FLORA, VEGETATION, AND TARGETED FLORA SURVEYS

LANDOR-MT AUGUSTUS ROAD REALIGNMENT

SHIRE OF UPPER GASCOYNE

JUNE 2021

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B	Jeni Alford Senior Botanist Natalie Krawczyk Botanist/Ecologist	Kellie Bauer-Simpson Principal Ecologist	Kellie Bauer-Simpson Principal Ecologist	25/06/2021
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The Shire of Upper Gascoyne (the Shire) are proposing to clear native vegetation under the *Environmental Protection Act 1986* (EP Act) for the purpose of a road realignment. The proposal is to clear 8.12 hectares (ha) of native vegetation within a clearing footprint of 11.07 ha within Lots 12, 19 and 30 on Deposited Plan 220366 and an unnamed road reserve (PIN 11700334), Gascoyne River.

The Shire previously applied to the Department of Water and Environmental Regulation (DWER) for a Purpose Permit to clear vegetation under Section 51E (1) of the EP Act. DWER undertook a preliminary assessment of the application and identified that since some Priority flora are known to occur in the vicinity, a field flora survey was required.

A reconnaissance flora and vegetation assessment and targeted conservation significant flora survey of the study area were undertaken by experienced personnel between 27 to 29 April 2021.

A targeted survey for potentially occurring Priority flora was undertaken within suitable habitat within the study area and no Threatened or Priority flora listed under the BC Act or under the EPBC Act were recorded.

The seasonal timing of the field survey was sub-optimal, however, further surveys during spring are considered unlikely to be necessary and the survey effort is considered adequate for a narrow linear corridor of proposed clearing, within an area that is degraded from pastoral activities and dry conditions.

The two weed species recorded within the study area, **Cenchrus ciliaris* (buffel grass) and **Malvastrum americanum* (spike malvastrum) neither of which is listed as a WoNs or Declared Pest plant under the BAM Act within the Upper Gascoyne.

Three vegetation units, AcMgCc, AspAspA?b/Ac, and AspAspEh were defined within the study area from six relevés. It is considered that the suite of vegetation units has been adequately sampled to accurately represent the vegetation present.

The vegetation recorded in study is considered unlikely to be representative of the Priority Ecological Communities (PECs) relevant to vegetation that resulted from the desktop assessment (Bubbagundy and Peedawarra Land Systems), based on the vegetation described, the flora species present, and the vegetation characteristics described.

All of the regional vegetation associations present in the study area are documented (Beard 1990) as represented by over the minimum 30% threshold in comparison to pre-European extents and therefore meet the EPA objective of retention for the purposes of biodiversity conservation.

Vegetation condition within the study area ranges from 'Good' to 'Completely Degraded', with most in 'Degraded to Poor' condition and more than in 'Poor' or worse condition. The degraded condition of the vegetation is due mostly to clearing and grazing which has resulted in loss of vegetation structure, poor diversity and a high proportion of weeds.

1 INTRODUCTION

1.1 BACKGROUND

The Shire of Upper Gascoyne (the Shire) are proposing to clear native vegetation under the *Environmental Protection Act 1986* (EP Act) for the purpose of a road realignment. The proposal is to clear 8.12 hectares (ha) of native vegetation within a clearing footprint of 11.07 ha within Lots 12, 19 and 30 on Deposited Plan 220366 and an unnamed road reserve (PIN 11700334), Gascoyne River. The Shire previously applied to the Department of Water and Environmental Regulation (DWER) for a Purpose Permit to clear vegetation under Section 51E (1) of the EP Act. DWER undertook a preliminary assessment of the application and identified some areas in which the information supplied was insufficient for the requirements of the assessment, which included the need to conduct a field flora survey, since some Priority flora are known to occur in the region. Species of particular interest to DWER (due to being represented by populations in the vicinity) were:

- *Acacia wiilcoxii* (Priority (P) 1)
- *Isotropis forrestii* (P1)
- *Acacia atopa* (P3)
- *Eremophila obliquisepala* (P3).

An assessment of the flora species, their local population sizes and distribution, particularly any species of conservation significance was required to evaluate the potential impacts of the project.

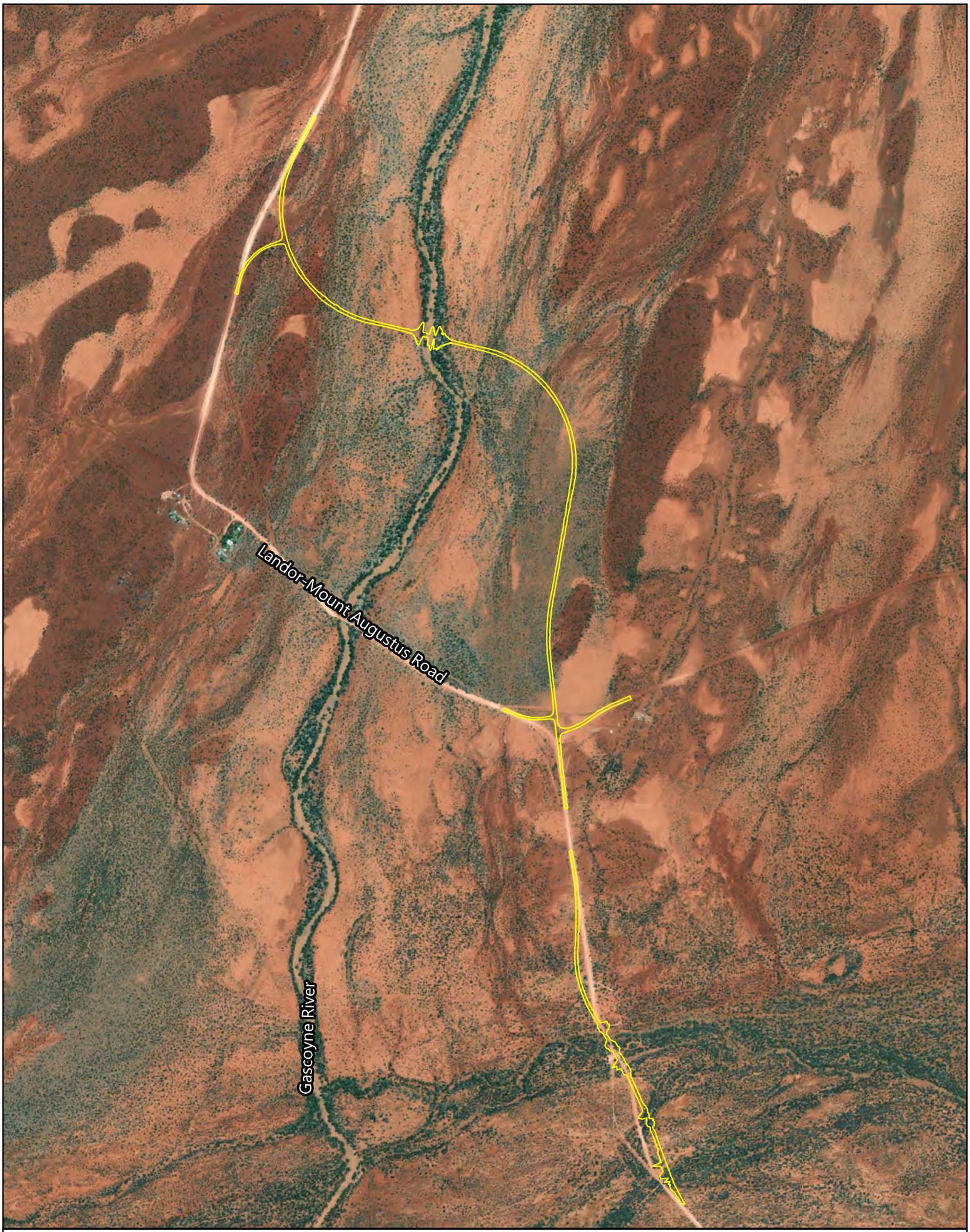
1.2 LOCATION

The proposed realignment, hereafter referred to as the 'study area' is within Lots 12, 19 and 30 on Deposited Plan 220366 and an unnamed road reserve (PIN 11700334) crossing the Gascoyne River (**Figure 1**), approximately 224 kilometres (km) northwest of Meekatharra.

1.3 SCOPE OF WORK

The scope of work was as follows:

- Undertake a desktop assessment for relevant Threatened and Priority flora and Threatened and Priority Ecological Communities (TECs and PECs).
- Undertake a reconnaissance field survey within the study area, targeting relevant Threatened and Priority flora, and to define and map the vegetation units present to determine the presence or potential presence of TECs or PECs.
- Prepare and provide a report on the finding of the desktop and field assessments.



0 0.25 0.5 0.75 1 km

GDA 94 / MGA Zone 50

Figure 1 - Study Area

Legend

Study Area

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2 EXISTING ENVIRONMENT

2.1 CLIMATE

The study area occurs in the Gascoyne bioregion, which has a climate characterised as desert with bimodal rainfall with predominantly summer rainfall in the east (Desmond *et al.* 2001). The closest operating Bureau of Meteorology (BoM) recording station is located at Meekatharra Airport (station number 007045). Rainfall and temperature data have been recorded since 1944. Annual mean maximum temperature in the area ranges from 19.2 °C in winter to 36.6°C in summer (BoM 2021; **Figure 2**). The average rainfall 12 months preceding the field survey was 105.6 mm, more than half the average mean rainfall of 234.9 mm for the area. Rainfall was more than a quarter average for the start of 2021, with exception to March, receiving the same amount to the long-term average (**Figure 2**).

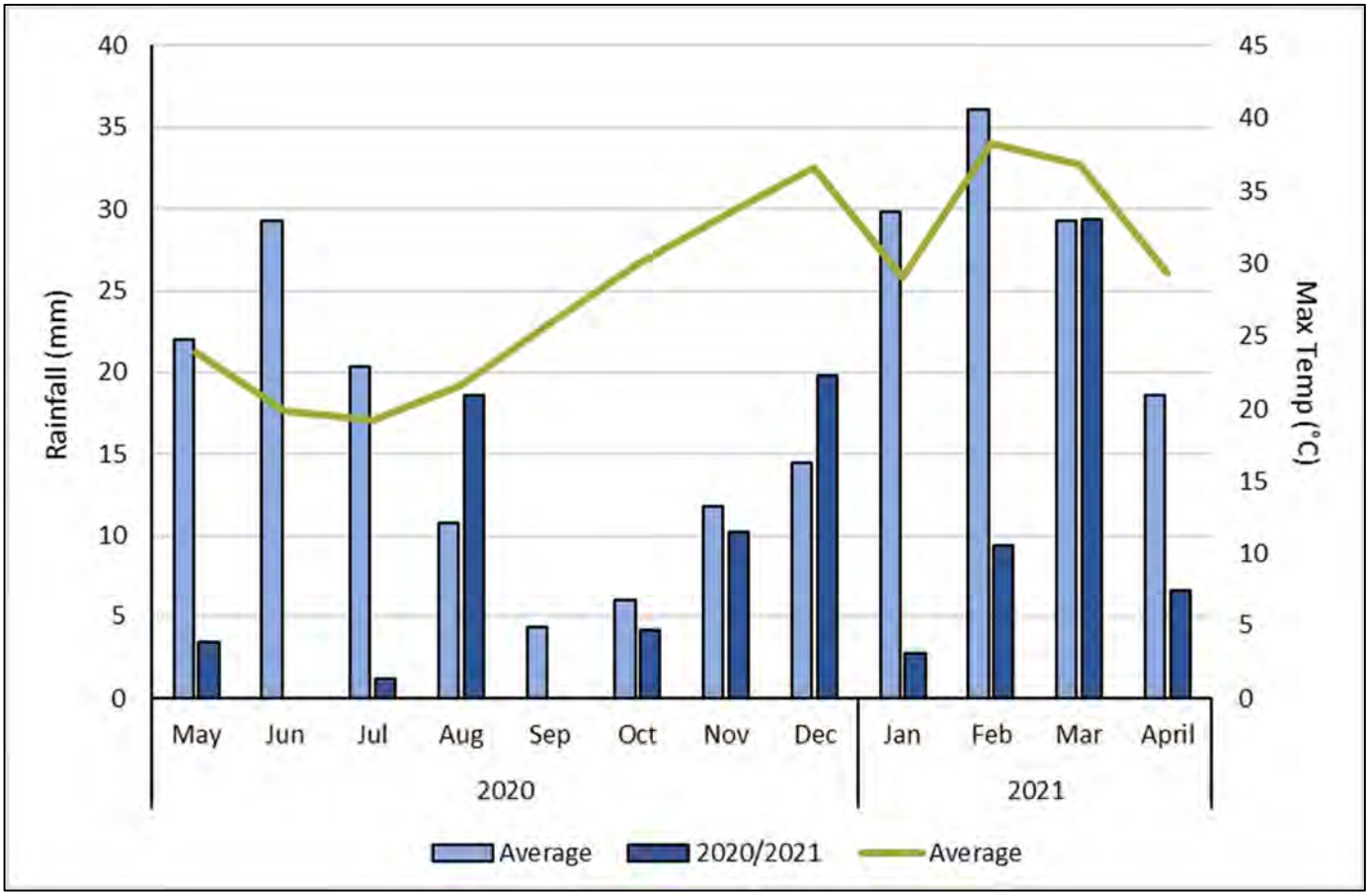

Figure 2 - Climate Data

2.2 IBRA REGION

The Interim Biogeographic Regionalisation for Australia (IBRA) defines 89 regions based on climate, geology, landforms and characteristic vegetation and fauna (Department of Agriculture, Water and the Environment (DAWE) 2021a). The study area lies within the Gascoyne bioregion and at a finer scale, within Augustus subregion (Desmond *et al.* 2001). Desmond *et al.* (2001) described the Augustus subregion as and granite and rugged low Proterozoic sedimentary ranges with broad flat valleys. The Gascoyne River system occurs in the subregion, which is the main drainage channel and is also the headwaters of the Ashburton and Fortescue Rivers (Desmond *et al.* 2001). The main land uses are native pasture grazing and reserves, with vegetation described as Mulga woodland with *Triodia*. The southern end of the study area occurs within the main Gascoyne River channel.

