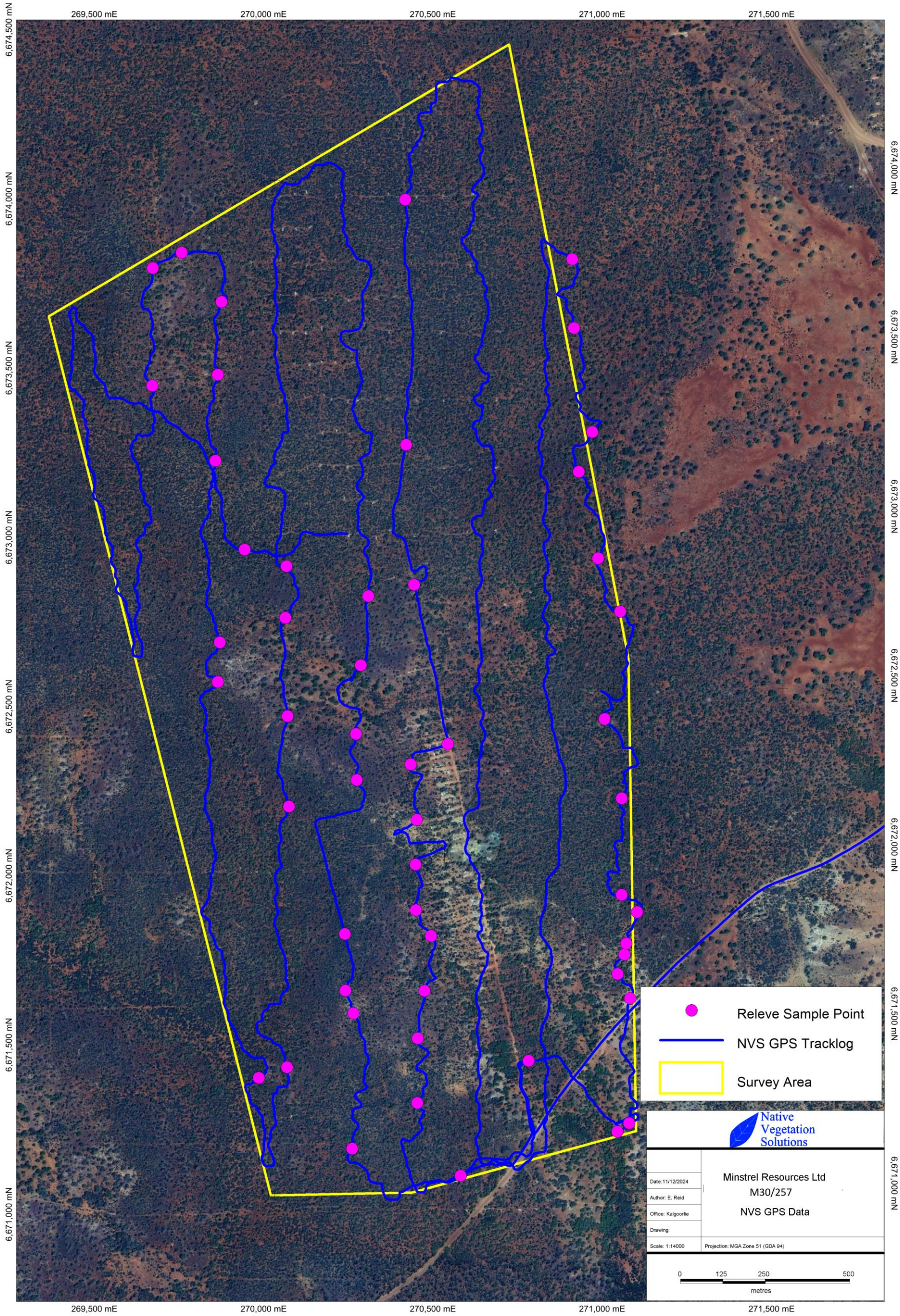
Vegetation Structure Definitions (Muir, 1977)

Life Form/Height Class	Canopy Cover			
	Dense 70-100% d	Mid-Dense 30-70% c	Sparse 10-30% i	Very Sparse 2-10% r
T Trees>30m	Dense Tall Forest	Tall Forest	Tall Woodland	Open Tall Woodland
M Trees 15-30m	Dense Forest	Forest	Woodland	Open Woodlnd
LA Trees 5-15m	Dense Low Forest A	Low Forest A	Low Woodland A	Open Low Woodland A
LB Trees<5m	Dense Low Forest B	Low Forest B	Low Woodland B	Open Low Woodland B
KT Mallee tree form	Dense Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee
KS Mallee shrub form	Dense Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee
S Shrubs>2m	Dense Thicket	Thicket	Scrub	Open Scrub
SA Shrubs 1.5-2.0m	Dense Heath A	Heath A	Low Scrub A	Open Low Scrub A
SB Shrubs 1.0-1.5m	Dense Heath B	Heath B	Low Scrub B	Open Low Scrub B
SC Shrubs 0.5-1.0m	Dense Low Heath C	Low Heath C	Dwarf Scrub C	Open Dwarf Scrub C
SD Shrubs 0.0-0.5m	Dense Low Heath D	Low Heath D	Dwarf Scrub D	Open Dwarf Scrub D
P Mat plants	Dense Mat Plants	Mat Plants	Open Mat Plants	Very Open Mat Plants
H Hummock Grass	Dense Hummock Grass	Mid-Dense Hummock Grass	Hummock Grass	Open Hummock Grass
GT Bunch grass >0.5m	Dense Tall Grass	Tall Grass	Open Tall Grass	Very Open Tall Grass
GL Bunch grass <0.5m	Dense Low Grass	Low Grass	Open Low Grass	Very Open Low Grass
J Herbaceous spp.	Dense Herbs	Herbs	Open Herbs	Very Open Herbs
VT Sedges >0.5m	Dense Tall Sedges	Tall Sedges	Open Tall Sedges	Very Open Tall Sedges
VL Sedges <0.5m	Dense Low Sedges	Low Sedges	Open Low Sedges	Very Open Low Sedges
X Ferns	Dense Ferns	Ferns	Open Ferns	Very Open Ferns
Mosses, liverwort	Dense Mosses	Mosses	Open Mosses	Very Open Mosses

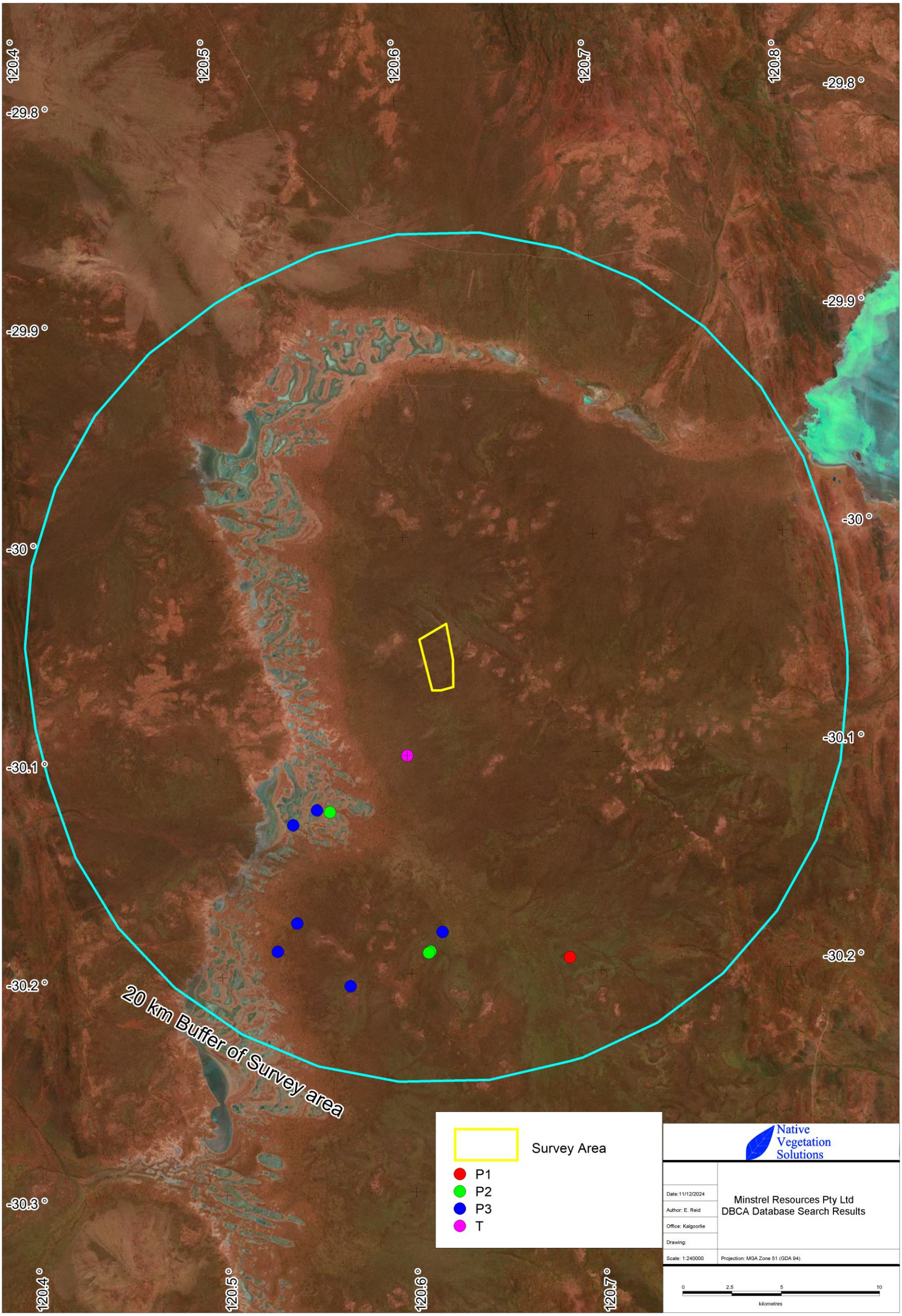
Appendix 4: Vegetation Mapping



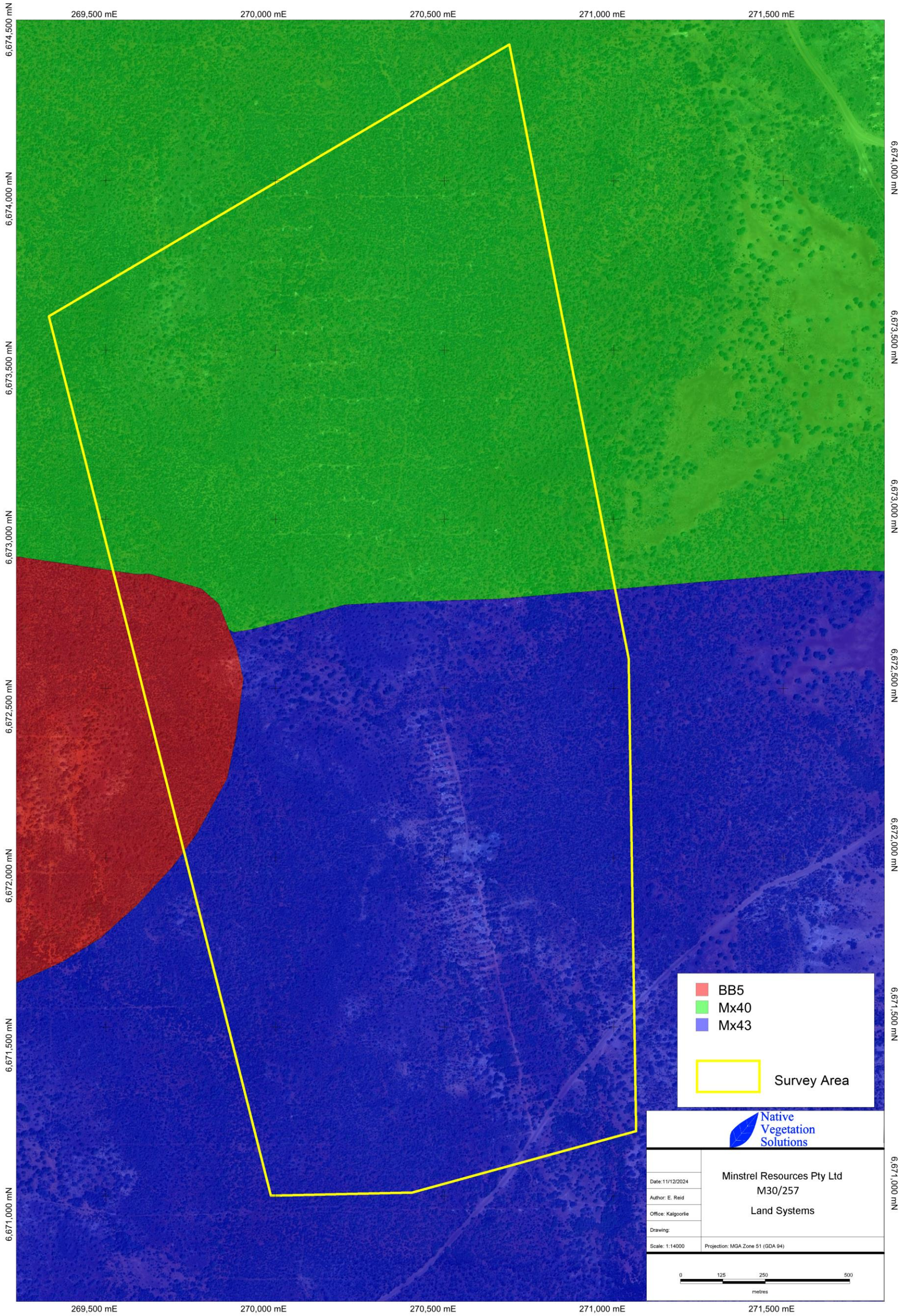
Map 1: Survey Area



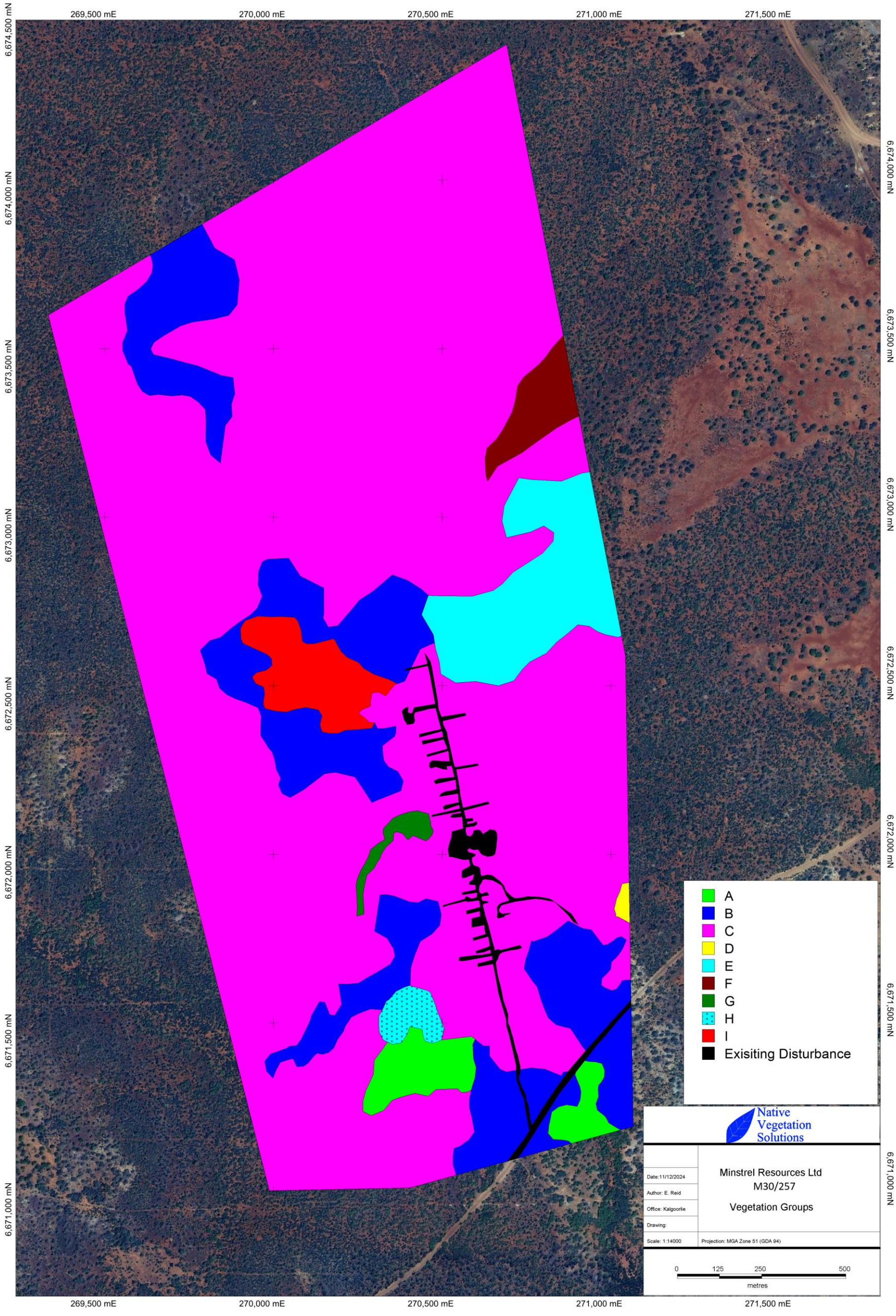
Map 2: NVS GP Data



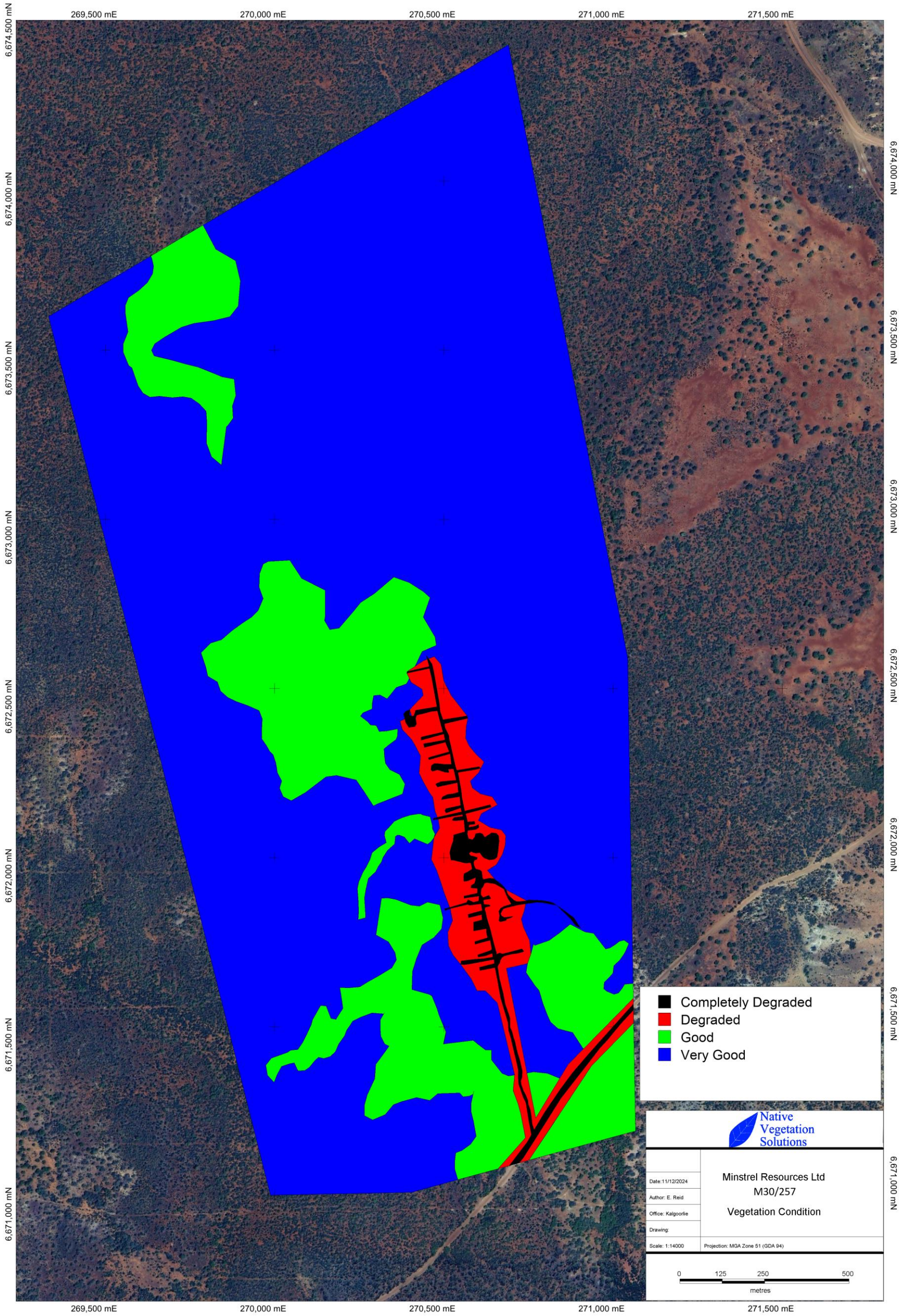
Map 3: DBCA Databases Search Results



Map 4: Land Systems



Map 5: Vegetation Groups