2.3 LAND SYSTEMS

Two land systems occur within the study area, with the majority mapped within the Gascoyne Land System (**Figure 3**). This system is described as major river systems and associated narrow, alluvial plains with vegetation comprised of mulga, acacias, sennas and buffel grass and river redgum fringing woodland. The remainder of the study area (1.2 km) is mapped within the Flood Land System, which is described as vegetation of mulga shrubland and wanderrie grass on long, interconnected banks with hardpan wash plains (Curry *et al.* 1994, Tille 2006).

2.4 GEOLOGY AND SOILS

The Gascoyne bioregion is underlain by the Ashburton Basin, Capricorn Orogen, Marymia and Sylvania Inliers, and the north-western and south-eastern parts of Bangemall Basin (Desmond *et al.* 2001). These basins and inliers are comprised of shales, sandstones, carbonates and conglomerates. The study area is situated on the Gascoyne Complex and Edmund and Collier Basins, with gneiss and volcanic rocks, and Colluvial 38485 and 38491 as described below and presented in **Figure 4** (Tille 2006):

- Colluvial 38485 - Channel and flood plain alluvium; gravel, sand, silt, clay, locally calcreted
- Colluvial 38491 - Colluvium, sheetwash, talus; gravel piedmonts and aprons over and around bedrock; clay-silt-sand with sheet and nodular kankar; alluvial and aeolian sand-silt-gravel in depressions and broad valleys in Canning Basin; local calcrete, reworked laterite.

2.5 VEGETATION

The objective of the Environmental Protection Authority (EPA) in relation to flora and vegetation is: *To protect flora and vegetation so that biological diversity and ecological integrity are maintained* (EPA 2016). The EPA considers it is important that in unconstrained areas, vegetation associations are maintained above a threshold level of 30% of their original pre-clearing extent, since species loss appears to accelerate exponentially at the ecosystem level once the extent of vegetation associations drops below 30%.

The Office of the EPA continues to enforce the EPA objective of vegetation retention for biodiversity conservation, as reflected in the now superseded EPA (2000) Position Statement No. 2, in strategic advice and similar documents, such as the interim strategic advice for WAPC's Perth and Peel @ 3.5 million report (WAPC 2015, 2018) (OEPA 2015). The following key criteria, as stated in EPA (2000) are applied to vegetation clearing from a biodiversity perspective, which justifies the retention targets:

- the 'threshold level' below which species loss appears to accelerate exponentially within an ecosystem level, is regarded as being at a level of 30% (of the pre-European, i.e. pre-1750 extent of the vegetation type)
- a level of 10% of the original extent of a vegetation community is regarded as being a level representing Endangered
- clearing which would increase the threat level to a vegetation community should be avoided.

Pre-European vegetation in Western Australia has been broadly characterised by Beard (1990). The vegetation is described in three categories (from broad to finer scale) as systems, associations (can occur in multiple systems), or system–association (combined system and vegetation association). The two Beard vegetation associations supported by the study area and their remaining extent across a range of contexts are presented in **Table 1** and spatially in **Figure 5** (Government of Western Australia 2019).

Table 1 - Pre-European Vegetation

Veg. Association No.	Veg. System Association	Broad Vegetation Description	Extent Context	Pre–European Extent (ha)	Current Extent (ha)	% Pre-European Extent Remaining	% Current Extent Protected (IUCN I –IV)
29	Gascoyne Ranges	Sparse low woodland; mulga, discontinuous in scattered groups	Western Australia	222,115.30	222,115.30	100.00	6.80
			Gascoyne	3,802,459.63	3,799,635.88	99.93	0.03
			Shire of Upper Gascoyne	5,479.75	5,479.75	100	0
166		Low woodland; mulga and *Acacia victoriae*	Western Australia	1,404,234.57	1,401,616.41	99.81	1.75
			Gascoyne	309,650.30	309,645.58	100.00	0
			Shire of Upper Gascoyne	82,626.72	82,622.01	99.99	0

One vegetation community dominated by *Eremophila* spp. on Landor Station indicated to be of high species or ecosystem diversity, is located north of the racetrack (Desmond *et al.* 2001), however this community is considered unlikely to be present in the study area.

Figure 3 - Land Systems

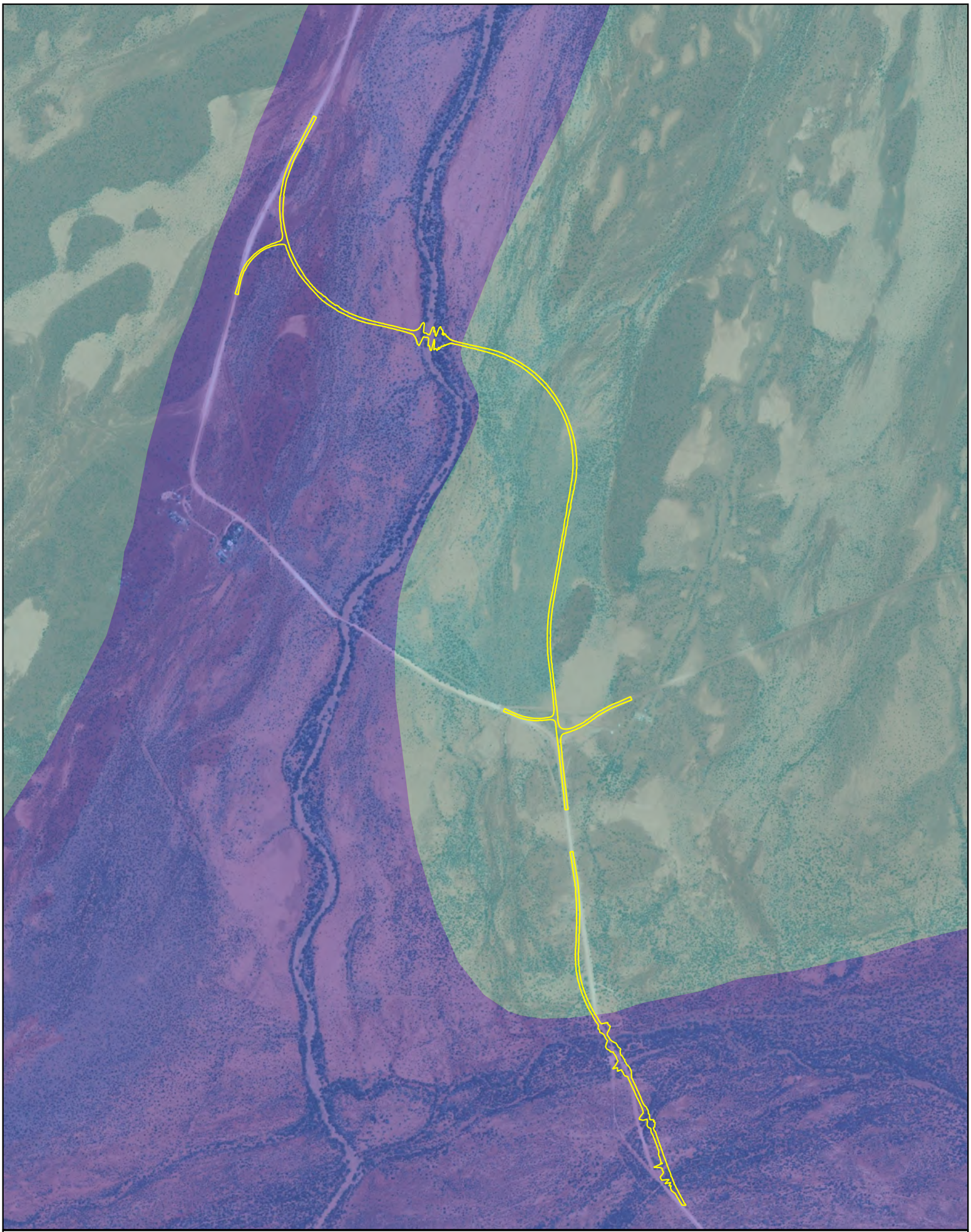

Figure 4 - Geology and Soils

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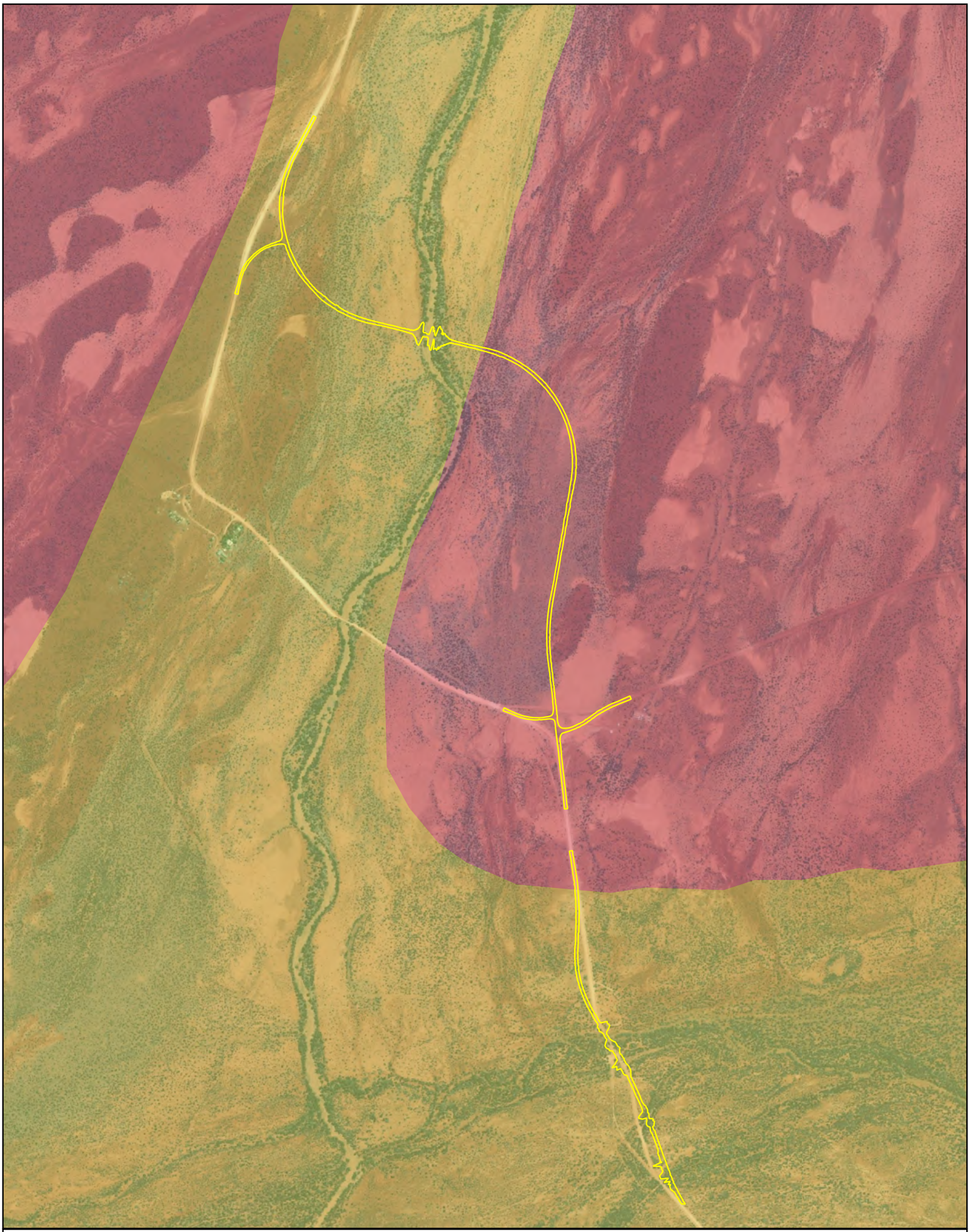

Figure 5 - Pre-European Vegetation

3 METHODOLOGY

3.1 DESKTOP REVIEW

A desktop assessment was undertaken prior to the field assessment to identify conservation significant flora and vegetation previously recorded within or in the vicinity of the study area. The desktop assessment consisted of database searches using NatureMap (DBCA 2021a) (**Appendix A**), DBCA Threatened and Priority flora (DBCA 2021b) and ecological communities (DBCA 2021c, d) databases and the Commonwealth Protected Matters Search Tool (PMST) for Matters of National Environmental Significance (MNES) (DAWE 2021b) (**Appendix B**).

The NatureMap, PMST and TEC and PEC searches were based on a central point within the study area; 25° 08' 12" S, 116° 55' 10" E with a 20 km buffer (radius). The Threatened and Priority flora search of the DBCA database initially returned results for a 120 km radius, which was clipped to encompass an 80 km radius, considered sufficient to capture a suitable suite of conservation significant flora that have the potential to occur within the study area.

Information gathered from the desktop assessment was used to generate potential species lists tailored to the study area.

Threatened and Priority flora identified from the desktop assessment were evaluated for their potential likelihood of occurring within the study area. Prior to the field assessment, the condition the of study area and possible habitats available were assessed via regional vegetation data and aerial imagery. Potential habitats occurring within the study area included: rivers/riparian areas and *Acacia* scrub (mulga).

The likelihood of occurrence of flora and vegetation of conservation significance was based on four criteria: the presence of suitable habitat within the study area, age of previous records, proximity of previous records to the study area and current condition of the study area (**Table 2**).

Table 2 - Likelihood of Occurrence Criteria

Criteria	Explanation
Suitable habitat	The likelihood of suitable habitat being present within the study area was based on known habitat information gathered from FloraBase (Western Australian Herbarium (WAH) 1998-) and literature sourced from the Species Profile and Threats Database (SPRAT) (DAWE 2021c) (e.g., recovery plans, conservation advice).
Age of previous records	The age of previous records for significant species resulting from the desktop assessment was evaluated to determine how likely the species was to still occur in the area (i.e., habitat of species recorded decades ago may no longer occur or a species may be locally extinct).
Proximity of previous records	The proximity of previous significant flora and vegetation results in relation to the study area contributed to the likelihood of occurrence results, with those previously recorded close by considered more likely to occur within the study area. It is noted that species identified from the PMST have not necessarily been recorded within close proximity to the study area and may have resulted due to habitat possibly occurring within the area.
Current condition of study area	The study area is largely unmodified although is degraded from pastoral activities, particularly in the riparian sections which degradation likely exacerbated by long-term low rainfall and dry conditions,. Highly modified and degraded environments usually represent a lower likelihood of the occurrence of significant flora, whilst intact remnants are known to harbour significant species and communities that may have otherwise been cleared or impacted throughout their range.