Map 6: Vegetation Condition

Appendix 5: Species List

Species List per Vegetation Group

Family	Genus	Taxon	A, P, NN	A	B	C	D	E	F	G	H	I
Fabaceae	*Acacia*	*Acacia acuminata*	P	*								
Fabaceae	*Acacia*	*Acacia aneura*	P							*		
Fabaceae	*Acacia*	*Acacia ayersiana*	P			*						
Fabaceae	*Acacia*	*Acacia burkittii*	P			*	*	*	*		*	
Fabaceae	*Acacia*	*Acacia craspedocarpa*	P			*				*		
Fabaceae	*Acacia*	*Acacia erinacea*	P		*	*					*	
Fabaceae	*Acacia*	*Acacia incurvaneura*	P							*		
Fabaceae	*Acacia*	*Acacia mulganeura*	P			*				*		
Fabaceae	*Acacia*	*Acacia ramulosa* var. *ramulosa*	P			*		*		*		
Fabaceae	*Acacia*	*Acacia sibirica*	P						*			
Fabaceae	*Acacia*	*Acacia tetragonophylla*	P	*	*	*		*				*
Casuarinaceae	*Allocasuarina*	*Allocasuarina eriochlamys* subsp. *eriochlamys*	P			*				*	*	
Apocynaceae	*Alyxia*	*Alyxia buxifolia*	P	*		*					*	
Pittosporaceae	*Apatelantha*	*Apatelantha viscida*	P			*						
Poaceae	*Aristida*	*Aristida contorta*	A			*			*			
Chenopodiaceae	*Atriplex*	*Atriplex bunburyana*	P	*	*							
Chenopodiaceae	*Atriplex*	*Atriplex nummularia* subsp. *spathulata*	P	*	*	*		*	*			*
Chenopodiaceae	*Atriplex*	*Atriplex stipitata*	P		*				*			*
Chenopodiaceae	*Atriplex*	*Atriplex vesicaria*	P	*					*			*
Poaceae	*Austrostipa*	*Austrostipa elegantissima*	P		*	*	*			*		*
Poaceae	*Austrostipa*	*Austrostipa nitida*	P						*			
Fabaceae	*Bossiaea*	*Bossiaea walkeri*	P			*						
Malvaceae	*Brachychiton*	*Brachychiton gregorii*	P			*						
Pittosporaceae	*Bursaria*	*Bursaria occidentalis*	P			*						
Myrtaceae	*Calytrix*	*Calytrix birdii*	P							*		
Casuarinaceae	*Casuarina*	*Casuarina pauper*	P	*	*	*					*	*
Pteridaceae	*Cheilanthes*	*Cheilanthes adiantoides*	P							*		
Pteridaceae	*Cheilanthes*	*Cheilanthes sieberi* subsp. *sieberi*	P							*		
Sapindaceae	*Dodonaea*	*Dodonaea lobulata*	P		*	*	*				*	
Sapindaceae	*Dodonaea*	*Dodonaea rigida*	P			*				*		
Chenopodiaceae	*Enchylaena*	*Enchylaena tomentosa* var. *tomentosa*	P	*	*				*			*
Scrophulariaceae	*Eremophila*	*Eremophila alternifolia*	P		*							