3.2 FIELD ASSESSMENT

A reconnaissance flora and vegetation assessment and targeted conservation significant flora survey of the study area were undertaken by Principal Ecologist, Mike Braimbridge and Botanist/Ecologist, Peter Smith between 27 to 29 April 2021.

Flora and vegetation data were collected in the field as relevés (detailed data collection points), in accordance with the requirements for reconnaissance flora and vegetation assessments, as documented in EPA (2016). Sites were selected using aerial imagery during initial field planning, conducted at a desktop level and adjusted in the field where appropriate to provide representation of each of the vegetation units present. Observations and opportunistic data collection were recorded continuously within and throughout the study area. Field data was recorded using electronic tablets equipped with the mobile mapping software, Mappt™ and customised data collection forms, tailored to the collection of floristic data.

Data from a total of six relevés were recorded. The location of each relevé is presented in the **Figure 6** series.

The following information was collected at each relevé:

- observer
- date
- location/site
- GPS location (GDA94)
- representative photograph
- soil type and colour
- topography
- vegetation condition/degradation/disturbances (e.g. weed invasion, fire)
- flora species observed, including height and projected foliage cover of dominant species within each stratum
- vegetation unit, described in accordance with the National Vegetation Information System (NVIS), NVIS Technical Working Group (2017)
- vegetation condition, assessed against the currently accepted scale; an adaptation of the Keighery (1994) and Trudgen (1991) condition scales.

The field assessment also included a targeted search for Threatened and Priority flora potentially supported by the study area. Habitat preferences for all target flora species was pre-determined during the desktop assessment, to enable targeted searching in the field. The location of any observed flora suspected to be Threatened or Priority were recorded using GPS requirements so that if they were identified to be of conservation significance, they could be included in the report figures and spatial data layers provided. The targeted search traverses made across the study area are presented in the **Figure 6** series.

The flora and vegetation data were collected from the combination of relevés and continuous opportunistic observations to contribute to the flora inventory for the study area. The vegetation units of the study area were defined by data collected from six relevés and opportunistically between, and how they related to other environmental features such as soil type and landform.

Vegetation condition was assessed using the current bushland condition scale which is an adaptation of the Keighery (1994) and Trudgen (1991) scales, as described in EPA (2016).

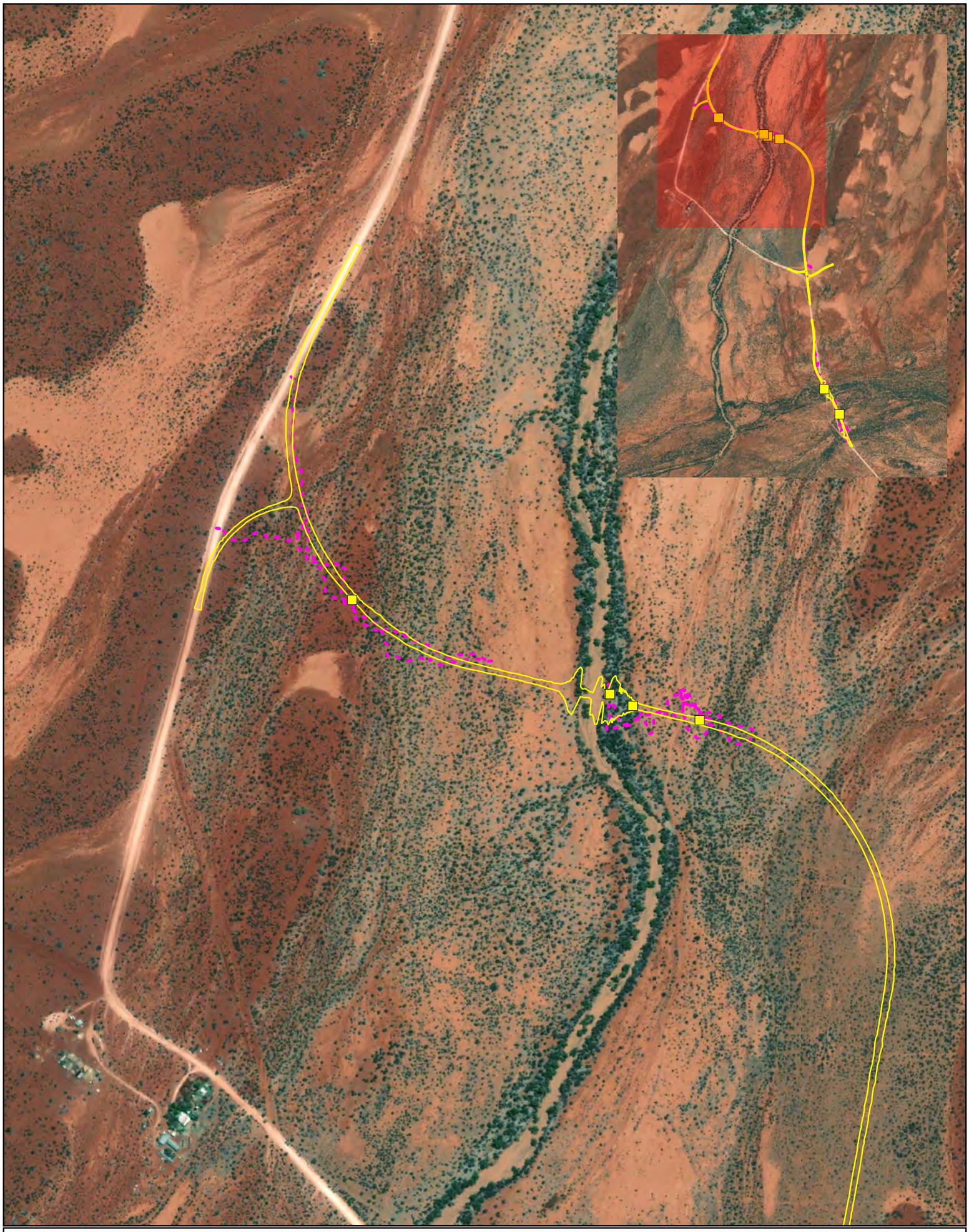

Figure 6a - Survey Effort

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Figure 6b - Survey Effort

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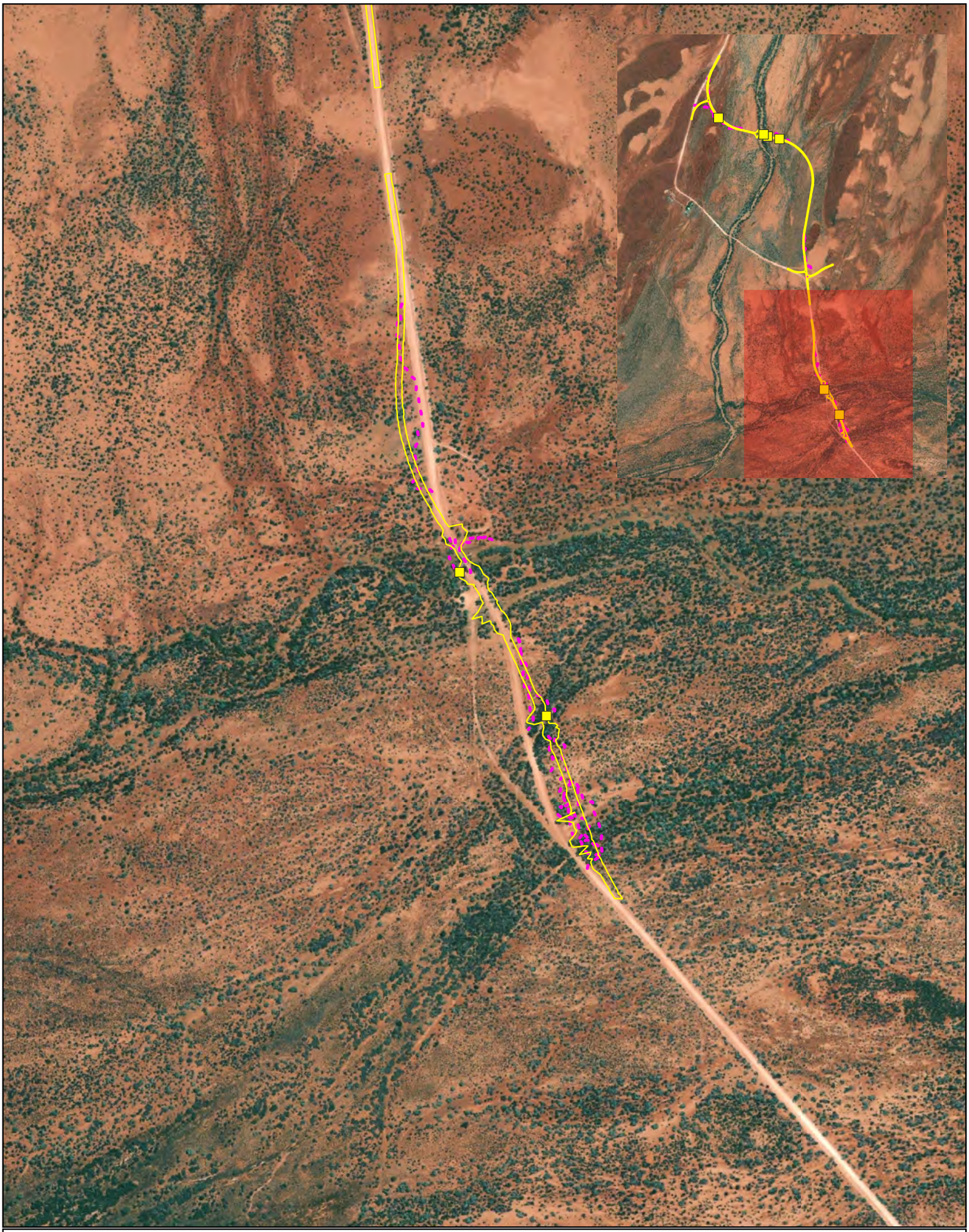

0 100 200 300 400 m

GDA 94 / MGA Zone 50

Figure 6c - Survey Effort

Legend

- Study Area
- Releve
- Traverse

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3.3 DATA PROCESSING AND REPORTING

Following completion of the desktop and field assessments, all information and collected field data were collated, ready for analysis and reporting.

Flora identifications were undertaken by one of FVC's botanical taxonomists, Sharnya Thomson-Yates, following return from the field. Flora taxonomy and nomenclature was cross-referenced with FloraBase (WAH 1998-).

All relevant data and results from the desktop and field assessments were collated and digitised in GIS, to enable the preparation of the suite of figures presented in this report.

All spatial data has been prepared as ESRI shapefiles that meet the protocols of the Index of Biodiversity Surveys for Assessment (IBSA) initiative.

This report has been prepared by suitably qualified and experienced professionals, in accordance with relevant guidelines.

3.4 SURVEY LIMITATIONS

The flora and vegetation assessment was assessed against limitations imposed by many variables as outlined in the *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016) (**Table 3**).

Table 3 - Survey Limitations

Aspect	Constraint (Yes/No)	Explanation
Availability of regional data, previously available information	No	There is data, literature and other information available for areas in the Gascoyne region, such as the detailed DBCA database search results, which provide evidence of flora and vegetation records that exist for the study area and surrounds.
Scope (detail)	No	Reconnaissance flora and vegetation and targeted conservation significant flora assessments were carried out in accordance with EPA (2016). Six relevés were sampled across the study area targeting each present vegetation unit. This level of survey detail was considered adequate for the assessment of floristic values in the context of a narrow linear corridor of proposed clearing, within an area that is degraded from pastoral activities and dry conditions.
Competency/ Experience of personnel	No	All personnel undertaking the flora and vegetation field assessment, targeted searches, flora identifications, vegetation mapping and reporting are experienced botanists, with specialist skills in their respective fields. Personnel who led the field flora and vegetation survey, reporting and report technical review all have a minimum of 22 years' experience.
Survey effort/detail/ intensity	No	Similarly, as per the 'scope (detail)' aspect above, the reconnaissance flora and vegetation and targeted conservation significant flora assessments were considered adequate to determine floristic values in the study area. Six relevés were sampled across the vegetation units presents which also accounted for the varying vegetation condition. Targeted search traverses were carried out on foot and covered a large proportion (more than half) of the vegetation not in degraded condition.
Seasonal timing and climatic conditions	No	The timing of the assessments (late April) was sub-optimal for the identification of flowering flora or annual and ephemeral species as most species within the sub-region flower in August and September or following summer or autumn rainfall. Whilst there had been some rain in the Gascoyne region during March, this did not extent to the study area in adequate volumes to result in annual flora emergence or flowering. Therefore, it is likely that not all species that may occur in the study area were recorded. However, further surveys during spring are considered

Aspect	Constraint (Yes/No)	Explanation
		unlikely to be necessary. The survey effort is considered adequate for a narrow linear corridor of proposed clearing, within an area that is degraded from pastoral activities and dry conditions.
Access	No	The study area was easily accessible via vehicle and traversing on foot.
Mapping reliability	No	The mapping has been prepared at a scale based on ground-truthed areas, with limited extrapolation given the good accessibility to the study area. Therefore, mapping reliability is considered high.
Disturbances	No	A large proportion of the study area is existing roads and tracks, and the area has been subject to a moderate to high degree of disturbance from clearing, infrastructure operation, cattle grazing and weeds. This degradation did not impede the definition of biological values present within the small areas of better-quality vegetation present.
Survey completeness	No	The entire study area was easily accessible by vehicle and traversed by foot to ensure the survey was able to be completed.

4 RESULTS AND DISCUSSION

4.1 DESKTOP REVIEW

4.1.1 Threatened and Priority Flora

The DBCA database search, NatureMap and the PMST Reports identified 17 conservation significant flora species that have potential to occur within the study area (**Figure 7**; **Appendix A** and **B**)). These species comprise of one Threatened flora pursuant to the Commonwealth EPBC Act and State *Biodiversity Conservation Act 2016* (BC Act), six P1, eight P3, and two P4 species and are presented in **Table 3**. No Threatened flora species have previously been recorded within the study area.

Based on known distribution, current records and preferred habitat type, it was considered that three conservation significant flora species are likely to occur, nine species may occur and the remaining five species are unlikely to occur within the study area (**Table 4**). The species that were considered likely to occur were *Acacia wilcoxii* (P1), *Isotropis forrestii* (P1) and *Acacia atopa* (P3), previously recorded within approximately 1.7 km of the study area.

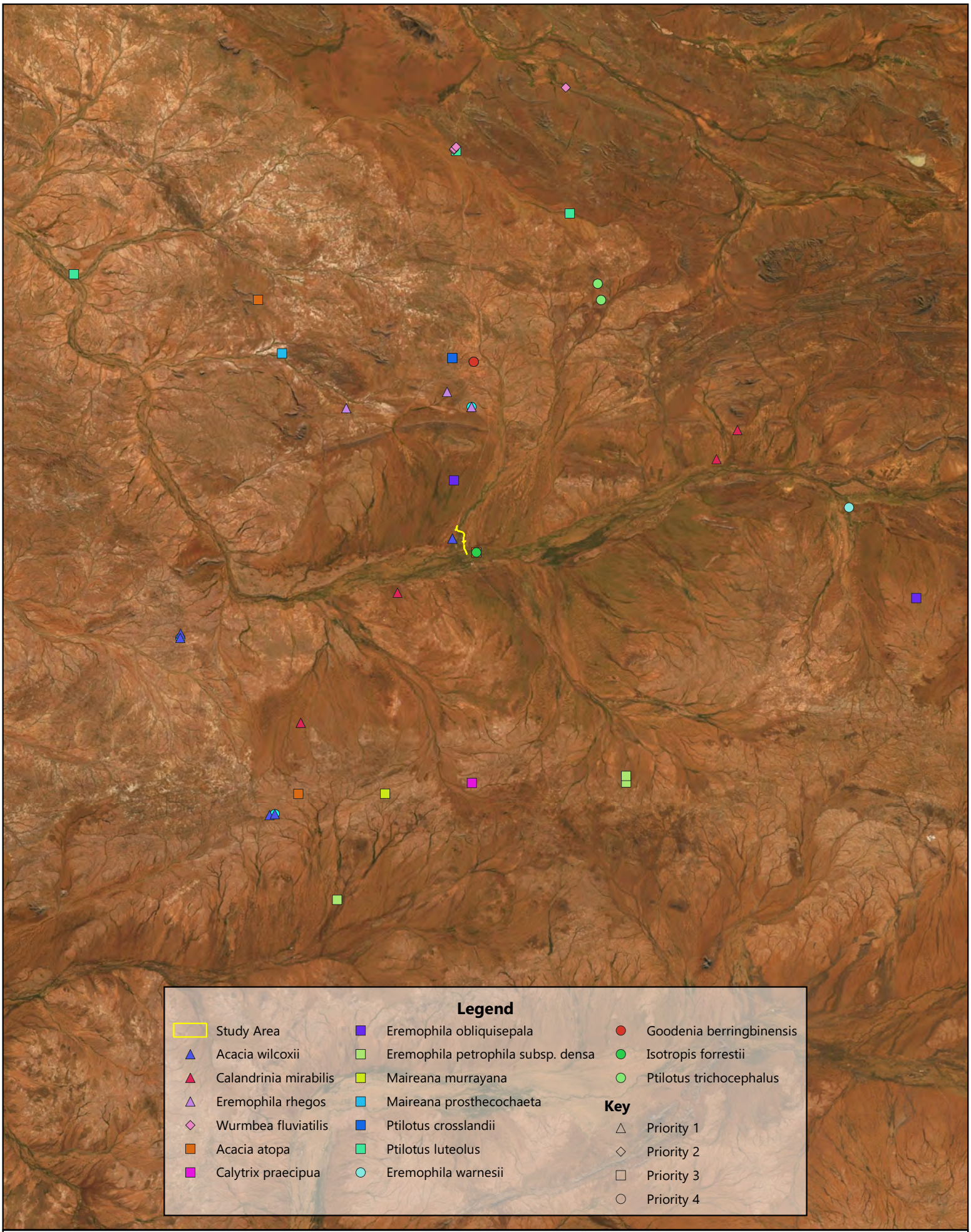

Figure 7 - Priority Flora

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Table 4 - Threatened and Priority Flora Likelihood of Occurrence

Species	EPBC Cons Status	WA Cons. Status	Description*	Preferred Habitat*	Likelihood of Occurrence	Source
Pityrodia augustensis	Vulnerable	T	Bushy shrub, up to 1 m high. Flowers purple and purple-red, from August to September.	Amongst rocks on slopes or in drainage lines.	**Unlikely** to occur – habitat probably not preferred.	DBCA PMST
Acacia wilcoxii		P1	Much-branched shrub, 2 to 4 m high. Flowers August to September. Granitic soils.	Along creeks, adjacent stony plains and granite outcrops.	**Likely** to occur – two previous records within 1.6 km of the study area.	DBCA NatureMap
Calandrinia mirabilis		P1	Prostrate to decumbent annual herb, up to 0.5 m high. Large flowers, magenta/purple.	Red-brown gritty clayey sand, sandy loam. Flat plain, small dunal rise on gibber plain, road verge.	**May** occur - suitable habitat may be present. Previously recorded 14 km southwest of the study area.	DBCA NatureMap
Eremophila rhegos		P1	Erect shrub, up to 1 m high. Flowers blue-purple-white in September.	Skeletal stony loam over granite.	**May** occur - suitable habitat may be present. Previously recorded 21 km north of the study area.	DBCA
Eremophila warnesii		P1	Shrub, up to 0.07 to 0.5 m high. Flowers purple in August.	Red-brown sandy clayey sand.	**May** occur - suitable habitat may be present. Previously recorded 66 km east of the study area.	DBCA
Isotropis forrestii		P1	Erect shrub, up to 0.4 to1.5 m high. Flowers yellow-orange and red, April to September or December.	Stony clay loam, sandy alluvium. Along drainage lines.	**Likely** to occur –previous record within 1.7 km of the study area	DBCA NatureMap
Wurmbea fluviatilis		P1	Spreading, rotund shrub, 0.5 m high. Flowers blue, May.	Creek lines and riverbanks.	**May** occur - suitable habitat may be present. Previously recorded 65 km north of the study area.	DBCA
Acacia atopa		P3	Slender tree (occasionally weeping), to 4.5 m high, phyllodes linear, terete, 6 to12 cm long, 0.7 to 1 mm diameter.	Red clay and red loam. Sometimes in rocky situations.	**Likely** to occur – previous record within 1.7 km of the study area	DBCA NatureMap
Calytrix praecipua		P3	Shrub 0.3-0.7 m high, pink-white flowers in June, July, September to November.	Skeletal sandy soils over granite or laterite. Breakaways, outcrops.	**Unlikely** to occur – nearest record 40 km to the south and habitat probably not preferred as part of road realignment	DBCA
Eremophila obliquisepala		P3	Spreading, rotund shrub, up to 0.5 m high with blue flowers in May.	Sand. Open hardpan plains.	**May** occur - suitable habitat may be present and previously recorded 8 km north of the study area.	DBCA NatureMap

Species	EPBC Cons Status	WA Cons. Status	Description*	Preferred Habitat*	Likelihood of Occurrence	Source
Eremophila petrophila subsp. *densa*		P3	Erect shrub 1.3 to 2.2 m high with blue-purple flowers August to September.	Stony, sandy loam or clay. Flats	**May** occur - suitable habitat may be present and previously recorded 65 km south south-west of the study area.	DBCA
Maireana murrayana		P3	Erect shrub, up to 0.3 m high.	Red clayey sand, dissected sandstone.	**Unlikely** to occur - recorded 45 km south south-west of the study area but habitat unlikely in the study area.	DBCA
Maireana prothecochaeta		P3	Open, densely leaved shrub, 0.3 to 0.6 m high.	Laterite, hills and salty places.	**Unlikely** to occur **–** nearest record 44 km to the northwest but habitat unlikely in study area.	DBCA
Ptilotus crosslandii		P3	Prostrate herb. Flowers white between September to October.	Sandy soils, colluvial plains.	**May** occur **–** nearest record 30 km to the north and habitat may occur in the study area.	DBCA
Ptilotus luteolus		P3	Shrubs or perennial herbs with dendritic hairs. Flowers yellow in August to November.	Loam, clay, stony sandy hill.	**Unlikely** to occur **–** nearest record 80 km to the northwest but habitat unlikely in study area.	DBCA
Goodenia berringbensis		P4	Ascending annual, herb, 0.1 to 0.3 m high. Flowers yellow in October.	Red sandy loam along watercourses.	**May** occur **–** nearest record 30 km to the north and habitat may occur in the study area.	DBCA
Ptilotus trichocephalus		P4	Prostrate, spreading perennial herb with white flowers in September.	Sandy soils, colluvial plains.	**May** occur **–** nearest record 48 km to the northeast and habitat may occur in the study area.	DBCA

* Information sourced from FloraBase (WAH 1998-)

4.1.2 Threatened and Priority Ecological Communities

A review of DBCA's TEC and PEC and the PMST databases identified no significant ecological communities within the study area but some that are known to occur nearby. The nearest significant ecological community is approximately 2 km west of the study area, which is associated with unique groundwater invertebrate assemblages. Two PECs relevant to vegetation; Bubbagundy and Peedawarra Land Systems, are located approximately 7-9 km in the northwest and southeast and 12 km in the northeast of the study area, respectively (**Figure 8**). These land systems are described as:

- **Bubbagundy Land System –** Very large and extensive sand banks which approach sandplain in quality and expression of vegetation. A lack of through drainage leaves large sand masses, sand banks and interbanks as the three constituent elements of this type. Threats: over grazing (P3 (iii))
- **Peedawarra Land System –** A tributary plain drainage system - characteristically saline, with mixed Acacia shrublands and grasslands. Threats: over grazing (P3 (iii)).

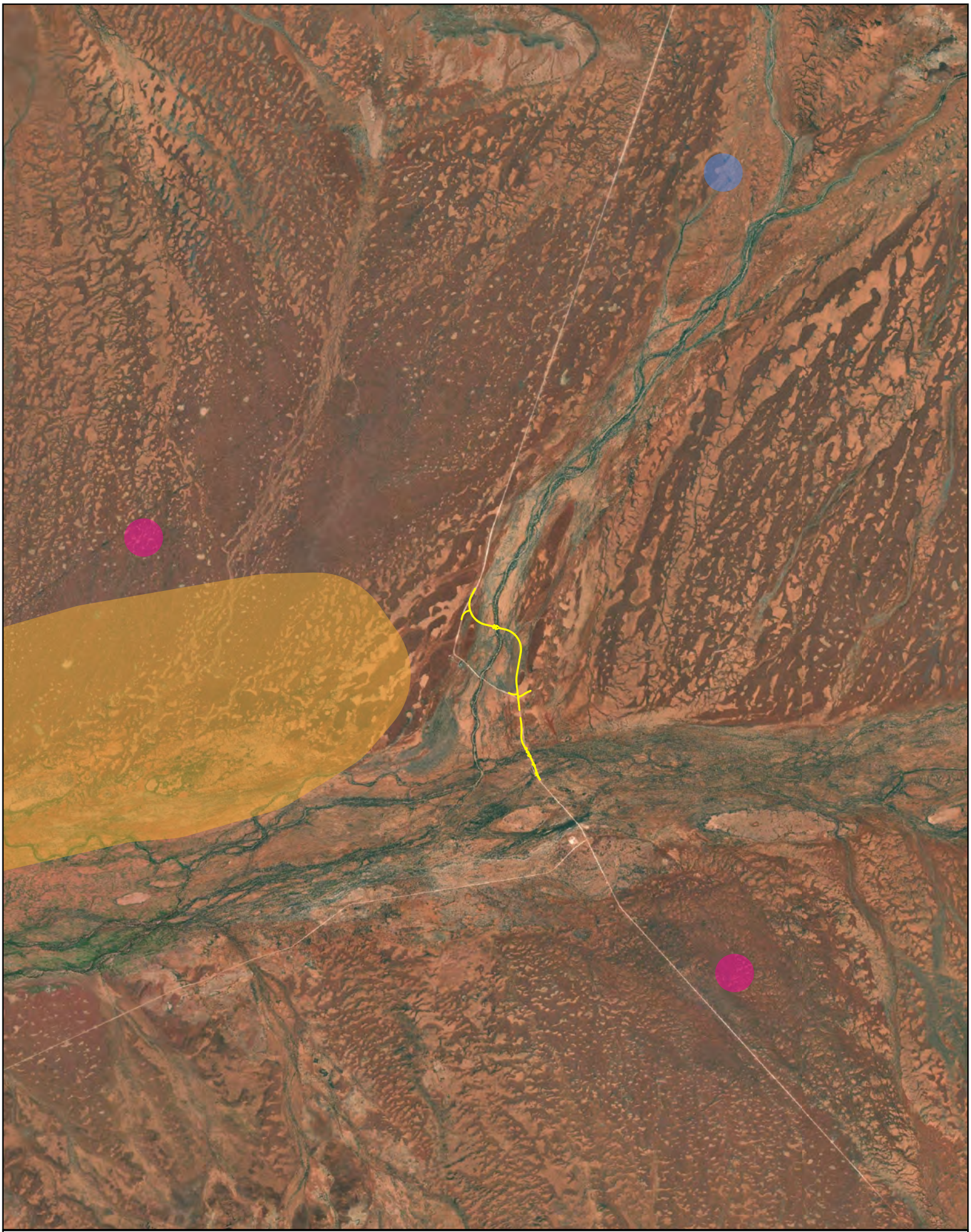


Figure 8 - Priority Ecological Communities

FOCUSED VISION consulting

SOUG21001 24 June 2021

4.2 FIELD ASSESSMENT

4.2.1 Flora

A total of 48 flora species, from 32 genera and 18 families were recorded during the survey. The dominant families represented were Fabaceae (13 taxa) and Poaceae (nine taxa), with the *Acacia* being the sole dominant genus within the study area. Of the 48 recorded flora species, two are introduced (weeds). The full list of vascular flora taxa recorded within each vegetation unit is presented in **Appendix C**, and individual relevé data is presented in **Appendix D**.