Scrophulariaceae	*Eremophila*	*Eremophila decipiens* subsp. *decipiens*	P		*	*						
Scrophulariaceae	*Eremophila*	*Eremophila dempsteri*	P						*			
Scrophulariaceae	*Eremophila*	*Eremophila forrestii* subsp. *forrestii*	P			*						
Scrophulariaceae	*Eremophila*	*Eremophila georgei*	P			*				*		
Scrophulariaceae	*Eremophila*	*Eremophila latrobei* subsp. *latrobei*	P			*						
Scrophulariaceae	*Eremophila*	*Eremophila metallicorum*	P			*			*			
Scrophulariaceae	*Eremophila*	*Eremophila oldfieldii* subsp. *angustifolia*	P			*	*	*			*	*
Scrophulariaceae	*Eremophila*	*Eremophila oppositifolia* subsp. *angustifolia*	P		*		*		*		*	
Scrophulariaceae	*Eremophila*	*Eremophila pustulata*	P		*						*	
Scrophulariaceae	*Eremophila*	*Eremophila scoparia*	P	*	*				*			
Scrophulariaceae	*Eremophila*	*Eremophila* sp. Mt Jackson	P		*	*					*	*
Chenopodiaceae	*Eriochiton*	*Eriochiton sclerolaenoides*	P		*							*
Myrtaceae	*Eucalyptus*	*Eucalyptus clelandiorum*	P		*						*	