No Threatened nor Priority flora species listed under the BC Act and/or under the EPBC Act were recorded during the field survey. The timing of the survey (late April) was not considered optimal timing for conducting a targeted significant flora survey in the region, as April is outside the peak flowering period. Therefore, it is unlikely that all species occurring within the study area were recorded, particularly given the dry seasonal conditions recorded prior to the survey. The field survey timing was considered to be sub-optimal for the identification of flowering flora or annual and ephemeral species as most species within the sub-region flower in August and September or following summer or autumn rainfall. Whilst there had been some rain in the Gascoyne region during March, this did not extent to the study area in adequate volumes to result in annual flora emergence or flowering. Therefore, it is likely that not all species that may occur in the study area were recorded. However, further surveys during spring are considered unlikely to be necessary.

The record of one species, *Alternanthera nana,* represents a potential range extension, with most records within the Pilbara bioregion, approximately 260 km northeast from the study area. One record in the Gascoyne bioregion is approximately 430 km west from the study area.

Neither of the two weed species recorded within the study area, **Cenchrus ciliaris* (buffel grass) and **Malvastrum americanum* (spike malvastrum) are listed as a WoNS or Declared Pest plants under the BAM Act within the Upper Gascoyne (DAWE 2021d and Department of Primary Industries and Regional Development (DPIRD) 2021). Buffel grass occurs in dense swathes in some of the flowlines within the study area, as seed of this species is commonly spread in flowing surface water and the species' incidence is exacerbated by grazing cattle throughout the pastoral regions.

4.2.2 Vegetation Units

A total of three vegetation units were defined and mapped within the study area from six relevés, which are described in **Table 5** and presented in **Figure 9** series. An additional two units were defined, bare claypan that had no vegetation present at the time of the survey and cleared areas. Each vegetation unit is Only 71.41% (7.9 ha) of the study area supports remnant vegetation. The remaining 28.59% (3.16 ha) of the study area has been subject to clearing, where these areas included roads, tracks and other areas completely devoid of vegetation.

Table 5 – Vegetation Units

Vegetation Unit Code	Vegetation Unit Description	Relevés	Area (ha)	% of Study Area
AcMgCc	*Acacia citrinoviridis, Eucalyptus camaldulensis* var. *obtusa* (and *A. distans*) Open Forest over *Melaleuca glomerata* and *Acacia* mixed species Tall Open Shrubland to Low Woodland over **Cenchrus ciliaris* Very Open to Tussock Grassland.	1, 5, 6	2.28	20.61
AspAspA?b/Ac	*Acacia citrinoviridis, Eucalyptus camaldulensis* var. *obtusa, A. tetragonophylla* Low Woodland over *Acacia* mixed species and *Grevillea striata* or *Eremophila ?galeata* Tall Open to Tall Shrubland over *Atriplex ?bunburyana* Shrubland or *Chrysopogon fallax, Aristida contorta* and *Iseilema membranaceum* Open Tussock Grassland.	2, 4	5.14	46.47
AspAspEh	*Acacia* sp., *Hakea lorea* subsp. *lorea* and *A. aptaneura* Low Woodland over *A. ramulosa* var. *linophylla, A. kempeana* and *Senna artemisioides* subsp. *helmsii* Tall Shrubland over *Eremophila forrestii* subsp. *?forrestii* Open Shrubland over *Eriachne helmsii* and *Aristida holathera* var. *holathera* Open Tussock Grassland with *Arivela viscosa* Very Open Herbland.	3	0.48	4.33
Bare Claypan	No vegetation present at the time of the survey.	NA	0.63	5.69
Cleared	Roads, tracks and other areas completely devoid of vegetation.	NA	2.53	22.87
	Total	**11.06**		

The vegetation recorded in study area is considered unlikely to be affiliated with the PECs, Bubbagundy and Peedawarra Land Systems, identified in the desktop review based on the vegetation described, the flora species present, and the vegetation characteristics described.

Figure 9a - Vegetation Units

Figure 9b - Vegetation Units

FOCUSED VISION consulting

SOUG21001 24 June 2021

0 50 100 150 200 m

GDA 94 / MGA Zone 50

Legend

Study Area

Bare Claypan

AspAspA?b/Ac

Figure 9c - Vegetation Units

FOCUSED VISION consulting

SOUG21001 24 June 2021

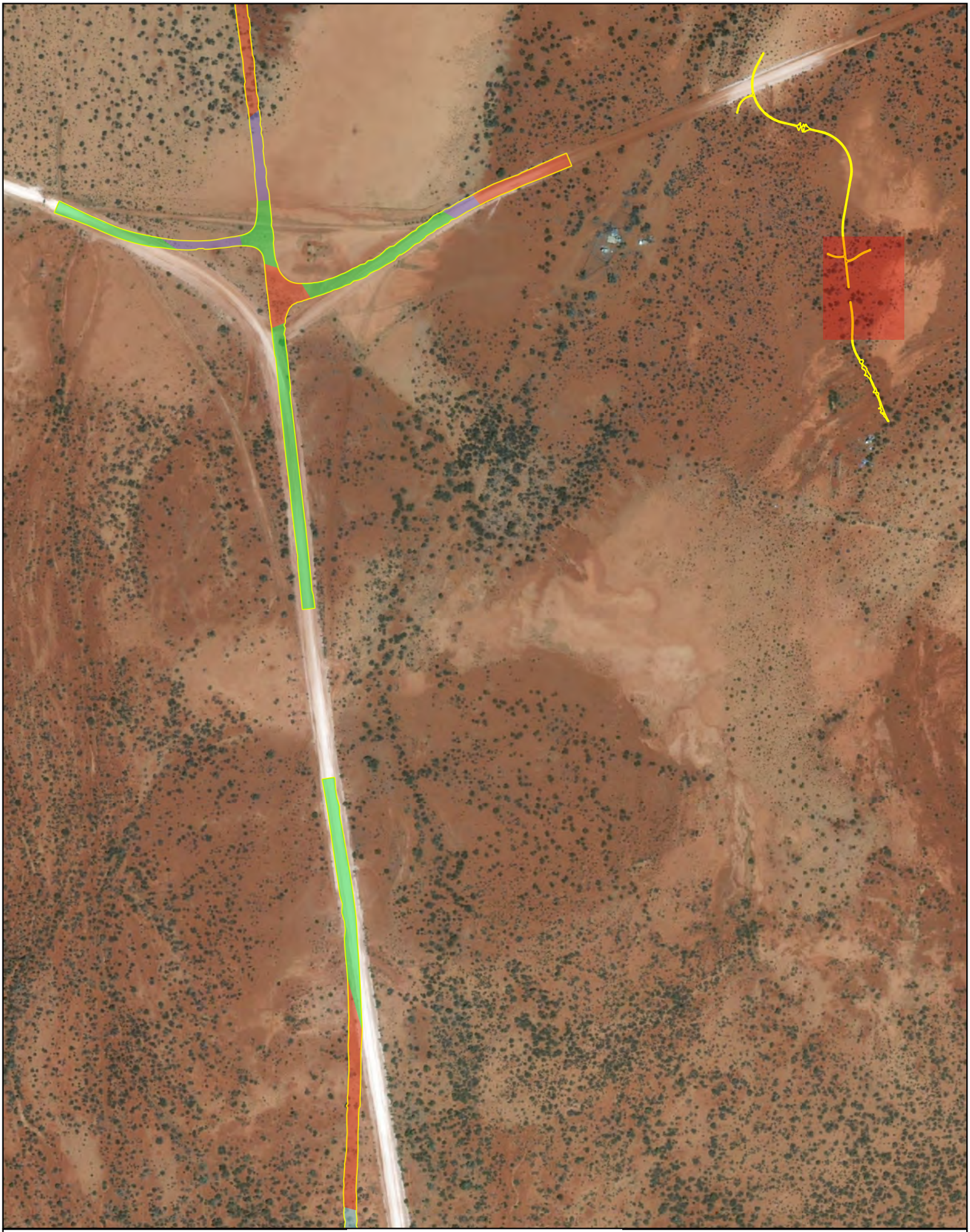


Figure 9d - Vegetation Units

FOCUSED VISION consulting

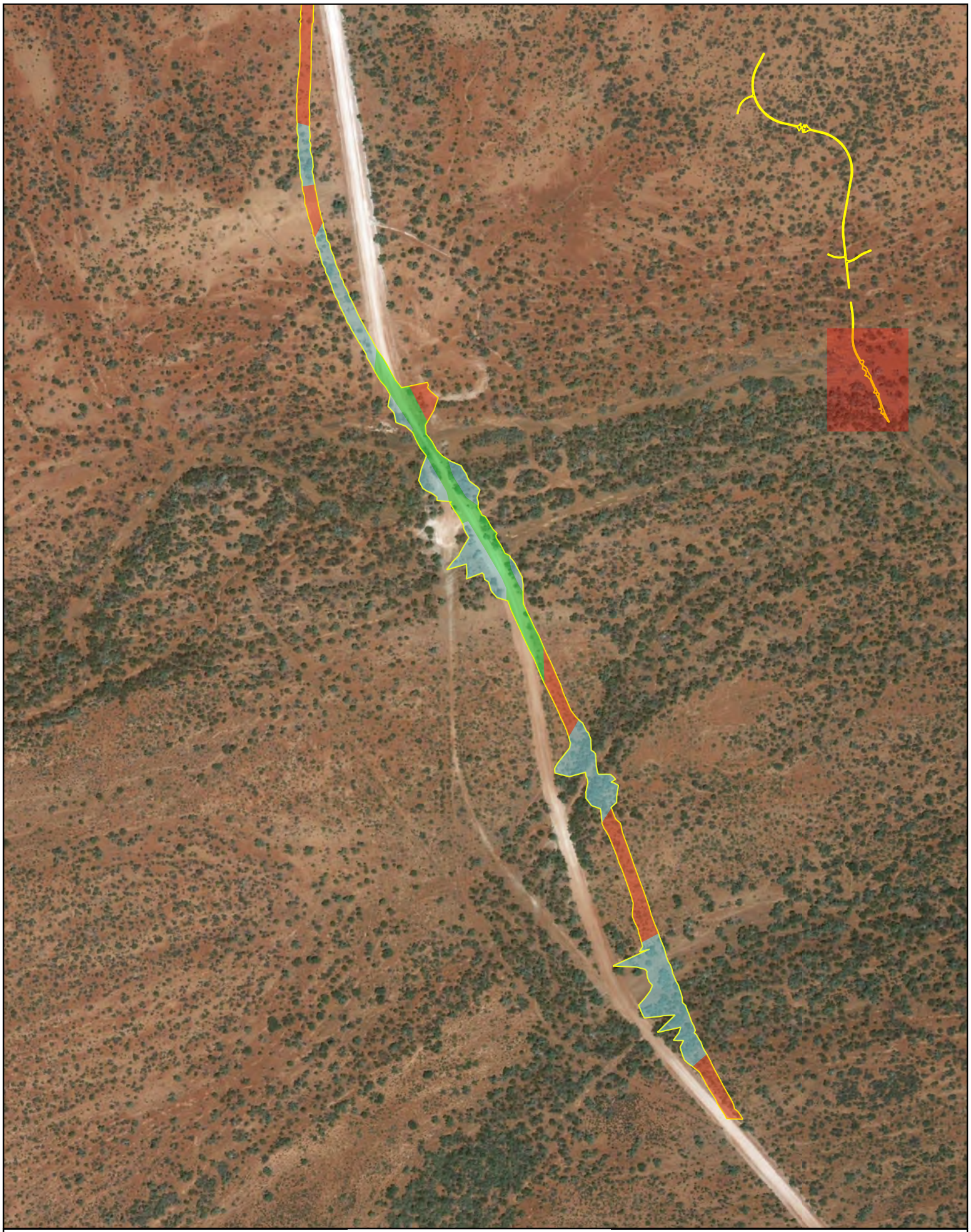


Figure 9e - Vegetation Units

FOCUSED VISION consulting

4.2.3 Vegetation Condition

Vegetation condition within the study area was found to range from 'Good' to 'Completely Degraded'. Most of the areas supporting vegetation were observed to be in 'Degraded to Poor' condition (**Table 6**). The spatial extent of the varying vegetation condition is presented in the **Figure 8** series.

Table 6 - Vegetation Condition

Vegetation Condition	Area (ha)	% of Study Area
Good	0.48	4.33
Poor to Good	0.95	8.58
Poor	0.52	4.70
Degraded to Poor	5.61	50.72
Degraded	0.76	6.87
Completely Degraded	2.74	24.77
TOTAL	**11.06**	

Over 87% of the study area was observed to be in 'Poor' or worse condition, due to clearing, or at least loss of vegetation structure, poor diversity, grazing from cattle and a high proportion of weeds. Areas of vegetation in 'Good' or 'Poor to Good' condition were found to have intact vegetation structure, with some evidence of impacts from human disturbances (tracks, clearing), lower levels of grazing from cattle and a lesser presence of weeds.

Figure 10a - Vegetation Units

FOCUSED VISION consulting

Figure 10b - Vegetation Units

FOCUSED VISION consulting

0 50 100 150 200 m

GDA 94 / MGA Zone 50

Legend

Study Area

Degraded-Poor

Degraded

Figure 10c - Vegetation Units

FOCUSED VISION consulting

Figure 10d - Vegetation Units

FOCUSED VISION consulting

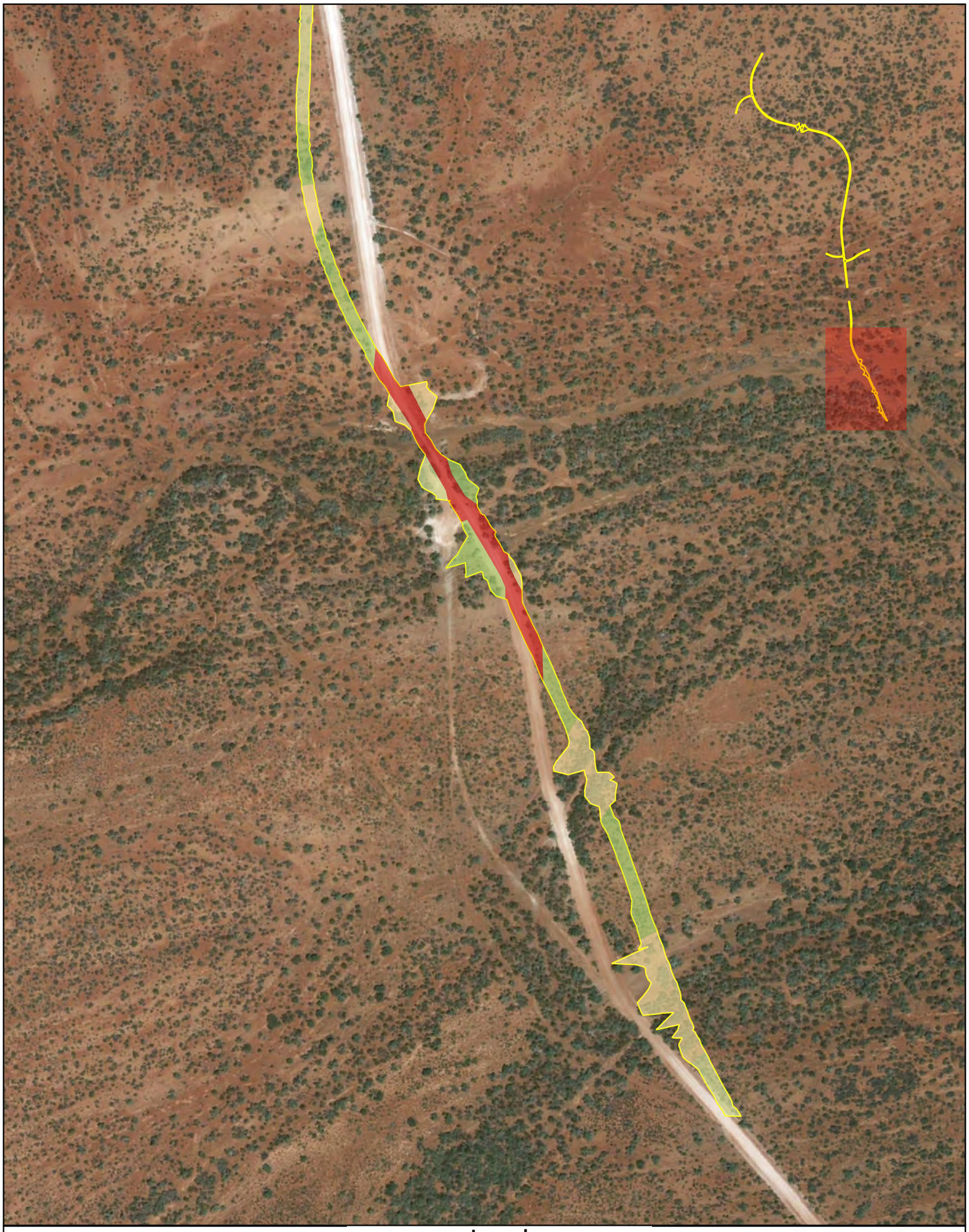


Figure 10e - Vegetation Units

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 FLORA

No Threatened or Priority flora listed under the BC Act or under the EPBC Act were recorded within the study area. Of the 17 conservation significant flora identified from the desktop assessment, three species, *Acacia wilcoxii* (P1), *Isotropis forrestii* (P1), and *Acacia atopa* (P3) were considered 'likely' to occur in the study area. A targeted survey for these species was undertaken within suitable habitat (along creeks, adjacent stony plains and granite outcrops; stony clay loam, sandy alluvium and along drainage lines; and red clay/loam, sometimes in rocky situations; respectively). Despite this, these species were not recorded, possibly due to the vegetation condition and the impact to the vegetation structure from cattle grazing within the study area.

A total of 48 flora species were recorded during the survey which includes 46 (96%) native species and two (4%) weeds. The floristic diversity of the vegetation within the study area was considered low, which is expected since the study area bisects few vegetation units, the seasonal timing was sub-optimal and the impacts of grazing, which are reflected in the vegetation condition. Further surveys during spring are considered unlikely to be necessary to ensure the suite of flora species for the Gascoyne region is adequate. The survey effort is considered adequate for a narrow linear corridor of proposed clearing, within an area that is degraded from pastoral activities and dry conditions.

The record of one species, *Alternanthera nana,* represents a potential range extension, with most records within the Pilbara bioregion. It is possible that this species was introduced by vehicle, machinery or soil deposited from the Pilbara, as there is a record in the Gascoyne region, approximately 430 km west from the study area.

All flora specimens collected, except for one, an *Acacia* species were able to be identified with certainty to species level. Although sterile, the specimen appears to be similar to a positively identified specimen of *Acacia distans*.

Two weed species, **Cenchrus ciliaris* and **Malvastrum americanum*, were recorded in the study area. Neither of these species, are listed as a WoNS or Declared Pest plants under the BAM Act (DAWE 2021d and DPIRD 2021). These species were recorded within the drainage lines and dispersed through disturbed areas that have been subject to impacts such as clearing, introduced herbivore movements and run-off from seasonal rainfall. Remaining within the clearing footprint and inspecting vehicles and personnel for weed seeds would assist in the reduction of weed dispersal to other areas.

5.2 VEGETATION

Three vegetation units, AcMgCc, AspAspA?b/Ac, and AspAspEh were defined within the study area from six relevés. It is considered that the suite of vegetation units has been adequately sampled to accurately represent the vegetation present.

The vegetation recorded in study is considered unlikely to be representative of the Priority Ecological Communities (PECs) relevant to vegetation that resulted from the desktop assessment (Bubbagundy and Peedawarra Land Systems), based on the vegetation described, the flora species present, and the vegetation characteristics described.

Vegetation condition within the study area ranges from 'Good' to 'Completely Degraded', with most in 'Degraded to Poor' condition and more than in 'Poor' or worse condition. The degraded condition of the vegetation is due mostly to clearing and grazing which has resulted in loss of vegetation structure, poor diversity and a high proportion of weeds.

All of the regional vegetation associations present in the study area are documented (Beard 1990) as represented by over the minimum 30% threshold in comparison to pre-European extents and therefore meet the EPA objective of retention for the purposes of biodiversity conservation.

6 REFERENCES

Beard, J.S. (1990) *Plant Life of Western Australia*. Kangaroo Press, Kenthurst NSW.

Bureau of Meteorology (BOM) (2021) *Climate statistics for Australian locations. Monthly climate statistic. Meekatharra (007045)* http://www.bom.gov.au/climate/averages/tables/cw_007045.shtml Accessed 10 May 2021.

Curry, PJ, Payne, AL, Leighton, KA, Hennig, P, and Blood, DA (1994), *An inventory and condition survey of the Murchison River catchment, Western Australia*. Department of Agriculture, Perth. Technical Bulletin 84.

Department of Agriculture, Water and the Environment (DAWE) (2021a) *Australia's bioregions (IBRA).* http://www.environment.gov.au/land/nrs/science/ibra Accessed 20 May 2021.

DAWE (2021b) *Protected Matters Search Tool.* http://environment.gov.au/epbc/protected-matters-search-tool Accessed 20 May 2021.

DAWE (2021c) *Species Profile and Threats Database.* http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl Accessed 20 May 2021.

DAWE (2021d) *Weeds of National Significance (WONS)*. Weeds Australia. Centre for Invasive Species Solutions. https://weeds.org.au/weeds-profiles/ Accessed 20 May 2021.

DBCA (2021a) *NatureMap* https://naturemap.dbca.wa.gov.au/ Accessed 20 May 2021.

DBCA (2021b) *Request for Threatened and Priority Flora information*. Species and Communities Branch. Ref: 34-0421FL.

DBCA (2021c) *Request for Threatened and Priority Ecological Communities information.* Species and Communities Branch. Ref: 04-0521EC.

DBCA (2021d) *Priority Ecological Communities for Western Australia Version 31*. Species and Communities Program, DBCA. 20 March 2021. Accessed 20 May 2021.

Department of Primary Industries and Regional Development (DPIRD) (2021) *Western Australian Organism List (WAOL)*. https://www.agric.wa.gov.au/organisms Accessed 20 May 2021.

Desmond, A., Kendrick, P. and Chant, A. (2001) *Gascoyne 3 (GAS03 – Augustus subregion)* in A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002. Collaboration between the Department of Conservation and Land Management and the Western Australian Museum.

Environmental Protection Authority (EPA) (2000) *Position Statement No. 2: Environmental Protection of Native Vegetation in Western Australia: Clearing Native Vegetation with Particular Reference to Agricultural Areas.*

Environmental Protection Authority (EPA) (2016) *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment*.

Government of Western Australia (2019) *2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of March 2019*. WA Department of Biodiversity, Conservation and Attractions, Perth.

Keighery, BJ (1994), *Bushland Plant Survey: A Guide to Plant Community Survey for the Community*, Nedlands, Wildflower Society of WA (Inc.).

McKenzie, NL, May, JE, and McKenna, S (Eds.) (2002) *Bioregional Summary of the 2002 Biodiversity Audit for Western Australia*, Department of Conservation and Land Management.

NVIS Technical Working Group (2017) *Australian Vegetation Attribute Manual: National Vegetation Information System, Version 7.0.* Department of the Environment and Energy, Canberra. Prep by Bolton, M.P., deLacey, C. and Bossard, K.B. (Eds).

Office of the Environmental Protection Authority (OEPA) (2015) *Perth and Peel @ 3.5 Million; Environmental Impacts, Risks and Remedies*. Interim strategic advice of the Environmental Protection Authority to the Minister for Environment under section 16(e) of the *Environmental Protection Act 1986.* July 2015.

Tille, P. (2006) *Soil-landscapes of Western Australia's Rangelands and Arid Interior*. Resource Management Technical Report 313. Department of Agriculture and Food. Government of Western Australia.

Trudgen, M. E. (1991) *Vegetation Condition Scale.* In: National Trust (WA) 1993 Urban Bushland Policy. National Trust of Australia (WA). Wildflower Society of Western Australia (Inc.) and the Tree Society (Inc.), Perth, Western Australia.

Western Australian Herbarium (WAH) (1998–). *FloraBase—the Western Australian Flora*. Department of Biodiversity, Conservation and Attractions. https://florabase.dpaw.wa.gov.au/ Accessed 11 May 2021.

Western Australian Planning Commission (WAPC) (2015) *Draft Perth and Peel@3.5 million*, Western Australian Planning Commission, Perth.

Western Australian Planning Commission (WAPC) (2018) *Perth and Peel@3.5 million*, Western Australian Planning Commission, Perth March 2018.

APPENDIX A - DBCA NATUREMAP SEARCH REPORT

NatureMap
Mapping Western Australia's biodiversity

SOUG21001

Created By Guest user on 14/04/2021

Current Names Only	Yes
Core Datasets Only	Yes
Method	'By Circle'
Centre	116° 55' 10" E,25° 08' 12" S
Buffer	20km
Group By	Conservation Status