Myrtaceae	*Eucalyptus*	*Eucalyptus dundasii*	P									*
Myrtaceae	*Eucalyptus*	*Eucalyptus ebbanoensis* subsp. *ebbanoensis*	P			*		*				
Myrtaceae	*Eucalyptus*	*Eucalyptus griffithsii*	P	*	*	*	*				*	
Myrtaceae	*Eucalyptus*	*Eucalyptus lesouefii*	P		*			*			*	
Myrtaceae	*Eucalyptus*	*Eucalyptus loxophleba* subsp. *lissophloia*	P		*	*						
Myrtaceae	*Eucalyptus*	*Eucalyptus oleosa* subsp. *oleosa*	P			*	*	*			*	
Myrtaceae	*Eucalyptus*	*Eucalyptus salubris*	P						*			
Myrtaceae	*Eucalyptus*	*Eucalyptus transcontinentalis*	P		*							
Santalaceae	*Exocarpos*	*Exocarpos aphyllus*	P	*	*	*	*	*	*			*
Asteraceae	*Gnephosis*	*Gnephosis angianthoides*	A							*		
Proteaceae	*Grevillea*	*Grevillea acuaria*	P								*	
Proteaceae	*Grevillea*	*Grevillea nematophylla* subsp. *nematophylla*	P			*						
Proteaceae	*Grevillea*	*Grevillea oligomera*	P			*						
Proteaceae	*Hakea*	*Hakea recurva* subsp. *recurva*	P			*				*		
Apocynaceae	*Leichhardtia*	*Leichhardtia australis*	P	*		*	*					
Chenopodiaceae	*Maireana*	*Maireana georgei*	P	*								