Conservation Status	Species	Records
Non-conservation taxon	239	700
Priority 1	3	4
Priority 3	2	2
TOTAL	**244**	**706**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Priority 1					
1.	14684	*Acacia wilcoxii*		P1	
2.	43640	*Calandrinia mirabilis*		P1	
3.	3994	*Isotropis forrestii*		P1	
Priority 3					
4.	19507	*Acacia atopa*		P3	
5.	19631	*Eremophila obliquisepala*		P3	
Non-conservation taxon					
6.	4886	*Abutilon amplum*			
7.	37260	*Acacia aptaneura*			
8.	15280	*Acacia cuthbertsonii subsp. cuthbertsonii*			
9.	17743	*Acacia demissa*			
10.	3305	*Acacia distans*			
11.	36781	*Acacia fuscaneura*			
12.	3399	*Acacia kempeana (Witchetty Bush, Ilykuwara)*			
13.	3500	*Acacia pruinocarpa (Gidgee)*			
14.	36800	*Acacia pteraneura*			
15.	29015	*Acacia pyrifolia var. pyrifolia*			
16.	3510	*Acacia ramulosa (Horse Mulga)*			
17.	19483	*Acacia ramulosa var. linophylla*			
18.	19499	*Acacia ramulosa var. ramulosa*			
19.	13078	*Acacia sclerosperma subsp. sclerosperma*			
20.	3577	*Acacia tetragonophylla (Kurara, Wakalpuka)*			
21.	3606	*Acacia xiphophylla*			
22.	24559	*Acanthagenys rufogularis (Spiny-cheeked Honeyeater)*			
23.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
24.	24265	*Acanthiza uropygialis (Chestnut-rumped Thornbill)*			
25.	13702	*Alyogyne pinoniana var. pinoniana*			
26.	30833	*Amphibolurus longirostris (Long-nosed Dragon)*			
27.	11614	*Amyema gibberula var. gibberula*			
28.	12011	*Amyema maidenii subsp. maidenii*			
29.	24266	*Aphelocephala leucopsis subsp. castaneiventris (Southern Whiteface)*			
30.	24268	*Aphelocephala nigricincta (Banded Whiteface)*			
31.	24285	*Aquila audax (Wedge-tailed Eagle)*			
32.	24341	*Ardea pacifica (White-necked Heron)*			
33.	24610	*Ardeotis australis (Australian Bustard)*			
34.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
35.		*Artamus cinereus subsp. cinereus*			
36.	24356	*Artamus personatus (Masked Woodswallow)*			
37.	2467	*Atriplex macropterocarpa*			
38.		*Barnardius zonarius*			
39.	2769	*Boerhavia burbidgeana*			
40.	240	*Bothriochloa ewartiana (Desert Bluegrass)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
41.	7871	*Brachyscome ciliaris*			
42.	7878	*Brachyscome iberidifolia*			
43.	24727	*Cacatua sanguinea subsp. westralensis (Little Corella)*			
44.	2869	*Calandrinia schistorhiza*			
45.	31073	*Calandrinia sp. The Pink Hills (F. Obbens FO 19/06)*			
46.	30396	*Calandrinia translucens*			
47.	7891	*Calocephalus francisii (Fine-leaf Beauty-heads)*			
48.	5451	*Calytrix desolata*			
49.	258	*Cenchrus ciliaris (Buffel Grass)*	Y		
50.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
51.	25339	*Chelodina steindachneri (Flat-shelled Turtle)*			
52.	2489	*Chenopodium gaudichaudianum (Cottony Saltbush)*			
53.	272	*Chloris virgata (Feathertop Rhodes Grass)*	Y		
54.	24431	*Chrysococcyx basalis (Horsfield's Bronze Cuckoo)*			
55.	24434	*Chrysococcyx osculans (Black-eared Cuckoo)*			
56.	273	*Chrysopogon fallax (Golden Beard Grass)*			
57.	24289	*Circus assimilis (Spotted Harrier)*			
58.	25581	*Climacteris affinis (White-browed Treecreeper)*			
59.	2778	*Codonocarpus cotinifolius (Native Poplar, Kundurangu)*			
60.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
61.	6612	*Convolvulus clementii*			
62.	24361	*Coracina maxima (Ground Cuckoo-shrike)*			
63.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
64.	13560	*Corchorus crozophorifolius*			
65.	24416	*Corvus bennetti (Little Crow)*			
66.	25593	*Corvus orru (Torresian Crow)*			
67.	17083	*Corymbia deserticola subsp. deserticola*			
68.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
69.	25595	*Cracticus tibicen (Australian Magpie)*			
70.	25596	*Cracticus torquatus (Grey Butcherbird)*			
71.		*Craterocephalus cuneiceps*			
72.	3774	*Crotalaria cunninghamii (Green Birdflower, Bilbun)*			
73.	24886	*Ctenophorus reticulatus (Western Netted Dragon)*			
74.	25075	*Ctenotus severus*			
75.	25375	*Cyclorana maini (Sheep Frog)*			
76.	25376	*Cyclorana platycephala (Water-holding Frog)*			
77.	279	*Cymbopogon ambiguus (Scentgrass)*			
78.	6584	*Cynanchum floribundum (Dumara Bush, Tjipa)*			
79.	774	*Cyperus bifax (Downs Nutgrass)*			
80.	12801	*Cyperus blakeanus*			
81.	290	*Dactyloctenium radulans (Button Grass)*			
82.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
83.	12721	*Dielitzia tysonii*			
84.	323	*Diplachne fusca (Brown Beetle Grass)*			
85.	48380	*Diplachne fusca subsp. muelleri*			
86.	2499	*Dissocarpus paradoxus (Curious Saltbush)*			
87.	2504	*Dysphania plantaginella*			
88.	25092	*Egernia depressa (Southern Pygmy Spiny-tailed Skink)*			
89.		*Egretta garzetta*			
90.		*Egretta novaehollandiae*			
91.	47937	*Elseyornis melanops (Black-fronted Dotterel)*			
92.	358	*Enneapogon cylindricus (Jointed Nineawn)*			
93.	368	*Enteropogon ramosus (Windmill Grass, Curly Windmill Grass)*			
94.		*Eolophus roseicapillus*			
95.	375	*Eragrostis cumingii (Cuming's Love Grass)*			
96.	378	*Eragrostis dielsii (Mallee Lovegrass)*			
97.	381	*Eragrostis falcata (Sickle Lovegrass)*			
98.	388	*Eragrostis leptocarpa (Drooping Lovegrass)*			
99.	393	*Eragrostis setifolia (Neverfail Grass)*			
100.	398	*Eragrostis tenellula (Delicate Lovegrass)*			
101.	7189	*Eremophila clarkei (Turpentine Bush)*			
102.	7192	*Eremophila cuneifolia (Pinyuru, T'iranju)*			
103.	17152	*Eremophila forrestii subsp. hastieana (Grey Poverty Bush)*			
104.	16696	*Eremophila fraseri subsp. fraseri*			
105.	29532	*Eremophila galeata*			
106.	17176	*Eremophila gilesii subsp. variabilis*			
107.	16363	*Eremophila maculata subsp. brevifolia (Native Fuchsia)*			
108.	17167	*Eremophila phyllopoda subsp. phyllopoda*			
109.	15057	*Eremophila reticulata*			
110.	23997	*Eremophila tietkensii*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
111.	400	*Eriachne aristidea*			
112.	403	*Eriachne benthamii (Swamp Wanderrie)*			
113.	408	*Eriachne flaccida (Claypan Grass)*			
114.	35345	*Eucalyptus camaldulensis subsp. obtusa (Blunt-budded River Red Gum)*			
115.	35303	*Euphorbia australis var. subtomentosa*			
116.	42869	*Euphorbia porcata*			
117.	12097	*Euphorbia tannensis subsp. eremophila (Desert Spurge)*			
118.	24471	*Falco berigora subsp. berigora (Brown Falcon)*			
119.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
120.	24472	*Falco cenchroides subsp. cenchroides (Australian Kestrel, Nankeen Kestrel)*			
121.	24958	*Gehyra punctata*			
122.	24959	*Gehyra variegata*			
123.	24401	*Geopelia cuneata (Diamond Dove)*			
124.	25585	*Geopelia striata (Zebra Dove)*			
125.	3938	*Glycine canescens (Silky Glycine)*			
126.	2680	*Gomphrena cunninghamii*			
127.	18367	*Gomphrena kanisii*			
128.	7495	*Goodenia berardiana*			
129.	7509	*Goodenia forrestii*			
130.	12574	*Goodenia prostrata*			
131.	24443	*Grallina cyanoleuca (Magpie-lark)*			
132.	1986	*Grevillea deflexa*			
133.	2096	*Grevillea stenobotrya*			
134.	2784	*Gyrostemon ramulosus (Corkybark)*			
135.	15916	*Halgania sp. A Kimberley Flora (H.A. Johnson 5123)*			
136.	24295	*Haliastur sphenurus (Whistling Kite)*			
137.	6180	*Haloragis trigonocarpa*			
138.	17325	*Harnieria kempeana subsp. muelleri*			
139.	8045	*Helipterum craspedioides (Yellow Billy Buttons)*			
140.	24961	*Heteronotia binoei (Bynoe's Gecko)*			
141.	24491	*Hirundo neoxena (Welcome Swallow)*			
142.	3982	*Indigofera monophylla*			
143.	6500	*Jasminum calcareum*			
144.	7118	*Josephinia eugeniae (Josephinia Burr)*			
145.	4953	*Lawrencia densiflora*			
146.		*Leiopotherapon unicolor*			
147.	3032	*Lepidium muelleri-ferdinandii*			
148.	25151	*Lerista macropisthopus subsp. fusciceps*			
149.	25392	*Litoria rubella (Little Red Tree Frog)*			
150.	4061	*Lotus cruentus (Redflower Lotus)*			
151.	2396	*Lysiana casuarinae*			
152.	2398	*Lysiana murrayi (Mistletoe, Parka-Parka)*			
153.	24136	*Macropus rufus (Red Kangaroo, Marlu)*			
154.	2551	*Maireana melanocoma (Pussy Bluebush)*			
155.	2556	*Maireana planifolia (Low Bluebush)*			
156.	25651	*Malurus lamberti (Variegated Fairy-wren)*			
157.	24544	*Malurus lamberti subsp. assimilis (Variegated Fairy-wren)*			
158.	25652	*Malurus leucopterus (White-winged Fairy-wren)*			
159.	25654	*Malurus splendens (Splendid Fairy-wren)*			
160.	4962	*Malvastrum americanum (Spiked Malvastrum)*	Y		
161.	24583	*Manorina flavigula (Yellow-throated Miner)*			
162.	74	*Marsilea drummondii (Common Nardoo)*			
163.	5875	*Melaleuca argentea (Silver Cadjeput, Bandaran)*			
164.	24736	*Melopsittacus undulatus (Budgerigar)*			
165.	24598	*Merops ornatus (Rainbow Bee-eater)*			
166.	4111	*Muelleranthus trifoliolatus*			
167.	17158	*Myoporum montanum (Native Myrtle)*			
168.	25427	*Neobatrachus sutor (Shoemaker Frog)*			
169.	24971	*Nephrurus vertebralis*			
170.	11331	*Nicotiana occidentalis subsp. obliqua*			
171.	11734	*Nicotiana rosulata subsp. rosulata*			
172.	25564	*Nycticorax caledonicus (Rufous Night Heron)*			
173.	24742	*Nymphicus hollandicus (Cockatiel)*			
174.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
175.	24618	*Oreoica gutturalis (Crested Bellbird)*			
176.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
177.	503	*Panicum decompositum (Native Millet, Kaltu-kaltu)*			
178.	48061	*Petrochelidon nigricans (Tree Martin)*			
179.	24659	*Petroica goodenovii (Red-capped Robin)*			
180.	7300	*Plantago drummondii (Sago Weed)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
181.	8167	*Pluchea dentex*			
182.	45238	*Podolepis aristata subsp. affinis*			
183.	45240	*Podolepis aristata subsp. auriculata*			
184.	8176	*Podolepis kendallii*			
185.	24907	*Pogona minor subsp. minor (Dwarf Bearded Dragon)*			
186.	582	*Polypogon monspeliensis (Annual Beardgrass)*	Y		
187.	25706	*Pomatostomus temporalis (Grey-crowned Babbler)*			
188.	6912	*Prostanthera campbellii*			
189.	6926	*Prostanthera wilkieana*			
190.	25263	*Pseudonaja modesta (Ringed Brown Snake)*			
191.	2721	*Ptilotus exaltatus (Tall Mulla Mulla)*			
192.	2727	*Ptilotus gaudichaudii*			
193.	2728	*Ptilotus gomphrenoides*			
194.	2747	*Ptilotus obovatus (Cotton Bush)*			
195.	2754	*Ptilotus roei*			
196.	25009	*Pygopus nigriceps*			
197.	24278	*Pyrrholaemus brunneus (Redthroat)*			
198.	41063	*Quoya loxocarpa*			
199.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
200.	13292	*Rhodanthe forrestii*			
201.	13246	*Rhodanthe humboldtiana*			
202.	13303	*Rhodanthe sterilescens*			
203.	13254	*Rhodanthe stricta*			
204.	45154	*Roebuckiella cheilocarpa var. cheilocarpa*			
205.	14027	*Samolus sp. Millstream (M.I.H. Brooker 2076)*			
206.	7644	*Scaevola spinescens (Currant Bush, Maroon)*			
207.	13285	*Schoenia ayersii*			
208.	13235	*Schoenia macivorii*			
209.	2614	*Sclerolaena forrestiana*			
210.		*Scolopendra morsitans*			
211.	24200	*Scotorepens greyii (Little Broad-nosed Bat)*			
212.	20775	*Senecio conferruminatus*			
213.	18449	*Senna glaucifolia*			
214.	12305	*Senna glutinosa subsp. chatelainiana*			
215.	12307	*Senna glutinosa subsp. glutinosa*			
216.	12309	*Senna glutinosa subsp. pruinosa*			
217.	12308	*Senna glutinosa subsp. x luerssenii*			
218.	613	*Setaria verticillata (Whorled Pigeon Grass)*	Y		
219.	4982	*Sida kingii*			
220.	25266	*Simoselaps bertholdi (Jan's Banded Snake)*			
221.	30948	*Smicrornis brevirostris (Weebill)*			
222.	7018	*Solanum lasiophyllum (Flannel Bush, Mindjulu)*			
223.	3078	*Stenopetalum nutans*			
224.	12355	*Swainsona affinis*			
225.	4220	*Swainsona canescens (Grey Swainsona)*			
226.	13595	*Swainsona elegantoides*			
227.	4230	*Swainsona incei*			
228.	4234	*Swainsona maccullochiana (Ashburton Pea)*			
229.	13581	*Swainsona paradoxa*			
230.	4242	*Swainsona pterostylis*			
231.	30870	*Taeniopygia guttata (Zebra Finch)*			
232.	33318	*Tecticornia indica subsp. leiostachya (Samphire)*			
233.	49017	*Tephrosia gardneri*			
234.	19531	*Tephrosia rosea var. clementii*			
235.	40060	*Tephrosia sp. clay soils (S. van Leeuwen et al. PBS 0273)*			
236.	673	*Themeda triandra*			
237.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
238.	19053	*Trachymene pilbarensis*			
239.	44241	*Trianthema glossostigmum*			
240.	44362	*Trianthema triquetrum*			
241.	4380	*Tribulus occidentalis (Perennial Caltrop)*			
242.	25445	*Uperoleia russelli (Northwest Toadlet)*			
243.		*Urodacus hoplurus*			
244.	30716	*Vachellia farnesiana (Mimosa Bush)*	Y		

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3

Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area

4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

APPENDIX B - EPBC PROTECTED MATTERS SEARCH REPORT

Australian Government

Department of Agriculture, Water and the Environment

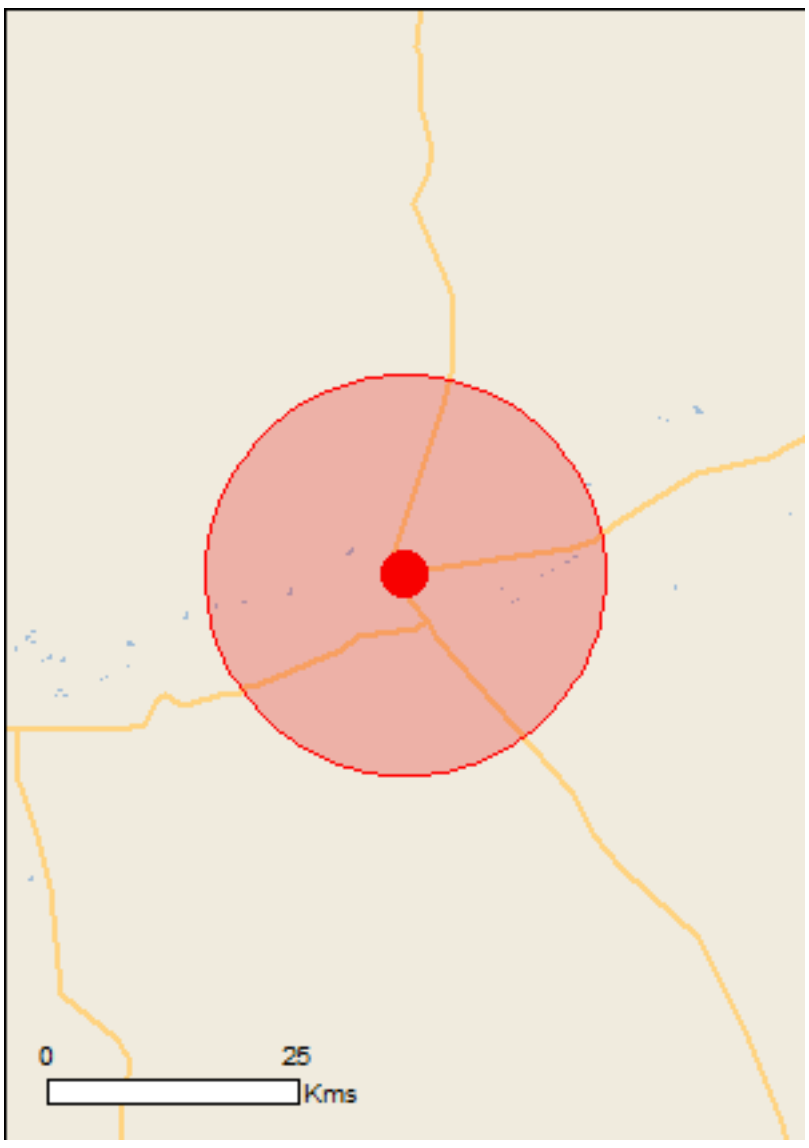
EPBC Act Protected Matters Report

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.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

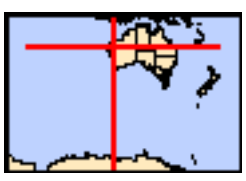
Report created: 14/04/21 18:08:43



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

Coordinates

Buffer: 20.0Km



Summary

Matters of National Environmental 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:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	4
Listed Migratory Species:	7

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 http://www.environment.gov.au/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 Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	11
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	8
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Plants		
Pityrodia augustensis Mt Augustus Foxglove [4962]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Waldburg	WA

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, 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 distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for 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 reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

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

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

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

Coordinates

-25.13667 116.91944

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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APPENDIX C – FLORA SPECIES BY VEGETATION UNIT AND RELEVÉ

Family	Species	Vegetation Unit/Relevé					
		EcAsp FW	AspWS	AspAc WG	AspWS	EcAspFW	
		1	2	3	4	5	6
Amaranthaceae	*Alternanthera nana*						+
	Alternanthera nodiflora					+	
	Ptilotus gomphrenoides						+
Apocynaceae	*Leichardtia australis*		+				
Asteraceae	*Pluchea rubelliflora*						+
Campanulaceae	*Wahlenbergia tumidifructa*						+
Chenopodiaceae	*Atriplex ?bunburyana*				+		+
	Atriplex semilunaris				+		
	Dysphania plantaginella						+
Cleomaceae	*Arivela viscosa*		+	+			
Convolvulaceae	*Duperreya commixta*	+					
	Ipomoea calobra		+				
	Ipomoea muelleri		+				1
Cyperaceae	*Cyperus betchei* subsp. *commiscens*						+
Euphorbiaceae	*Euphorbia* sp.		+				
Fabaceae	*Acacia ?victoriae*		+		+		
	Acacia aptaneura		+	+	+		
	Acacia citrinoviridis	+	+		+	+	+
	Acacia distans					+	+
	Acacia kempeana		+	+			
	Acacia pyrifolia var. *pyrifolia*	+					
	Acacia ramulosa var. *linophylla*		+	+			
	Acacia sclerosperma subsp. *sclerosperma*				+		
	Acacia sp.			+			
	Acacia tetragonophylla	+	+		+		
	Aeschynomene indica					+	
	Senna artemisioides subsp. *helmsii*		+	+			
	Senna glaucifolia		+				
Goodeniaceae	*Scaevola spinescens*				+		
Malvaceae	**Malvastrum americanum*	+					
Marsileaceae	*Marsilea drummondii*		+		+	+	
Myrtaceae	*Eucalyptus camaldulensis* var. *obtusa*	+			+	+	+
	Melaleuca glomerata					+	+
Plantaginaceae	*Stemodia viscosa*						+
Poaceae	*Aristida contorta*		+				
	Aristida holathera var. *holathera*			+			
	**Cenchrus ciliaris*	+				+	+
	Chrysopogon fallax	+	+				
	Enteropogon ramosus		+				
	Eragrostis tenellula						+
	Eriachne flaccida		+				
	Eriachne helmsii			+			
	Eriochloa pseudoacrotricha						+
	Iseilema membranaceum		+				
Proteaceae	*Grevillea striata*				+		
	Hakea lorea subsp. *lorea*	+	+	+			
	Hakea preissii				+		
Scrophulariaceae	*Eremophila ?galeata*		+				
	Eremophila forrestii subsp.? *forrestii*			+			
Solanaceae	*Solanum lasiophyllum*	+					

APPENDIX D – VEGETATION RELEVÉ DATA

Site 1

Date	27 April 2021
Recorder	Mike Brambridge and Peter Smith
Quadrat Size	Relevé
NW Corner Coordinates	491350mE 7221521mN
Vegetation Unit	**AcMgCc –** *Acacia citrinoviridis, Eucalyptus camaldulensis* var. *obtusa* (and *A. distans*) Open Forest over *Melaleuca glomerata* and *Acacia* mixed species Tall Open Shrubland to Low Woodland over **Cenchrus ciliaris* Very Open to Tussock Grassland
Slope	Gentle
Landform	Drainage line
Aspect	West
Soil Colour	Red brown
Soil Type	Loam
Litter	50%
Bare Ground	10%
Fire Age	>10 Years
Vegetation Condition	Good
Disturbances/Impacts	Grazing and weeds

Species	Height (m)	Cover (%)
Acacia citrinoviridis	15	30
Eucalyptus camaldulensis var. *obtusa*	12	5
Acacia tetragonophylla	4	10
Acacia pyrifolia var. *pyrifolia*	4	5
**Cenchrus ciliaris*	1	60
Hakea lorea subsp. *lorea*		5
Chrysopogon fallax		+
Duperreya commixta		+
**Malvastrum americanum*		+
Solanum lasiophyllum		+

Site 2

Date	27 April 2021
Recorder	Mike Brambridge and Peter Smith
Quadrat Size	Relevé
NW Corner Coordinates	491551mE 7221462mN
Vegetation Unit	**AspAspA?b/Ac -** *Acacia citrinoviridis, Eucalyptus camaldulensis* var. *obtusa, A. tetragonophylla* Low Woodland over *Acacia* mixed species and *Grevillea striata* or *Eremophila ?galeata* Tall Open to Tall Shrubland over *Atriplex ?bunburyana* Shrubland or *Chrysopogon fallax, Aristida contorta* and *Iseilema membranaceum* Open Tussock Grassland
Slope	Gentle
Landform	Floodplain
Aspect	West
Soil Colour	Red brown
Soil Type	Loam
Litter	10%
Bare Ground	35%
Fire Age	>10 Years
Vegetation Condition	Degraded
Disturbances/Impacts	Grazing and weeds

Species	Height (m)	Cover (%)
Acacia citrinoviridis	8	5
Hakea lorea subsp. *lorea*	6	5
Acacia tetragonophylla	4	10
Eremophila ? galeata	3	5
Acacia kempeana	2.5	5
Chrysopogon fallax	1	5
Aristida contorta	0.5	15
Enteropogon ramosus	0.3	5
Iseilema membranaceum	0.3	5
Acacia ? victoriae		+
Acacia aptaneura		+
Acacia ramulosa var. *linophylla*		+
Arivela viscosa		+
Eriachne flaccida		+
Euphorbia sp.		+
Ipomoea calobra		+
Ipomoea muelleri		+
Leichhardtia australis		+
Marsilea drummondii		+
Senna artemisioides subsp. *helmsii*		+
Senna glaucifolia		+

Site 3

Date	28 April 2021
Recorder	Mike Brambridge and Peter Smith
Quadrat Size	Relevé
NW Corner Coordinates	490778mE 7221730mN
Vegetation Unit	**AspAspEh -** *Acacia* sp.., *Hakea lorea* subsp. *lorea* and *A. aptaneura* Low Woodland over *A. ramulosa* var. *linophylla, A. kempeana* and *Senna artemisioides* subsp. *helmsii* Tall Shrubland over *Eremophila forrestii* subsp. *?forrestii* Open Shrubland over *Eriachne helmsii* and *Aristida holathera* var. *holathera* Open Tussock Grassland with *Arivela viscosa* Very Open Herbland
Slope	Gentle
Landform	Sandplain
Aspect	Southwest
Soil Colour	Red brown
Soil Type	Sand
Litter	5%
Bare Ground	75%
Fire Age	>10 Years
Vegetation Condition	Good
Disturbances/Impacts	Grazing

Species	Height (m)	Cover (%)
Acacia sp.	6	10
Hakea lorea subsp. *lorea*	6	5
Acacia aptaneura	5	5
Acacia ramulosa var. *linophylla*	3	5
Acacia kempeana	2	5
Senna artemisioides subsp. *helmsii*	2	5
Eremophila forrestii subsp.? *forrestii*	1.5	6
Arivela viscosa	0.75	5
Eriachne helmsii	0.5	20
Aristida holathera var. *holathera*	0.3	5

Site 4

Date	28 April 2021
Recorder	Mike Brambridge and Peter Smith
Quadrat Size	Relevé
NW Corner Coordinates	492366mE 7217822mE
Vegetation Unit	**AspAspA?b/Ac -** *Acacia citrinoviridis, Eucalyptus camaldulensis* var. *obtusa, A. tetragonophylla* Low Woodland over *Acacia* mixed species and *Grevillea striata* or *Eremophila ?galeata* Tall Open to Tall Shrubland over *Atriplex ?bunburyana* Shrubland or *Chrysopogon fallax, Aristida contorta* and *Iseilema membranaceum* Open Tussock Grassland
Slope	Flat
Landform	Floodplain
Aspect	West
Soil Colour	Red brown
Soil Type	Loam
Litter	20%
Bare Ground	75%
Fire Age	>10 Years
Vegetation Condition	Degraded
Disturbances/Impacts	Grazing, all annual flora species dead

Species	Height (m)	Cover (%)
Eucalyptus camaldulensis var. *obtusa*	8	5
Acacia aptaneura	6	5
Acacia citrinoviridis	6	5
Acacia ?victoriae	4	15
Grevillea striata	4	5
Acacia sclerosperma subsp. *sclerosperma*	3	5
Acacia tetrangonophylla	3	5
Scaevola spinescens	1.5	5-10
Atriplex ?bunburyana	1.5	5
Atriplex semilunaris	0.3	1
Marsilea drummondii	0.1	1
Hakea preissii		+

Site 5

Date	29 April 2021
Recorder	Mike Brambridge and Peter Smith
Quadrat Size	Relevé
NW Corner Coordinates	492314mE 7217963mN
Vegetation Unit	**AcMgCc –** *Acacia citrinoviridis, Eucalyptus camaldulensis* var. *obtusa* (and *A. distans*) Open Forest over *Melaleuca glomerata* and *Acacia* mixed species Tall Open Shrubland to Low Woodland over **Cenchrus ciliaris* Very Open to Tussock Grassland
Slope	Gentle
Landform	Drainageline
Aspect	West
Soil Colour	Red brown
Soil Type	Loam
Litter	25%
Bare Ground	20%
Fire Age	>10 Years
Vegetation Condition	Degraded-Good
Disturbances/Impacts	Grazing

Species	Height (m)	Cover (%)
Acacia citrinoviridis	15	20
Eucalyptus camaldulensis var. *obtusa*	15	10
Acacia distans	10	10
Melaleuca glomerata	8	5
**Cenchrus ciliaris*	0.5	10
Aeschynomene indica		+
Alternanthera nodiflora		+
Marsilea drummondii		+

Site 6

Date	29 April 2021
Recorder	Mike Brambridge and Peter Smith
Quadrat Size	Relevé
NW Corner Coordinates	492121mE 7218283mN
Vegetation Unit	**AcMgCc –** *Acacia citrinoviridis, Eucalyptus camaldulensis* var. *obtusa* (and *A. distans*) Open Forest over *Melaleuca glomerata* and *Acacia* mixed species Tall Open Shrubland to Low Woodland over **Cenchrus ciliaris* Very Open to Tussock Grassland
Slope	Gentle
Landform	Drainageline
Aspect	West
Soil Colour	Red brown
Soil Type	Loam
Litter	40%
Bare Ground	15%
Fire Age	>10 Years
Vegetation Condition	Degraded-Good
Disturbances/Impacts	Grazing

Species	Height (m)	Cover (%)
Eucalyptus camaldulensis var. *obtusa*	15	20
Acacia citrinoviridis	15	10
Acacia distans	12	20
Melaleuca glomerata	8	5
Atriplex ? bunburyana	0.75	1
Cyperus betchei subsp. *commiscens*		+
Dysphania plantaginella		+
Eragrostis tenellula		+
Eriochloa pseudoacrotricha		+
Pluchea rubelliflora		+
Ptilotus gomphrenoides		+
Stemodia viscosa		+
Wahlenbergia tumidifructa		+
Alternanthera nana		+
**Cenchrus ciliaris*		+
Ipomoea muelleri		+