Chenopodiaceae	*Maireana*	*Maireana pentatropis*	P		*							
Chenopodiaceae	*Maireana*	*Maireana tomentosa*	P	*	*				*			
Chenopodiaceae	*Maireana*	*Maireana trichoptera*	P		*							
Chenopodiaceae	*Maireana*	*Maireana triptera*	P	*	*	*		*	*		*	*
Myrtaceae	*Melaleuca*	*Melaleuca interioris*	P			*						
Myrtaceae	*Melaleuca*	*Melaleuca leiocarpa*	P							*		
Poaceae	*Monachather*	*Monachather paradoxus*	P	*								*

Family	Genus	Taxon	A, P, NN	A	B	C	D	E	F	G	H	I
Asteraceae	*Olearia*	*Olearia humilis*	P			*				*		
Asteraceae	*Olearia*	*Olearia muelleri*	P		*	*		*	*		*	
Rutaceae	*Philotheca*	*Philotheca brucei* subsp. *brucei*	P			*				*		
Thymelaeaceae	*Pimelea*	*Pimelea microcephala* subsp. *microcephala*	P	*								*
Pittosporaceae	*Pittosporum*	*Pittosporum angustifolium*	P		*							
Lamiaceae	*Prostanthera*	*Prostanthera althoferi* subsp. *althoferi*	P			*						
Lamiaceae	*Prostanthera*	*Prostanthera grylloana*	P			*				*		
Amaranthaceae	*Ptilotus*	*Ptilotus aervoides*	A						*			
Amaranthaceae	*Ptilotus*	*Ptilotus exaltatus*	A						*			
Amaranthaceae	*Ptilotus*	*Ptilotus obovatus*	P	*	*	*	*	*	*		*	*
Chenopodiaceae	*Rhagodia*	*Rhagodia drummondii*	P	*		*			*			*
Zygophyllaceae	*Roepera*	*Roepera apiculata*	A		*							
Zygophyllaceae	*Roepera*	*Roepera eremaea*	A		*							
Santalaceae	*Santalum*	*Santalum spicatum*	P	*	*	*		*	*			*
Goodeniaceae	*Scaevola*	*Scaevola spinescens*	P		*	*	*	*	*		*	*
Chenopodiaceae	*Sclerolaena*	*Sclerolaena cuneata*	P					*	*			
Chenopodiaceae	*Sclerolaena*	*Sclerolaena densiflora*	P									*
Chenopodiaceae	*Sclerolaena*	*Sclerolaena diacantha*	P		*				*			*
Chenopodiaceae	*Sclerolaena*	*Sclerolaena patenticuspis*	P						*			
Fabaceae	*Senna*	*Senna artemisioides* subsp. *artemisioides*	P	*								
Fabaceae	*Senna*	*Senna artemisioides* subsp. *filifolia*	P	*	*	*	*	*			*	*
Solanaceae	*Solanum*	*Solanum hoplopetalum*	P					*				
Solanaceae	*Solanum*	*Solanum lasiophyllum*	P			*						
Rhamnaceae	*Stenanthemum*	*Stenanthemum stipulosum*	P		*	*						